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ICO-ASCNITECH 2018 offers a collaborative environment to academicians, researchers and practitioners to exchange and share their experiences and research results on all aspects including science and technology, engineering, business, linguistic, education and social science. The conference provide a platform for the intellectuals from various fields and disciplines to debate and discuss the current issues worldwide as well as finding solutions to the problems.This proceedings of ICO-ASCNITECH 2018 consists of **104** manuscripts that has been presented during the conference.It is hoped that this proceedings will be a valuable reading reference in ensuring educators to be more innovative and creative as well as motivating lecturers to be more involved in the world of research and innovations. The organizing committee would like to congratulate the researchers and express our gratitude and appreciation for the contribution towards the completion of the ICO-ASCNITECH proceedings.

THEME:

EMERGING ISSUES IN GLOBAL RESEARCH

TABLE OF CONTENTS

Motivasi Terhadap Penerimaan Proses Secara e-Pembelajaran 14

Mohd Sanusi Deraman

Typo-illustrations: Illustrating Song Through Typographic Expression 24

Agung Zainal Muttakin Raden, Muhammad Iqbal Qeis

Gamification: Its Effectiveness on Learning In Polytechnic Ibrahim Sultan 31

L. Sarawanan , H. Rohana

Technology Enabled Collaborative Classroom: Optimizing Teaching For 21st Century Learning 38

L. Sarawanan , P.Renukha

Pollution Monitoring at Sungai Semantan Tributaries using Geographical Information System (GIS) 45

Norayushafira Che Kamaruddin, Norika Karim, Johan Sohaili

Review Of Understanding Semester One Students to the Serial and Parallel Circuit Load Resistor at Tanjung Piai Community College 60

Hasealah Binti Ishak , Mardiah Binti Morsin

Fabrication and Measurement of Switchable Dielectric Resonator Antenna Array for 5G Applications 68

N.H. Shahadan, M.H. Jamaluddin, M.R. Kamarudin

Evaluation of Mechanical Properties of Sugarcane Fibre Reinforced Composite with Unsaturated Polyester (PE) Resin 75

T.H. Yap, S. Ishak, M. Marzuki, M. Ibrahim, M. H. Idris

A Study on Fired Clay Brick Reinforced with Waste Plastic 82

T.H. Yap, S. Ishak, M. Ibrahim, M. Marzuki , M. H. Idris

The Study of Design and Layout Space at Maternity Ward (O & G), Hospital Raja Permaisuri Bainun Ipoh, Perak 90

Siti Salwana bt Mohd Nawayai

Potential Of Cacao Peels And Bagasse For Particle Board With Isocyanate Adhesive 98

Yuli Yetri, YeniFathatun Najihah, Dwi Puryanti, Rahmi Hidayati

Improving The Four Stage Performance Savonius Wind Turbine With Additional Darrieus Blade 107

Ruzita Sumiati, Hanif and Adriansyah

Liquefaction Preventif by Cement Column Method:A Case Study in Padang City 115

Liliwarti, Satwarnirat , Silvianengsih

Comparative Study of Solar Thermal Application in Australia and Malaysia 123

Hooi Peng Lim, Muhammad bin Mustapha

Development of Gambir Adhesive Mixing Machine with TKKS Fiber Screw System 129

Junaidi, Maimuzar, Adriansyah, Ikhsan, Tuti Angraini

A capability study of distance towards radio frequency identification reading range. 139

Sofian A.S., Saifunnizam A. K. Nik Hakimi N.H.

Mapping Vulnerability Status of an Urban Catchment Using DEM and Vegetation Index 143

Syofyan, E.R., Herdianto, R., Saidi, A., Istijono, B.,Khairat, N. Nulrajabmil

The Multicultural of Minangkabau in Padang, Inodenisa : Semotic Analysis on Padang City Branding 149

Fitri Adona, Sri Nita, Yusnani, Luth Mafrudoh

Power Supply of Landslide Early Warning System with Solar Tracker using Fuzzy Logic Algorithm 165

Suryadi, Adi Chandranata, Yultrisna, Pevi Ramadhani

Materials Handling Systems at Manufacturing Industry 176

N.M. Nurul, R.S. Liza , A.S. Aida

Integrated Pest Management for Educational Institute 181

Nor Hazlin Md Gharip, Farzana Abdul Samad, Zuriati Abdul Majid

Fabrication Of Floor Tiles From Recycled HDPE Bottle Filled Recycled Glass Composite Using Hot Press Method **189**

Nurlina A.R, Zuzilah H.H

Tahap Kesediaan Menggunakan MOOC Dalam Pengajaran dan Pembelajaran di Politeknik Ibrahim Sultan **201**

Z. Norfarahi, A.H Adilah, A. Ummul , M.K Hajaratul

The Impact of Physical Distribution Service Quality and Brand Image on Customer Satisfaction **209**

Sandriana Marina, Raden Didiet Rachmat Hidayat, Mochamad Syahrizal, Olfebri, Rohana Sitanggang

Halal Cold Chain Warehouse National Standard Operating Procedure Review for Halal Logistics in Indonesia **218**

Aisyah Rahmawati, Raden Didiet Rachmat Hidayat, Lira Agusinta, Aswanti Setyawati, Hasanuddin Yasni, Norzaidi Mohd Daud

Performance of the 25kw Stirling Engine - Parabolic Dish under Malaysia Environment by Using Simulation Method **226**

Rosnani Affandi, Zamali Omar, Mohd Ruddin Ab Ghani, Chin Kim Gan

Level of Safety and Health Awareness of the Workers House in Construction Sites at Merlimau, Melaka **233**

Zamali Omar, Rosnani Affandi

Kesan Isipadu Martensit Terhadap Sifat Kekuatan Dan Pengerasan Kerja Bagi Keluli SNC415 **240**

Norhazlina Amon, Siti Ruziati Tomin, Suhaila Mohd.Sharif

Lap Shear Properties of Steel/FRP Double Strap Joint **251**

N. A. Jamaluddin, A. A. Dani , S. Abu Hassan

Penyelidikan Dan Pembangunan Paramount Seat Bagi Pesakit Strok Melalui Aplikasi Model Shingley's **258**

Nur Farahaizan Idris, Wan Majdah Ton Mamat

Reka Bentuk dan Pembangunan Sistem Pemantauan Akuakultur Berasaskan Kepada 'Internet of Things' (IOT) **265**

Z. Ismail , H.A.M. Adam

Study of Risk Assessment Rating on Ergonomic Hazards Among Staff of Politeknik Metro Tasek Gelugor **271**

Noreriyawaty Mat Rani, Afiq Fahim Md Yusof

Compact X Ray Film Developer **285**

S.B Mustapa, A.S Muhamad, M.S Abdul Latib

A Review of Single Bubble Dynamics during Pool Boiling of Nanofluid **291**

S.N. Deraman, M.Z.A. Rehim, M.R.M. Nawi

The Effect of Pack Carburizing on Different Shape of Mild Steel **297**

M.J. Nor Shaufina , M. M Soffi

Aplikasi Pembelajaran Berpusatkan Pelajar Bagi Subjek Kekuatan Bahan Dalam Pelaksanaan Amali Terhadap Kekuatan dan Keliatan Kayu Bakau **307**

Irinah Abdullah, Liana Fairuz Zakaria

Effect of Relative Density to Liquefiable Sand Reinforced by Palm Fiber **315**

Yelvi, Handi Sudardja, Eko Wiyono

The Fractured Failures on Nozzle Neck Pressure Safety Valve: A Case Study at Water Tube Boiler **323**

Norlini Husshin, Nur Aziah Hamzah C.M.Nizam

Cutting Tool Wear Assessment Using Novel Z – Statistical Rotation Analysis **330**

N. A. Kasim, M. G. Mohamed, M. Rizal, M. Z. Nuawi, J. A. Ghani

Characterisation of dry sliding behaviour of Cast Al-Si-Mg **337**

Maheran Sulaiman, Mazyan Yahaya, Seri Nian Akmad, Mariyam Jameelah Ghazali

Failure Analysis on Leaf Spring for Light Truck **342**

M.F. Abdullah, M.S. Ahmad, S. Sahidin@Salehudin

Flood Risk Mapping Using GIS (Case Study : Kuantan, Malaysia) **350**

R. Zainal, N.Karim, H. Hashim

Keberkesanan Penggunaan Brainy Board Dalam Proses Pengajaran dan Pembelajaran di Kolej Komuniti Selandar, Melaka **355**

Nor Hidayah Ahmad Mustafa, Nurhidayati Mad Noh, Nur Azlin Azhari

Innovative Travel Iron using ADXL335 and PIR sensor **360**

N.M Rizuan ,Z. Faizah, M.N Nor'Ashikin

Staling of Gluten Free Bread: Correlation Between Instrumental Analysis and Sensory Perception **366**

A. Azwin, A.B. Nurhamimah

Personal Internet Use: The Use of Personal Mobile Device at the Classroom **373**

H. Hashim, Z. Othman

Identification of Main Factors in Safety Health and Environment (SHE) In the Construction of Toll Road Projects **380**

Fajar Susilowati, Iwan Supriyadi

Keberkesanan Penglibatan Aktiviti Kokurikulum Terhadap Pembangunan Sahsiah Pelajar Kolej Komuniti Segamat 2 Melalui Pendekatan Model Kirkpatrick **387**

Hasimahwati Binti Abu Yamin

A Microcontroller Based Line Tracing Mobile Robot With A Single Sensor Input And PWM Control Scheme **399**

I. *Ariffuddin, A. Juliyanna*

An Investigation of Heat Treatment Effect on Tool Life Performance in Friction Drilling **408**

M.A. Mohammad Sayuti, M.K. Kusaini, M.A. Mohd Daud

Fabrication Y-shaped Fracture Plates of Ti40Nb Alloy by Powder Metallurgy Route **418**

Mazyan Yahaya, Nurul Azna Idayu Ab Aziz, Seri Nian Akmad , Nur Zarina Mohd Zin, Maheran Sulaiman, Muhammad Hussain Ismail

Kid's Alert - Portable Tracking system using Bluetooth Sensor With Sound Notification **424**

Rosuzaini Isa, Syed Syazwan , Syed Arif

Keberkesanan Electrical Wiring Kit Sebagai Alat Bahan Bantu Mengajar (ABBM) Bagi Kursus Asas Pendawaian Elektrik **430**

Shaiful Hanif Mat Din ,' Nor Hanida Ahmad

Faktor Yang Mendorong Pelajar Menipu Semasa Peperiksaan: Satu Tinjauan di Politeknik Seberang Perai **437**

Nor Hanida Ahmad , Shaiful Hanif Mat Din

Faktor Dan Halangan Dikalangan Pensyarah Jabatan Kejuruteraan Mekanikal, Politeknik Port Dickson Untuk Mengikuti Program Sangkutan Industri Pensyarah (SIP) **444**

Che Azlina Che Norohoseni, Normawar Ali

Keberkesanan Pelaksanaan Lawatan Teknikal Bagi Program KPI Pensyarah Pelawat Industri Terhadap Kejuruteraan Mekatronik Politeknik Nilai **453**

H. Rosliza , M.S. Shuharzi, Z.R.N. Sarah Narimah Noorazyze

Keberkesanan Kaedah Peer Group Dalam Proses Pengajaran Dan Pembelajaran Untuk Kursus Engineering Mechanics Bagi Pelajar Jabatan Kejuruteraan Mekanikal Politeknik Port Dickson **464**

Siti Meriam Ibrahim , Nor Hafidzah Mohd Husni

Strategi Pembelajaran Koperatif Bagi Kursus DBM3013-Matematik Kejuruteraan 3: Satu Kajian Tindakan **474**

Noorazlina Abd.Karim

Tinjauan Isu dan Cabaran Dalam Perlaksanaan Program Work Based Learning (WBL) Sarjana Muda Politeknik Malaysia **481**

Aziyati Ibrahim, Muhammad Nafi' Rezani Tahrir, Mohd Syahrizad Elias

Automatic Switching Earth Leakage Circuit Breaker Using GSM Controlled by PIC Microcontroller **488**

K. Kamarudin, M.N Rizuan, M.N Nor'Ashikin

Tahap Kompetensi Keusahawanan Dalam Kalangan Pelajar Politeknik Nilai **495**

Seri Nian Akmad , Zaiton Yusok, Mohd Ghafran Mohamed

4Ps Marketing Mix and Ariani's Customers Purchase Decision **502**

F.S. Salmi Nordin, N.F. Ismail , M.A. Abd. Wahab

Keberkesanan Program Rehab Dalam Meningkatkan Prestasi Pembelajaran Bagi Kursus Matematik Kejuruteraan Dan Sains Kejuruteraan **510**

Zahril Harun, Syafarizan Nasroddin, Nur Hafezah Md Yasin

Proposed Design and Development of Mobile Learning Environment for Higher Education 4.0 **517**

A.F. Rosmani, A. Abdul Mutalib, S.M. Sarif

Tahap Kefahaman Konsep Pemakaian dan Aurat Pelajar Muslimah di Politeknik Ibrahim Sultan **525**

Hajaratul Adhwa' Ahmad Kuthi, Norhidayah Md Saleh

Kajian Pelaksanaan e-Pembelajaran Melalui CIDOS Dalam Kalangan Pensyarah Jabatan Matematik, Sains dan Komputer di Politeknik Port Dickson **532**

Sharifah Noor Anita Syed Jaafar, Syafarizan Nasroddin

Kualiti dan Pencemaran Air Tasik Rekreasi Taman Bandar Indera Mahkota **540**

Nurul Izza Abdul Ghani , Norika Karim

Integrated Curriculum Through Implementation of CDIO-From The Perspectives of Tourism and Hospitality Study **546**

R.*Mat Radzi, N.S. Sukor, S.S. Samian*

Kajian Terhadap Kecenderungan Pelajar-Pelajar Kursus Keusahawanan Dalam Menjalankan Perniagaan Atas Talian **552**

Nor Fa'alina Abu Hassan, Nor Radhiah Borhan

Perbezaan Kemahiran Employability Dimiliki Pelajar Dengan Kehendak Majikan **561**

Mohamad Rasidi Pairan, Nur Hazirah Noh@Seth, Nurul Aini Mohd Ahyan, Mohd Rustam Mohd Rameli, Hanifah Jambari, Najua Syuhada Ahmad Alhassora, Mohamad Farid Sies, Muhammad Nasir Nasru

Breaking Through The Hidden Reasons Why Demang Abdul Ghani Gallery Is Not Popular Among Tourist And Local People **567**

Zuraida Yaacob, Nur 'Adilla Mat Nipah, Nur Qamariah Abdul Hakim, Siti Nuraisya Mohd Salleh

Persepsi Pelajar Terhadap Program Diploma Perkhidmatan Bangunan **574**

Haryati Ismail, Aryuziyanti Mohamad, Abdul Muthalib Abdul Rahman

Sejauh manakah Keberkesanan Pengaruh Pendekatan Pensyarah Terhadap Sikap Dan Gaya Pembelajaran Pelajar Di PSAS Dalam Matematik Kejuruteraan Dua **580**

Noormala Abdullah

Analysis of Integration of Information of Bus System and Urban Rail Transit Services at TBS Station(Terminal Bersepadu Selatan) **587**

Aminah Mohd Salin, Prof. Dr.Hj. Mohd Idrus Mohd Masirin, Mohd Syafiq Abd Rashid, Noor Hafiza Nordin

The Role of Intenet of Things (IoT) in Enhancing People with Disabilities Livelihood : A Review **597**

M. Mohamed Hashim

Exploring Waqf Risk Management: The Case of Wakaf Daarut Tauhiid **603**

D.N. Devani, H. Ihsan

E-Learning for CAD using SCORM Based Modules **610**

Rabindra s/o Gandhi Thangarajoo, Mohd Noralimi Mohd Ali

Rangka Kerja Metodologi Program Diploma Seni Digital (DDS) Melalui Lima Indikator Pembelajaran Abad ke-21: Satu Kajian **617**

M. Nurulaini Idaya, B. Norzaida

Faktor Yang Mempengaruhi Tingkah Laku Pelajar Akibat Penggunaan Media Sosial Tidak Terkawal : Pelajar Politeknik Nilai **627**

Seri Nian Akmad, Norfazila Ahmad, Nurzarina Mohd Zin

Exploratory Study on Performance Measurement Practice at Waqf Institution **633**

J.A Defiva, Eliyanora, Hidayatul Ihsan

Penerimaan Pelajar Dalam Penggunaan Garis Panduan Proses Perkembangan Idea Di Dalam Rekabentuk Kreatif **641**

S. Basar, N. Johari

Path Planning Algorithm for A Car-Like Robot Based on Cell Decomposition Method. **649**

O. Nurhanum, J.M.Yazid

Effect of Thermal Conductivity Towards Squeezed MHD Insulating Nanofluid in Traction Transformer Over A Porous Surface **658**

Deenesh Kumar Nalathambi, Khalid Hasnan, Kandasamy Ramasamy, Mohd Noh Dalimin

The Implementation of Android Phone in Blood Pressure Measurement for IOT Applications **665**

B. Mustapha, A.K.M. Akhir , N.R.A. Mutalib, J. Omar

Perceptions of Politeknik Ibrahim Sultan Students Towards Collaborative Learning in English Classroom **672**

A.E Muhammad Alhafiz

Creative Engagement Dalam Pengajaran dan Pembelajaran Melalui Penggunaan Galeri Aspirasi Kreatif di Politeknik Ibrahim Sultan **678**

M.A Ismalyza

DC-DC Buck Converter for Photovoltaic Application **684**

Kamarudin Kamit, M. F. Husny Yusof and M. Azali Zainal Abidin

Loss factor and tensile properties of green composites **691**

R.B. Yusoff , H.Takagi and A.N. Nakagaito

Improvement of System Acquisition Scheme for Fast Scanning in Heterogeneous Network **696**

F.Adlan, M.Ismail, N.Zainal, S.Bohanudin

Peranan Industri Dan Institusi Pengajian Tinggi (IPT) Dalam Meningkatkan Mutu Kurikulum Pelajar Aliran Teknikal **702**

M.A Nurul, R. Rafiuddin dan Z. Norfarahi

Tribological Study Of Textured And Untextured Taper Die in Cold Extrusion Process **707**

M.A. Nurul and S. Syahrullail

Keberkesanan Festival Layang-Layang Sedunia Kali ke-21 Sebagai Pengukuhan Domain Pembelajaran Bagi Program Pengurusan Acara di Politeknik Ibrahim Sultan **715**

M.C. Nyi Imas , M. Nurulizati

To Study the Effect of the Cooling Media Process on Fatigue Surface Patterns **722**

Muda Ibrahim, Mohd Norazizul Fadli

PG Easy Map Sebagai Inovasi Baru Peta Pelancongan di Pasir Gudang **743**

S. Zaiton, W. M. Rosnani and N. Nadzlin

Festival Layang-Layang Sedunia : Faktor Motivasi Penglibatan Pelajar Jabatan Pelancongan & Hospitaliti Sebagai Sukarelawan **752**

Sarman. Z, Kassim N. A. and Zulkifli N. H.

Appraisal on Different Road Stabilization Techniques for Different Road Condition **760**

H. Halina, Masirin, M.I.M

Keberkesanan Proses Pengajaran dan Pembelajaran Selepas Penggunaan Buku Termodinamik **766**

Che Azlina binti Che Norohoseni , Sharifah Enne Suhaini binti Syed Mohd Zahari

Developing an Advertorial Video for Increasing the Sale of Traditional Food Home Industry (A Case Study at Rakik Ayah Home Industry) **777**

Sumira, Nini Wahyuni, Annisa Rahma Fianti

Tensile Strength of Cogon Grass (Imperata Cylindrica) Reinforced Polypropylene **784**

Norlini Husshin, Nur Aziah Hamzah and Dr Nor Fazli Adull Manan

Keberkesanan Penggunaan Borang Penilaian Keberkesanan Latihan Secara Atas Talian Di Unit Latihan Dan Pendidikan Lanjutan, PIS **791**

S. Maisarawani , S. Julaila

Penghasilan Prototaip Inovasi Lemang Roaster **796**

Sariah Binti Ahmad, Safiah Binti Abdul Razak,,Rosedhila Binti Ramli

The Internet of Things Implementation for Remote Controls of Classroom's Electronic Devices Based on Android **805**

Silfia Rifka, Firdaus, Ihsan Lumasa

The Effectiveness Of Four Band Resistor Wheel As Learning Aids For Basic Electric And Electronic (SSK 1033) And Electrical Technology (DET 1013) Courses. **812**

Hasealah Binti Ishak, Mardiah Binti Morsin,

Measuring The Sustainability Of Urban Development For Johor Bahru Using Geographic Information System **818**

Siti Hajar Binti Ismail, Siti Nurhidayah Binti Ramli,and Ayati Binti Parmen,

Motivasi Pelajar Terhadap Penerimaan Proses Secara e-Pembelajaran

Mohd Sanusi Deraman
Politeknik Kota Bharu
sanusi@pkb.edu.my

Katakunci : *e-Pembelajaran, Motivasi, Penerimaan*

Abstrak: Dalam bidang pendidikan, motivasi merupakan aspek yang perlu diutamakan kerana ianya mempengaruhi sikap di kalangan pelajar. Tahap motivasi yang dialami dikalangan pelajar akan mempengaruhi tahap penerimaan pelajar dalam proses pembelajaran mereka secara atas talian. Walaupun begitu, ciri-ciri aplikasi dan kandungan juga merupakan aspek penting dalam pembinaan hubungan antara motivasi dan penerimaan pelajar terhadap e-Pembelajaran. Oleh sebab itu, kajian motivasi dijalankan dan ianya penting bagi memastikan lonjakan ke-9 Pelan Pembangunan Pendidikan (PengajianTinggi) 2015-2025 yang menekankan bahawa pendidikan dalam talian mesti mencapai tahap global. Sampel dipilih secara rawak kebarangkalian seramai 165 orang berdasarkan kepada jadual Krejie dan Morgan (1970). Secara keseluruhan, instrumen kajian yang dibangunkan mempunyai 28 soalan dan berjaya dijawap semua responden. Analisis data menunjukkan bahawa motivasi (M=2.44, SD=0.791) dan penerimaan (M=3.01, SD =0.690) pelajar terhadap e-Pembelajaran berada pada tahap yang sederhana. Manakala penerimaan pula berada pada tahap yang sederhana. Nilai signifikan (ρ=.000) menunjukkan bahawa terdapat hubungan yang signifikan ($\rho < \alpha$) antara motivasi dan penerimaan pelajar dimana tahap hubungannya berada pada peringkat yang tinggi positif (r =.897).

Pengenalan

Mantan Menteri Pengajian Tinggi, Datuk Seri Mohamed Khaled Nordin berkata, Dasar e-Pembelajaran Negara akan dilaksanakan secara optimum pada tahun 2015 sekali gus mewujudkan sistem pembelajaran lebih terbuka yang dapat di akses secara adil untuk mewujudkan masyarakat berilmu (Utusan Malaysia, 2011). Kerajaan telah mengeluarkan satu kertas kerja “Dasar e-Pembelajaran Negara (Depan) untuk Institusi Pengajian Tinggi” bagi menerangkan dasar-dasar yang ditetapkan. Perancangan ini diperkasakan dalam Pelan Pembangunan Pendidikan Negara (Pengajian Tinggi), PPPN (PT) 2015 – 2025. Terdapat 10 lonjakan teras pembangunan pendidikan negara. Lonjakan ke-9 menyatakan bahawa pendidikan dalam talian mesti sampai ke tahap gobal (Malaysia Education Blueprint, 2013). Perkara ini melibatkan pembelajaran dalam talian yang mana memerlukan inovasi yang aktif bagi memastikan kejayaan PPPN (PT). Penggunaan teknologi digital menjadi satu kemestian dalam pelaksanakan dasar pendidikan negara.

Teknologi digital dan penghantaran data maklumat yang sangat laju kini membuka ruang yang luas di dalam bidang pendidikan (Juraidah Mohd Amin, et al., 2009). Teknologi multimedia meresap ke dalam bidang pendidikan dan pengembangannya berterusan dimangkinkan oleh kecanggihan teknologi maklumat dan komunikasi. Penghantaran maklumat berkomputer untuk pendidikan di

universiti awam telah membawa kepada perubahan kaedah e-Pembelajaran. Teknologi multimedia yang digunakan dalam e-Pembelajaran berkait rapat dengan pengetahuan teknologi maklumat dan komunikasi (Latifah, Ramli, & Ng, 2009).

Motivasi adalah istilah yang digunakan untuk mengambarkan apa yang memberi kepada seseorang dan apa yang memberi arah bagi aktivitinya. Abraham Maslow (1943;1970) mengemukakan bahawa pada dasarnya semua manusia memiliki permasalahan. Ia menunjukkan dalam 5 tingkat yang berbentuk piramid, orang memulai dorongan dari aras bawah. Lima peringkat masalah itu dikenali dengan sebutan Hirarki Permasalahan Maslow, ia dimulai dari masalah biologis sampai motif psikologis yang lebih kompleks; yang hanya akan penting setelah permasalahan dasar dipenuhi. Permasalahan pada suatu peringkat paling tidak harus terpenuhi sebagian sebelum kebutuhan pada peringkat berikutnya menjadi penentu tindakan yang penting.Dalam bidang pendidikan, masalah motivasi sering menjadi topik yang penting. Hal ini disebabkan motivasi dianggap sebagai faktor yang sangat dominon dalam menentukan pencapaian akademik pelajar. Kemampuan intelektual yang tinggi menjadi sia-sia jika pelajar berkenaan tidak mempunyai berkeinginan untuk mendapat kejayaan akademik. Di sini motivasi memain peranan penting bagi menggalakkan pelajar berusaha lebih dalam pembelajaran mereka. Nissim, et al., (2016) menakrifkan motivasi sebagai sejauh mana individu mengenalpasti matlamat penting bagi mereka, mendapatkan sumber-sumber dan menghadapi kesukaran untuk mencapai matlamat.

Selain motivasi, tahap penerimaan sistem pengurusan pembelajaran juga mempengaruhi e-Pembelajaran. Nanayakkara & Whiddett (2011) menyatakan bahawa hasil kajiannya menunjukkan faktor sistem dan sikap individu pengguna mempengaruhi penerimaan dan penyerapan penggunaan teknologi e-Pembelajaran. Persepsi individu dan budaya fakulti memainkan peranan yang penting bagi penentuan samada tutor itu menerima atau menolak sistem e-Pembelajaran.

Fong-Ling Fu, Hung-Gi Chou, & Sheng-Chin Yu (2007) membuat kajian tentang hubungan interaksi aktif penerimaan e-Pembelajaran di kalangan pelajar yang sukarela melibatkan diri dalam kajiannya. Pelajar ini terdiri daripada kalangan yang pernah mengikuti kursus dalam talian sekurang-kurangnya sekali. Jumlah sampel adalah 451 unit. Ianya terdiri 39% kursus perniagaan, 23.9% kursus sains sosial dan selebihnya lain-lain kursus. Kebanyakan responden bukan pengguna internet yang baru dan 72.5% menyatakan mereka mempunyai pengalaman dalam talian selama tiga tahun. Kajian ini menggunakan perkembangan Technology Acceptance Model (TAM) untuk menjelaskan motivasi, sikap dan penerimaan e-Pembelajaran oleh pelajar. Faktor-faktor yang menentukan kualiti sesawang adalah seperti peranan yang dimainkan oleh sistem tersebut, reka bentuk antaramuka dan isi kandungan. Kesemua faktor-faktor ini menentukan penerimaan pelajar terhadap e-Pembelajaran.

Objektif

Objektif kajian yang dijalankan adalah untuk:

i. Menentukan tahap motivasi pelajar menggunakan e-Pembelajaran.

ii. Menentukan tahap penerimaan terhadap penggunaan e-Pembelajaran.

iii. Menentukan tahap hubungan korelasi antara motivasi dan penerimaan terhadap sistem pengurusan pembelajaran.

Persoalan Kajian

Kajian ini mempunyai persoalan seperti berikut:

i. Apakah tahap motivasi pelajar politeknik menggunakan e-Pembelajaran.

ii. Apakah tahap penerimaan pelajar politeknik terhadap penggunaan e-Pembelajaran.

iii. Apakah tahap hubungan korelasi antara motivasi dan penerimaan pelajar terhadap sistem pengurusan pembelajaran.

Penyataan masalah

Politeknik Malaysia termasuk Politeknik Kota Bharu melaksanakan e-Pembelajaran yang menggunakan sistem pengurusan pembelajaran yang dinamakan *Corriculum Information Document Online System (CIDOS).* Penggunaan sistem e-Pembelajaran ini memberi cabaran kepada semua pensyarah terutama pensyarah yang lebih berusia. Penerimaan pensyarah menggunakan CIDOS dalam pelaksanaan e-Pembelajaran mempengaruhi motivasi seterusnya tahap penerimaan pelajar juga terjejas. Berdasarkan pengalaman sendiri, pelajar kurang motivasi dimana mereka kurang bermotivasi menggunakan CIDOS.

Sorotan kajian

Ruiz, Mintzer, & Leipzig (2012) telah membuat kajian di Universiti Miami. Mereka menyatakan bahawa keberkesanan e-Pembelajaran telah ditemui dalam kajian pendidikan pengajian tinggi, kerajaan, korporat dan persekitaran tentera. Tetapi e-Pembelajaran tidak berkesan dalam aspek reka bentuk bidang perubatan di mana pereka bentuk gagal untuk menentukan kualiti kandungan, ciri-ciri teknologi dan analisis. Menurut Wirtky et al. (2013), ciri-ciri perisian memain peranan penting dalam proses peningkatan motivasi. Masalah motivasi dalam e-Pembelajaran boleh diatasi dengan menggunakan pendekatan teknik pembelajaran dalam talian yang dikenali sebagai gamifikasi. (Blagov, Simeonova, & Bogolyubov, 2013). Motivasi adalah proses internal yang mengaktifkan dan mengekalkan keterlibatan berulangan perilaku pengguna dari semasa ke semasa. Ada banyak jenis dan tujuan motivasi, bagaimanapun motivasi untuk belajar berperanan penting dalam meningkatkan percapaian akademik (Hamari, Koivisto, & Sarsa, 2014).

Dalam proses pembelajaran motivasi merupakan salah satu aspek dinamik yang penting. Pengguna sering kurang berprestasi bukan disebabkan kemampuan rendah tetapi tidak adanya motivasi untuk belajar mungkin disebabkan kaedah pembelajaran yang sama atau kandungan

pembelajaran yang menjemukan. Satu elemen baru harus diterapkan supaya pengguna mendapat penyampaian dalam pembelajaran mereka. Ohno, Yamasaki, & Tokiwa (2013) ada menyatakan bahawa guru perlu melakukan pembaharuan kaedah penyampaian dalam kelas dari semasa ke semasa. Sekarang sistem gamifikasi merupakan kaedah terbaru dalam sistem pembelajaran. Perlaksanaannya boleh dilakukan dalam sistem pengurusan pembelajaran bagaimanapun tahap kebelehgunaan masih lagi dalam kajian.

Zuraini & Abdull Sukor (2012) menyatakan bahawa bagi mencapai hasrat, strategi pengajaran dan pembelajaran yang dirancang hendaklah menggunakan pendekatan yang berfokuskan pelajar dengan menggunakan kepelbagaian teknik dan sumber pembelajaran untuk menghasilkan keberkesanannya. Salah satu pendekatan yang mengamalkan pembelajaran dalam talian ialah pembelajaran konstruktivisme.

Skop kajian

Kajian ini dilaksanakan terhadap penggunaan CIDOS dalam pengajaran dan pembelajaran di Politeknik Kota Bharu. Populasi yang dipilih merupakan pelajar politeknik yang berada dalam arus perdana dan mempunyai kehadiran kuliah melebihi 80%. Data yang diperolehi tidak mewakili dapatan politeknik lain di Malaysia.

Metodologi kajian

Kajian ini dijalankan menggunakan kaedah kuantitatif dan data dianalisis secara deskriptif dan inferens. Instrumen ini dibina berdasarkan instrumen kajian yang dibangunkan oleh Khairul Azhar (2014). Instrumen kajian mempunyai tiga bahagian iaitu A (demografi), B (Motivasi) dan C (Penerimaan). Secara keseluruhan instrumen ini mengandungi 28 soalan yang dibina menggunakan skala *Likert*.

Pelaksanaan kajian ini dimulakan dengan mengenal pasti masalah kajian, membina objektif kajian dan soalan-soalan kajian serta mengenal pasti dan membentuk instrumen kajian bagi tujuan mengutip data. Untuk menjayakan kajian ini, pengkaji akan mengikut prosedur-prosedur seperti yang ditetapkan.

Semasa pentadbiran instrumen, penyelidik mengumpulkan semua responden di dalam sebuah bilik dan mereka diminta bersedia untuk menjawab soal selidik berkenaan. Sebelum mereka mula menjawab soal selidik, penerangan telah diberikan kepada mereka tentang tujuan soal selidik ini dijalankan ke atas mereka dan memberi jaminan akan berkaitan kerahsiaan kesemua maklumat yang mereka berikan dan kesemua maklumat ini hanya akan digunakan bagi tujuan kajian inisahaja. Responden diberikan masa antara 30 hingga 60 minit untuk menjawab soal selidik berkenaan. Responden tidak dibenarkan berbincang semasa menjawab soal selidik berkenaan

Pelajar Politeknik Kota Bharu dipilih menjadi responden. Seramai 165 orang dipilih menjadi sampel berdasarkan kepada jadual Krejcie & Morgan (1970). Permilihan sampel ini menggunakan kaedah pensampelan kebarangkalian mudah dimana pelajar dalam populasi mempunyai peluang

yang sama untuk dipilih. Tahap motivasi dan penerimaan ditentukan menggunakan selang skala min sepertimana dalam jadual 1 (Khairul Azhar, 2014).

Jadual 1 : Pembahagian Tahap Min

Selang Skala Min	Tahap
1.00 – 2.33	Rendah
2.34 – 3.67	Sederhana
3.68 – 5.00	Tinggi

Ujian korelasi digunakan untuk mendapatkan hubungan motivasi dan penerimaan pelajar. Ujian korelasi Pearson sesuai digunakan kerana pembolehubah yang digunakan akan menghasilkan data interval (van der Spoel et al., 2015). Pengkali korelasi akan dibandingkan dengan jadual pekali korelasi yang dicadangkan oleh *Guilford* pada tahun 1956 (Fauziah, Mohamad, Chong, & Manaf, 2012) sepertimana dalam jadual 2.

Menurut Bahaman Abu Samah (2012), ujian korelasi Pearson sesuai digunakan untuk data yang mempunyai taburan normal. Ujian ini dilakukan bertujuan mendapatkan pertunjuk kekuatan hubungan korelasi. Jika hubungan negatif, nilai yang diperolehi berada dalam lingkungan antara -1 hingga 0. Jika hubungan positif, nilai yang diperolehi mesti berada dalam lingkungan antara 0 hingga +1. Julat Pearson (r_p) adalah $-1 \leq r_s \leq 1$.

Jadual 2 : Interpretasi Mengikut Kelas Pekali Korelasi

r	Hubungan
< .2	Tiada korelasi
0.2 - 0.4	Korelasi lemah
0.4 - 0.7	Korelasi sederhana
0.7 - 0.9	Korelasi tinggi
> .9	Korelasi sangat tinggi

Perbincangan

Maklum balas yang dikumpulkan menggunakan soal selidik bertujuan meninjau motivasi dan penerimaan pelajar terhadap sistem pengurusan pembelajaran. Data yang telah dianalisis dipersembahkan dalam bentuk bilangan responden, peratusan, min (M) dan sisihan piawai (*Standard Deviation*, SD)

Data Demografi

Data demografi responden yang dianalisis merujuk kepada jantina, kaum, kekerapan penggunaan

e-Pembelajaran dalam tempoh seminggu. Terdapat 165 responden yang terlibat daripada pelajar.

Jadual 3 : Pecahan Mengikut Jantina

Jantina	Lelaki	Perempuan
Bilangan	92 (55.7%)	73 (44.3%)

Jadual 4 : Pecahan Mengikut Kaum

Kaum	Melayu	Cina	India	Siam	Lain-lain
Bilangan	142 (86.1%)	15 (9.1%)	5 (3.0%)	3 (1.8%)	0 (0.0%)

Jadual 5 : Kekerapan Penggunaan Seminggu

Kekerapan seminggu	< 5	6 – 10	11 – 15	16 - 20	> 20
Bilangan	54 (32.7%)	82 (49.7%)	29 (17.6%)	0 (0.0%)	0 (0.0%)

Jadual 3 hingga 5 menunjukkan taburan respoden mengikut pecahan jantina, kaum dan kekerapan penggunaan CIDOS dalam tempoh seminggu. Pelajar lelaki mewakili 55.7% daripada keseluruhan pelajar. Mengikut pecahan kaum, pelajar kaum Melayu merupakan kaum majoriti, kemudian diikuti dengan kaum Cina, India dan Siam dengan nilai 86.7%, 9.1%, 3.0% dan 1.8% masing-masing. Nilai peratusan kaum ini dipengaruhi oleh faktor geografi negeri Kelantan. Manakala penggunaan CIDOS, tahap penggunaan 6 hingga 10 kali seminggu menjadi majoriti di kalangan pelajar iaitu 49/7%. Penggunaan kurang 5 kali seminggu menduduki tahap kedua dan 11 hingga 15 kali seminggu berada tahap ketiga dengan nilai 32.7% dan 17.6% masing-masing. Tidak ada seorang pelajarpun yang menggunakan CIDOS melebihi 16 kali seminggu. Data ini menunjukkan kekerapan pelajar menggunakan CIDOS pada tahap memuaskan sahaja.

Motivasi dan Penerimaan

Dapatan kajian menunjukkan bahawa motivasi (*M*=2.44, *SD*=0.791) pelajar terhadap e-Pembelajaran berada pada tahap yang sederhana. Keputusan kajian ini tidak menepati dapatan kajian oleh Mohd Nor dan Mohammad Hanafiah (2014) yang menyatakan bahawa motivasi pelajar berada pada tahap yang sangat baik (M=4.44). Beliau juga berpendapat bahawa aspek-aspek

seperti pengetahuan, sikap, motivasi, kesedaran, minat dan lain-lain lagi mempengaruhi kesediaan pelajar menggunakan e-Pembelajaran.

Dapatan kajian penerimaan pula mendapati bahawa penerimaan juga berada pada tahap yang sederhana (*M*=3.010, *SD*=.690). Dapatan kajian ini menghampiri dapatan kajian Rubiah & Jamilah Ahmad (2009) di mana beliau mendapati bahawa tahap penerimaan dan aplikasi e-Pembelajaran di universiti awam sebagai alat pembelajaran berada pada tahap yang tinggi. Banyak faktor-faktor yang mempengaruhi penerimaan sistem pengurusan pembelajaran antaranya penggunaan di dalam kelas, kekurangan latihan dan pendedahan, pengaruh rakan sekeliling, minat, sikap. kelajuan internet dan sebagainya.

Dapatan kajian ini sebenarnya telah dijumpai oleh pengkaji terdahulu. Beberapa pengkaji telah membuat kajian tentang penerimaan e-Pembelajaran di kalangan pelajar universiti awam. Di antaranya ialah Nanayakkara & Whiddett (2011). Beliau menjumpai bahawa faktor sistem dan sikap individu pengguna mempengaruhi penerimaan dan penyerapan penggunaan teknologi e-Pembelajaran. Hasil kajian ini juga menyokong kajian yang telah dilakukan oleh Keller , Hrastinski, & Carlsson Scott Schroeder (2012) dimana beliau mendapati tahap kesediaan penerimaan pembelajaran arahan kendiri pelajar berada paras tahap yang sederhana.

Hubungan Korelasi

Jadual 4 : Keputusan ujian *Pearson* hubungan motivasi dan penerimaan

Pembolehubah Kajian	N	Pengkali Korelasi Pearson, r_p	Sig. (2-hujung), ρ
Tahap hubungan motivasi dengan penerimaan sistem pengurusan pembelajaran	165	.897**	.000

Jadual di atas menunjukkan keputusan ujian korelasi, nilai pengkali korelasi Pearson, *r* =.897 dengan signifikannya, ρ=.000. Ini menunjukkan bahawa terdapat hubungan signifikan (ρ < α) antara motivasi dengan penerimaan pada aras keertian, *α=0.01*. Maka dapatlah dirumuskan bahawa terdapat hubungan signifikan yang tinggi antara motivasi dan penerimaan sistem pengurusan pembelajaran. Hubungan ini berlaku secara posiif dimana semakin tinggi motivasi, maka semakin bertambahlah penerimaan pelajar terhadap CIDOS.

Kesimpulan

Hasil kajian menunjukkan bahawa motivasi dan penerimaan berada pada tahap yang sederhana.

Banyak faktor-faktor yang mempengaruhi keadaan ini. Kajian ini juga menunjukkan bahawa motivasi pelajar memberi kesan yang besar terhadap penerimaan. Terkini, sistem pengurusan pembelajaran telah ditambah baik dengan platform unsur-unsur permainan tetapi tidak mempunyai kandungan permainan. Ianya dikenali sebagai platform gamifikasi. Penggunaan gamifikasi ini masih baru lagi dalam pendidikan di Malaysia. Masih banyak lagi penerokaan yang mesti dilakukan tentang penggunaan gamifikasi ini dalam proses pengajaran dan pembelajaran berasaskan sistem pengurusan pembelajaran. Kaedah e-Pembelajaran ini sebenarnya telah diterima oleh kebanyakan pelajar. Mereka berpendapat bahawa kaedah ini memudahkan proses pengajaran dan pembelajaran di politeknik. Untuk pengkaji masa depan, kajian seumpama ini juga boleh digunakan untuk mengetahui tahap motivasi ke atas sistem pengurusan pembelajaran dalaman bagi pelajar dan pensyarah. Secara tidak langsung suatu perbandingan dapat dibuat untuk mengenalpasti sistem kawalan dalaman yang terbaik yang boleh diterapkan dalam bidang pendidikan. Cadangan terakhir bagi kajian masa hadapan adalah mencari faktor-faktor yang boleh meningkatkan motivasi. Kajian juga boleh dibuat dengan menyentuh isu-isu etika dan integriti pihak pengurusan e-pembelajaran. Selain itu, perkara-perkara berkaitan perilaku atau sikap individu terhadap pengurusan sistem pengurusan pembelajaran juga boleh dimasukkan untuk kajian pada masa hadapan.

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Typo-illustrations: Illustrating Song Through Typographic Expression

Agung Zainal Muttakin Raden, Muhammad Iqbal Qeis

Faculty of Language and Art, Visual Communication Design Program

Universitas Indraprasta PGRI, Jakarta, Indonesia

agung.zainalmr@gmail.com, qeis.m.i@gmail.com

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Abstract. Listening to music is a fun experience. Multimedia development has grown rapidly to the point of enhancing the already fun experience of music listening by using application supporting multimedia technology. However the question still remains on how to further enhance the experience on listening music by engaging with other sensory receptors such as using visual elements to stimulate a visual experience of music listening. Experiment conducted in this research was done to visualize the song lyrics using the approach of typography, semantics, and illustrations. Typography was used to select the typefaces that match the lyrics of the song while semantics provides the understanding behind the meaning of the lyrics and illustrations build the atmosphere in visualizing the lyrics. This research aims to provide a new visual experience and combine interdiciplinary approaches to create a visual project that can conform to the stimulus of music so that it was not only pleasing to be heard but also to be seen visually. The result shows that typography as a visual element can be used to illustrate music so that one can express a more personal semantic meaning about a particular song and give the audience a visualization of how one feels about the song.

Introduction

Typo-illustrations is a combination of typography and illustration. Typography uses typefaces as a visual representation of a verbal communication and has become an effective visual element found throughout the media. Through their functional and aesthetic value, typefaces have an untapped potential to express abstract and implied meaning behind one's design [1]. Illustration is a specialized area of art that uses images, usually representational or expressionist, to make a visual statement. Illustration is artwork created for commercial reproduction, possibly in print form, as animation, as motion graphics for various venues, or for Web delivery [2]. Typography and illustration were used to express the lyrics from the song using experimental approaches. This kind of experimental approaches has been existed since the rise of Dadaism where typography and illustration were used to express and enhance the art of poetry. This movement was known as Visual Poetry which broke the conventions of traditional typography well before modern and postmodern forms of typography emerged [3]. Visual poetry produced a poem formed by typography and illustration. One of the artists who is known to use this method is Guillaume Apollinaire.

At that time, Guillaume Apollinaire asked an expert in letterpress printing to print his poem. Starting with a sketch, the letter was arranged with uneven layouts that force the reader to figure out the meaning and context behind his poem. This way influenced the graphic language of visual communication and some of them had a deep impact on Typography which changed the way people saw type which gave a whole new vision to the subject . This is why we may consider visual poetry as a truly revolutionary step in the context of visual communication [3]. Lyrical typography then was introduced to the world with the advancement of technology and the rise of multimedia communication. According to O'Keeffe, the roots of lyric videos emerged in 1965, with simple handwritten cue cards in Bob Dylan's Subterranean Homesick Blues [4].

Lyrical typography has become a trend from time to time along with the growing market of music industry. It can be an interesting tool to communicate the meaning and context behind the music since the art of typography and illustration can evoke the emotion needed for the people to better understand the music. As multimedia development has grown to the point of enhancing the already fun experience of music listening, the question still remains on how to further enhance the experience on listening music by engaging with othersensory receptors such as using visual elements to stimulate a visual experience of music listening. Gingras, Marin, Puig-Waldmüller, and Fitch stated in their article that the human eyes also listen to music with physiology reaction such as pupillary responses towards music [5]. Thus, this research aims to provide a new visual experience and combine interdiciplinary approaches in creating a visual project that can conform to the stimulus of music so that it was not only pleasing to be heard but also to be seen visually.

Literature Review

Previous research related to typo-illustrations comes from the visualization of poetry texts. In 2001, Menezes did an experiment on poetry text to understand the trends of experimental poetics base on sound poetry today; as it is necessary first to understand in general what sound poetry is, at least by defining what is not contained within it [6, 7]. In his study in 2005, Kong also stated that modern poetry ought not be read just in terms of its sound and rhythm; it needs to be viewed as well in a way similar to movies [8]. Keni then researched how a literature work can be visualized by arranging letter dynamically, employing typography as a form of illustration. He stated that typography is the art and craft of giving language a durable visual form as it has a dual responsibility to document knowledge or data and to create a visual experience [9].

In his work on analyzing the traditional Mandailing song, Dasopang cited Charles W. Kreidler (1998:3) that stated semantics was one of the branches of linguistics that study about the meaning of language and how languages organize and express meanings [10]. The semantics then can be implemented in creating dynamic visual of typographic arrangement as illustrations to give music a visual form. This kind of experiment was done recently by Bhattacharya in his research on lyrical typography. He argued that over the years, lyric videos have transformed from being a mere format for display of lyrics to become a compelling stories, adding a new depth of expression to the overall visual experience through typographic art [4].

Research Methodology

This research particularly employs visual methodology to do experiment in creating a visual project. Rose argued that the method for the production processes of the image itself relies on the method of understanding the compositional interpretation such as the visual effect used, the layout composition, and the visual meaning [7]. Thus, semantic approach was used to create a visual meaning so that the compositional interpretation can better express the visual experience of music. The method used in this research was done through experimental approaches laid out below:

Choosing a song. Students choose their favorite song and analyze the lyrics found within to see the intended meaning and messages communicated through the song.



a b

Fig. 1. The Lyrics (a) Love Don't Hurt (b) Angin Pujaan Hujan.

This research observed two songs found in three case study of student experimentation in doing typo-illustration. In figure 1 we can see two songs written in two different languages. The first one is Love Don't Hurt written in English and the second one is Angin Pujaan Hujan written in Indonesian. Love Don't Hurt is a song by Korean singer Shannon featuring Amber. This song tells about someone who loved a person that has just been broken hearted. Angin Pujaan Hujan is a song by Indonesian group Payung Teduh. This song depicts a longing feeling that ends in sadness. Using semantics approaches, the meaning was then derived from both of the songs.

Choosing typefaces. After the meaning was derived from both of the songs, the next step is choosing which typefaces to be used in order to communicate that meaning. The script family was used because the script family can better express the dynamic mood and feelings found within the song. Generally, script family has a flexible, attractive, creative, and feminine typeface. Script typefaces are designed to imitate handwriting so that when printed the characters appear to be joined up. As with handwriting, some variations are easier to read than others [9].

Drawing a sketch. The next step is drawing a sketch to visualize the song. The sketch was approached with many different angles and layout to find a suitable form that can fully express the meaning found within the song.

Sketching alternatives. The next step is to sketch some alternatives typographic composition. The sketches were done to bring out creativity and as a base to finalize the end result.

Supervision Process. Here, the alternative sketches were supervised and the decisions over which sketch will go to be finalized was made.

The Final Artwork. The last step is finalizing the accepted sketch. The finalized typo-illustrations was done in A4 paper format and was handwritten and arranged manually.

Result and Discussion

The experiment for this paper was done in the span of two weeks where students choose their favorite song, delve within the music and creates sketches of typo-illustrations to be supervised. The first week observed the student listening to the music while mind-mapping their interpretation and semantic expression as a base for sketching the alternatives. This process can be seen in Figure 2.



Fig. 2. Student listening to the music while mind mapping their interpretation and making sketches.

Over the span of the second week, the student then did some supervision of their sketches and revisions were made to be finalized. The second week sees the student finalizing the experiment

on creating the typo-illustration artwork. The result of this experiment can be seen in figure 3, 4, and 5. These three figures show three different compositional interpretations of typographic illustrations. The first one focused on the form of heart. The second one focused on the form of umbrella amidst the rain. The third one focused on the form and layout of the typefaces used by using blank spaces.



Fig. 3. Final Result Love Don't Hurt



Fig. 4. Final Result Angin Pujaan Hujan (a)



Fig. 5. Final Result Angin Pujaan Hujan (b)

Figure 3 shows the typographic illustration for the song Love Don't Hurt. The heart as the focus was made by arranging the words in a dynamic layout so the composition will be seen like the heart is protected by walls of words. This illustration express the emotion of someone wanting to support the person with broken hearted by shielding the heart with words such as "heartbroken don't break" and "I'm gonna love you like you never been loved before". The composition was done so that it illustrates the encouraging words are coming from eight different direction to gather around and slowly fix the broken heart.

Figure 4 shows the typographic illustrations for the song Angin Pujaan Hujan. The composition focused on illustrating the umbrella shielding one's emotion from the rain. Serif typefaces used in the word "angin", "langit", "mimpiku", "rinduku", and "lara" was shown in the umbrella to express the emotive aspect of the song. The umbrella made from those words express the longing feeling which hurts oneself. This composition also expresses how by experiencing a longing feeling, one is living through the difficulties, as is conveyed by the typefaces illustrating the rain.

Figure 5 also shows the typographic illustrations for the song Angin Pujaan Hujan. This figure was different from the composition done in figure 4 as it was focused on the contrast shown by blank spaces and the different composition of typefaces in the form of horizontal versus vertical layout. The two contrasting element of spaces, groupings, and directions formed the longing effect that assert the emotion of one who want to connect but living in a different world. The composition in figure 5 shows that typographic illustration can show an alternative semantic meaning even though the illustration was derived from the same song.

Conclusion

Typographic illustration done through experimental methods can be applied to the song to give a whole new visual experience in expressing the song. The boring formal layout of song lyrics writing and the monotony of the word repetition can be eschewed to achieve an emotional appeal that is more expressive. By narrating the lyrics of the song using typographic illustration, one can express a more personal semantic meaning and give the audience a visualization of how one feels about the song. Layout arrangement and typeface choices will affect the narrative greatly in communicating the semantic meaning derived from the song.

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Gamification: Its Effectiveness on Learning In Polytechnic Ibrahim Sultan

L. Sarawanan1,a and H. Rohana2,b

[1]Polytechnic Ibrahim Sultan, Pasir Gudang, Malaysia

[2]Polytechnic Ibrahim Sultan, Pasir Gudang, Country

[a]sarawanan@pis.edu.my, [b]rohana@pis.edu.my

Keywords: Gamification; 21st Century Learning; Knowledge retention; Motivation.

Abstract: Gamification in e learning now appears as an effective technique for engaging students in learning. It has been said to be an important method for learning to achieve the learning outcomes. Gamification helps create an effective learning system that enables students to learn life scenarios and challenges in a safe environment, but it is also a concept that implements game design thinking to non-game applications. The blended learning approach adopted in Malaysian Polytechnics requires the use of gamification in teaching and learning especially in Technology Enabled Collaborative Classroom (TeCC). This paper examines the use of gamification in TeCC at Polytechnic Ibrahim Sultan. The study was carried out using questionnaires with 222 students using TeCC. The study showed positive findings on student's interest in the learning process, creating better environment for learning process and enhancing students' understanding of the topic. Gamification helps students increase their motivation to learn, and because of the positive feedback in the game, they are pushed forward and become more interested. As the use of gamification is informal, it enhances the full involvement of the students and creates a good and fun learning environment and gives students the opportunity to appreciate what being taught which leads to the preservation of better understanding and knowledge.

Introduction

Gamification has penetrated the world of learning and is seen as an important strategy in education. Although its definitions vary, gamification in learning is the use of game mechanics to maximize content to attract and engage users and students by promoting and rewarding. Recently gamification in generally is defined as the use of game design elements and game mechanics in a non-gaming context with the goal of attracting users in solving problems (Dixon, Khaled & Nacke, 2011; Huotari & Hamari, 2012). In addition, Andrew and Carman (2013) state „Gamification refers to the application of game dynamics, mechanics and frameworks into non-game settings" which means gamutation refers to the application of dynamics, mechanics and game framework into a

non-gaming environment. Wouteer (2015) explains that although gameplay is closely related to excitement, gamification is a serious approach to improving the learning experience.

Teaching without fun is seen as ineffective and boring by many students. While educators are continuously debating and looking for new teaching approaches, most agree that today's teaching has a major problem around student motivation and involvement (Lee & Hammer, 2011). Gamification in the context of education is the process of transforming a familiar component or academic session into a theme or game element. The concept of gamification is to literally create a game environment in learning. The goal is to improve learning with student engagement. Gamification is a process of using something that already exist such as websites, apps or online communities and integrates game mechanics into it to motivate participation, engagement, and rewards. Gamification takes on data-driven techniques used by game designers to engage players, and apply them to non-gaming experiences to motivate action that adds value (Moreno, 2012).

Problem Statement

Presnky (2008), Tapscott (2009) and Sprenger (2010) say that technology has changed the way students learn today. The technology applied to the classroom for the purpose of improving the learning process is referred to as technology enhanced learning (TEL) (Dror, 2008). While teaching and learning today has begun to use technology well, the effectiveness and diversity in student learning environment remains relevant. Technology Enhanced learning is a new learning strategy in the classroom where teaching and learning are using technology to keep the lessons in good shape. Lecturers are constantly striving to try new methods that can attract students to be lively and concentrated in the classroom and not wondering or lost focus. While there are many pedagogical approaches and strategies that provide the foundation for learning that appeal to the learners, learning may not work without elements of the game.

The use of gamification in education is still at an early stage and there is also a lack of evidence to support claims about the positive impact on learning outcomes and research on gamification in education. It is important to examine different opinions on the effectiveness of gamification in this emerging education. (Hanus & Fox, 2015). Dicheva et al. (2015) says that ,while the concept of gamification can seem simple, but analysis shows that effective learning is not easy'. Therefore, the main purpose of this study is to study a better understanding of the use of gamification in student learning by assessing their interests, motivation, user experience and gamification effectiveness on learning achievement. The following question questions are derived from these elements:

a. Can gamification help and attract students in the learning process?
b. Is gamification able to create a better learning environment?
c. Does gamification enhance student learning in a topic?
d. Are students interested in the concept of gamification in learning at polytechnics?

Research Objectives

This study has three main objectives:

a. To examine that gamification can help and attract students in the learning process.

b. To examine that gamification can create better learning environment

c. To examine that gamification can increase student understanding in a topic

Research Importance

The use of gamification in learning process has been regulated and policy of using it is written and distributed to polytechnics in Malaysia. Accordingly, the results of this study are expected to help:

a. Identify the effectiveness of gamification application in learning at Polytechnic Ibrahim Sultan.

b. Identify the suitability of gamification in courses offered at Polytechnic Ibrahim Sultan.

c. On behalf of the management to plan activities that can help and improve the skills and use of gamification among lecturers at Polytechnic Ibrahim Sultan.

d. On behalf of the curriculum division to design and develop a curriculum that incorporates gamification application.

Literature Review

Gamification has the advantage of increasing motivation in learning. Motivation can be defined as the desire and energy to achieve a goal (Awad Mohamed 2012). The main purpose of gamification is to increase engagement and motivate its users through the application of game elements (Jorge 2015). Gamification can help in enriching the learning experience if well implemented where students will recognize and respond (Andrew and Carman 2015).

In higher education gamification is discussed in relation to the involvement of students in the learning process. According to Renaud and Wagoner (2011) and Villagrasa and Duran (2013) gamification provide the opportunity to gain knowledge through the use of game elements are the main drivers for engaging and encouraging students to learn, a view supported by Poole et Al study. (2014) and revision by Hamari et al. (2014).

According to Gabe Zichermann, quoted by (Giang, 2013), the use of game mechanics increases the ability to learn new skills by 40%. The gamification approach leads to a higher level of commitment

and motivation from users with the activities and processes they engage. According to Chik, (2014), a good game involves players not only in playing games, but also in reading and writing about the driving interest. Game-based learning has been used in various levels of learning and has created a great way to increase interest in the classroom. Studies have shown that game design elements in education encourage positive psychology and increased motivation among students (Mc Gonigal, 2011).

The use of games as a means of learning in education is an approach that promotes positive achievement because of the game‘s ability to reinforce not only knowledge but also essential skills such as problem solving, collaboration, and communication. The game has tremendous motivational power, it uses several mechanisms to encourage people to engage with games without any reward, just for fun of play and the possibility to win (Kapp, 2012).

Gameplay provides important benefits in education where it gives students the right to control how the learning takes place while maintaining the level of motivation of students by displaying the goals and targets that they need to achieve (Zoe Stokes 2014). Patrick B. and Elaine D. (2016) and Juho H. et al. (2014) also noted that gamification increase student motivation in learning while, Fuziah et al. (2013) found that video games are an effective teaching material in improving student motivation in learning. In addition, M. Hamizul and Nik Mohd Rahimi (2015) point out that online games are an approach that enhances students‘ ability to master a topic.

Game context has proven to be effective in promoting learning (Annetta, Minogue, Holmes, & Cheng, 2009; Moreno, 2012; Papastergiou, 2009), and more motivated for students than non-game teaching methods (Barab et al., 2005; Batson & Feinberg, 2006; De Freitas, 2006; Papastergiou, 2009). Games in education have proven to be effective in learning „because learning takes place in a meaningful context“ (Van Eck, 2006), which enables applications and practices.

Methodology

The study was carried out with 222 students using TeCC, in Polytechnic Ibrahim. Courses are taught face-to-face at TeCC according to the applicable curriculum. The gamification approach used is the use of web based gamification tools such as kahoot, quizziz, cram, exploitation and socrative. After the presentation of a topic or subtopic the students were asked to engage in a gamification activity using one of the mentioned approaches. The activity sessions are tailored to the topic and take about 4 to 10 minutes of duration or accordingly. After the gamification activity, the achievement score is screened to see the success and level of knowledge and understanding of each students in a topic discussed. Rewards in the form of badges and points for correct problem solving are given. This can showcase the level of understanding, knowledge and skills in mastering the courses taught.Questionnaire was distributed among them to obtain more accurate and correct information. Data obtained from the questionnaire were analyzed quantitatively. In order to determine the respondents‘ perceptions of the questionnaire data, the mean acquisition is categorized based on mean interpretation as in Table 1. The source is adapted from Wiersma (1995).

Table 1. Mean Interpretation

Mean	1.00 – 2.40	2.41 – 3.80	3.81 – 5.00
Interpretation	Low	Medium	High

Research Findings

Interest and Learning. The results of the data analysis showed that the level of interest in the use of gamification among students is high. Average mean score for interest level is 4.5. Good games involve players not only in playing games, but also increasing interest in the classroom. Based on the finding, it is also possible to see the highest mean score obtained from statement that gamification eliminates boredom in learning with mean score 4.52. The exciting and engaging game activity of the course gives students the opportunity to study with more interests than to get bored of learning. Overall, students showed a fairly high interest if gamification was applied into teaching and learning process as well as ensuring that learning outcomes were achieved as expected. Student responses show that gamification makes learning fun, engaging and eliminating boredom.

Learning environment. The results of the data analysis for learning atmosphere is high with average mean of 4.42. The highest mean score obtained is 4.50 from the statement that gamification makes the learning atmosphere in a class active. Analysis on gamification need in a teaching and learning activity in a class for a semester showed a high percentage on item that gamification should be done during every lesson with 35 percent of which 78 students. However, 66 students (30 percent) choose that the gamification session is sufficient for 5-9 times during the course of a semester. This shows that although gamification is well received but the frequency of use in a semester differs among students. Overall, students agree that the use of gamification creates an exciting, challenging, active learning environment and gives students the opportunity to think, collaborate, engage and solve problems. The use of games as a means of learning in education is an approach that promotes positive achievement because of the game‘s ability to reinforce not only knowledge but also essential skills such as problem solving, collaboration, and communication.

Understanding. The level for understanding analysis is at high with an average mean of 4.39. The highest mean score of 4.39 was obtained for statement that gamification improved understanding, achieved learning outcome and improved student evaluation results. Overall, gamification is capable of enhancing students understanding in the course. Gamification guides players to go through the mastery process and keep them engaged in teaching and learning (Koster, Lee & Hammer, 2011).

Conclusion

From the findings of the study, it can be concluded that gamification has a positive impact on the interests, learning environment and students' understanding of the course. Gamification makes teaching and learning more fun and engaging, without degrading its credibility. It helps students increase their motivation to learn, and because of their positive feedback they are encouraged and become more interested and stimulated to learn more. Since the use of gamification in teaching and learning is informal, it increases the full involvement of the students and creates a good and fun learning atmosphere. In the future, instructional material for teaching and learning could be developed based on gamification concepts. Technology plays a vital role in the 21st century education. Incorporating technology and IR4 is a necessity and holds the key for success in future education trends. It will provide opportunities for students to appreciate learning which leads to the preservation of better understanding and knowledge.

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Technology Enabled Collaborative Classroom: Optimizing Teaching For 21st Century Learning

L. Sarawanan1,a and P.Renukha2,b

1Polytechnic Ibrahim Sultan, Pasir Gudang, Malaysia

2Polytechnic Ibrahim Sultan, Pasir Gudang, Malaysia

asarawanan@pis.edu.my, brenukha@pis.edu.my

Keywords: Technology enabled collaborative classroom; Technology; Gamification; Learning space.

Abtract: Educating TVET students for the 21st century has become the country's education agenda. Emphasis on technology and learning space is now intensified in educational institutions to assist in student-centered learning as well as to achieve quality learning outcomes among students. The aim of this study is to identify if technology, learning spaces and gamification plays an important role in students motivation, knowledge retention and attract students in the learning process, improve the students' understanding and create a good learning environment at technology enabled collaborative classroom (TeCC) in Polytechnic Ibrahim Sultan. The respondents were 263 students of various options and department. The design of the study was by quantitative methods. The instrument employed was a five –point Likert scale questionnaires, which focused on technology, learning space and gamification. The findings show that technology and learning space motivates students to learn and retain knowledge and enhances their involvement in learning activities. Gamification approach makes learning fun, engaging and eliminates boredom while creates an exciting, challenging, active learning environment and gives students the opportunity to think, collaborate, engage and solve problems. It improves learners comprehension, achieved learning outcome and improved student evaluation results.

Introduction

Learning needs space to take place; hence, learning space, whether digital or physical, is the most important contemporary infrastructure requirement for learning in the 21st century (Uduku, 2015). Unlike previous centuries that focused on building more learning spaces, the 21st century requires not more physical spaces but increased flexibility of available spaces (Uduku, 2015). Polytechnic Malaysia has begun introducing future learning space as to enrich the delivery of knowledge and skills required for the future. The technology enabled collaborative classroom (TeCC) is a room introduced in every polytechnic to ensure the teaching and learning of TVET is implemented according to the technological and modernization of the 21st century.

Technology and learning play a significant role in education today. According to Mark Osborne, 2013, most modern learning environments developed today promote and support diverse pedagogy including conveying, communicating, creating, communicating and making decisions through a modern and tech-savvy environment. The current learning environment is often centered on an environment that promises active learning and provides access to other learning space with vast variety of approaches just to ensure students are attracted and follow the learning process.

Problem Statement

Presnky (2008), Tapscott (2009) and Sprenger (2010) said that technology has changed the way students learn today. Technology that is applied in the classroom for the purpose of improving the learning process is referred to as technology enhanced learning (TEL) (Dror, 2008). Learning requires space and technology to take effect; Therefore, tech-learning space, whether digital or physical, is the most important contemporary infrastructure requirement for learning in the 21st century (Uduku, 2015).

Teaching and learning at TeCC requires lecturers to think, plan, discuss, evaluate, create and make decisions based on the 21st century learning concept and promote 21st century learning skills. The problem among lecturers is that in terms of their understanding, skills and readiness to provide input and teaching skills needs in the 21st century. Lecturers do diversify 21st century teaching and learning methods that focus on elements of critical thinking skills, collaborative skills, communication skills and creativity. In order to ensure that the approaches and strategies used in TeCC have a positive impact on students and polytechnics, a study in identifying the use of technology and gamification methods in TeCC is implemented to determine the effectiveness of student learning which also seeks to motivate and retain knowledge and gamification.

Research Objectives

This study has two main objectives:

A. To examine whether the use of technology and learning space can motivate and retain student knowledge in TeCC.
B. To examine whether the use of gamification in teaching and learning can attract students in the learning process, improve the students' understanding and create a good learning environment for TeCC.

Research Importance

Emphasis on technology and learning space is now intensified in educational institutions to assist in student-centered learning as well as to achieve quality learning outcomes among students. This study will help the Polytechnic Ibrahim Sultan and the Department of Polytechnic Studies to:

a) Identify the appropriate technology and learning space needed to produce skilled and knowledgeable TVET graduates.
b) Plan Malaysian physical polytechnic facilities as well as appropriate pedagogical methods for 21st century education to be applied in the course curriculum.
c) Identify the suitability of gamification approach in courses offered at Polytechnic Ibrahim Sultan.
d) Planning activities that can help and improve the skills and use of gamification among lecturers.
e) Designing and forming a curriculum that can embed gamification approach.

Litreture Review

Research on how learning space affects student behavior and the outcome has become a matter of interest over the last few decades. Research on learning using technology with learning space in the classroom found to be related to student's behavioral behavior (Cohen et al, 2012). Learning requires space to take effect; therefore, learning space, whether digital or physical, is the most important infrastructure requirement for learning in the 21st Century (Uduku, 2015). Additionally, the 21st century learning room offers students access to technology in learning such as computers and internet connection. Integration of this learning technology does not necessarily require more physical space, but space is more flexible.

Many of the modern learning environments being built today effectively promote and support a range of pedagogies including delivering, applying, creating, communicating and decision-making. Often they are centred around a student 'home base' where a lot of the teaching and learning occurs but these bases also allow access to other learning spaces. Not all classes will need all spaces all of the time, but students should have access to them should the need arise (Osborne, 2013).

In higher education gamification is discussed in relation to the involvement of students in the learning process. According to Renaud and Wagoner (2011) and Villagrasa and Duran (2013) providing the opportunity to gain knowledge through the use of game elements are the main drivers for engaging and encouraging students to learn, a view supported by Poole et Al study (2014). The use of games as a means of learning in education is an approach that promotes positive achievement because of the game's ability to reinforce not only knowledge but also essential skills such as problem solving, collaboration, and communication. The game has tremendous motivational power, it uses several mechanisms to encourage people to engage with games without any reward, just for fun of play and the possibility to win (Kapp, 2012).

Methodology

The study was conducted among students in Polytechnic Ibrahim Sultan who used the TeCC during june 2017 and december 2017 session. A total of two hundred and sixty-three (263) students of all

academic departments were involved. All of these students followed the teaching and learning session at TeCC for different courses with their own respective lecturers for the study session. Questionnaire was distributed among them to obtain more accurate and correct information. Data obtained from the questionnaire were analyzed quantitatively. In order to determine the respondents' perceptions of the questionnaire data, the mean acquisition is categorized based on mean interpretation as in Table 1. The source is adapted from Wiersma (1995).

Table 1. Mean Interpretation

Mean	1.00 – 2.40	2.41 – 3.80	3.81 – 5.00
Interpretation	Low	Medium	High

Research Findings and Discussion

Technology Effect. The result of data analysis for the effect of technology on the motivation and retention of the students' knowledge is at high level. Average mean score is 4.35. Overall, technology has a high impact on the motivation and retention of knowledge among students. Student responses show that technology makes students remember better, motivates them to learn to help maintain knowledge and increase engagement in learning activities. Students agreed that they like to use technology in learning and want to use technology to learn in the future. Mergers of technology in the classroom can be very useful, because „the use of virtual environments for collaborative activities and discussion in learning can result in the flow of ideas and thoughts leading to higher productivity improvements (Chandra, Theng, Lwin, & Foo, 2009). Information technology as a whole is seen to have a positive impact on the motivational aspects (Fook and Sidhu, 2007; Razak, 2013).

Learning Space Effect. The result of data analysis for the effect of learning space on the motivation and retention of knowledge of students is at high level. Average mean score is 4.33. Overall, the learning space affects the motivation and retention of student knowledge. Modern learning space that incorporates elements of technology and comfort does impact students to indulge in learning. The highest mean score is obtained for the statement students like to use TeCC in learning following TeCC helps them to maintain knowledge better and TeCC enhances their involvement in learning activities.

Gamification Effect On Interest And Learning Process. The results of the data analysis showed that the level of interest in the use of gamification on learning process among students is at high level. Average mean score for interest level is 4.5. Overall, students showed a fairly high interest if gamification approach that was applied as well as ensuring that learning outcomes were achieved as expected. Student responses show that gamification makes learning fun, engaging and eliminating

boredom.

Gamification Effect On Learning Environment. The result of the data analysis for the learning atmosphere shows a high level. This can be seen through the mean average of 4.42. Students agree that the use of gamification creates an exciting, challenging, active learning environment and gives students the opportunity to think, collaborate, engage and solve problems. The use of games as a means of learning in education is an approach that promotes positive achievement because of the game's ability to reinforce not only knowledge but also essential skills such as problem solving, collaboration, and communication.

Gamification Effect On Understanding. The analysis results for understanding is at a high level with an average mean of 4.39. The highest mean score is obtained for statements, gamification improved learners comprehension, achieved learning outcome and improved student evaluation results. Overall, gamification is capable of enhancing students understanding of the course. Gamification guides players to go through the mastery process and keep them engaged in learning (Koster, Lee & Hammer, 2011).

Conclusion

This study contributes to the dispute over the importance of the 21st century learning space for 21st century students as it demonstrates its ability to motivate and retain current knowledge of students. Studies show that the use of technology and learning space characterized by the 21st century has a positive effect on students in terms of motivation and retention of knowledge. Motivation is important as it ensures that students are able to follow learning process all the time while comfortable learning space enhances student involvement in learning activities. The findings also show that students are keen to use TeCC and voice out that each class in polytechnics should have technological facilities and a better learning space. Students also feel that 21st century learning space is better than traditional lecture rooms that support: interaction among fellow students, student learning, students interest in pursuing courses and motivations to learn and improve the skills and knowledge required for the future.

On the other end gamification approaches has a positive impact on the interests, learning environment and students' understanding of the course. Gamification makes teaching and learning more fun and engaging, without degrading its credibility. It helps students increase their motivation to learn, and because of their positive feedback they are encouraged and become more interested and stimulated to learn more. Since the use of gamification is informal, it increases the full involvement of the student and creates a good and fun learning atmosphere. It helps students in three aspects, cognitive, emotional and social because gamification enhance motivation and student engagement, increase curiosity and learn from mistakes and provide opportunities for students to appreciate learning which leads to the preservation of better understanding and knowledge.

Lectures in pedagogical practices of the 21st century need to be more creative and innovative in using TeCC. Technology, learning space and gamification does remarkably influence students' cognitive, emotional and psychomotor. It ensures knowledge, skill, critical thinking, problem solving and decision-making ability is formed within its respective boundary in producing a remarkable TVET graduated. In future research should also focuses on collecting data from other polytechnics as it would justify the actual findings of the research. Other factors of learning spaces should be considered beyond TeCC, as it can justify the realistic evaluation of research.

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Pollution Monitoring at Sungai Semantan Tributaries using Geographical Information System (GIS)

Norayushafira Che Kamaruddin1a, Norika Karim2b, Johan Sohaili3c

1, 2Civil Engineering Department, Politeknik Sultan Haji Ahmad Shah, Kuantan,Pahang

3Faculty of Civil Engineering, Universiti Teknologi Malaysia, Skudai, Johor

aayushafira@polisas.edu.my, bnorika5552@gmail.com

Keywords: Sungai Semantan, Water Quality Index (WQI), Georaphic Information System (GIS).

Abstract: Availability of fresh water for human use has become a problem due to climate change scenario. This study aims to assess water quality patterns of pollution concentrations in Sungai Semantan catchment using GIS. This spatial pattern of each parameter was then analysed based on Water Quality Index (WQI) and National Water Quality Standards (NWQS) to determining the locations of major pollutant sources that contribute to water quality depletion in Sungai Semantan catchment. The considerations of sampling were focused on land use data that contributes to high potential impact to water quality. The water sampling was collected from 9 different locations of Bentong region starting from Sungai Bentong and Sungai Kelau to Sungai Semantan in the sunny and rainy seasons from November 2016 to April 2017. The samples collected were then analysed for different physicochemical parameters including pH, TSS, DO, BOD, COD, NH_3-N, turbidity, colour, iron and manganese to determine the spatial distribution of water quality in the study area. Geo-statistical analysis and Geographical Information System (GIS) were used to visualize the spatial pollution characteristics and identifying potential polluted risky regions. From the obtained results of parameters characteristic, it can be concluded that the water in Sungai Semantan is disturbed due to presence of BOD, COD, TSS, turbidity, colour, iron and manganese concentrations. This parameter was exposed to various pollutants and seriously exceeded the standard of Category III refer Malaysia (NWQS). However, based on WQI, most of parameters measured remained in class II ranged from 85.12 to 90.11. In this study, final representation of WQI has been done on the GIS map to show spatial variation of pollution level in the entire Sungai Semantan catchment. It is suggested that monitoring should be carried out continuously for proper management of this river basin to ensure the sustainability of the water supply.

Introduction

The water is one of the important substances on human life. All human, plants and animal need water to survive. If there was no water, there would be no life on earth. Besides from drinking to

survive, human use water for cooking, washing clothes, keeping houses and communities clean and keeping plants alive in gardens and parks. Water is necessary for all living organisms. The quality of water is getting worse as a result of the pollution from industrial, agricultural, domestic, recreation and commercial.

The Sungai Semantan catchment receives water from the industries, domestic and agricultural waste. The river has a significant socio-economic value to nearby region, Selangor. The Pahang Selangor Water Transfer (PSWT) station which is located at Sungai Semantan is collected water from Sungai Bentong and Sungai Kelau that is expected to have a synergistic effect on the water quality of the river. The water from Sungai Semantan is transferred to the nearby region for domestic and commercial use of the city. This study will focus on a contribution of point and non-point sources of pollution using upstream – downstream sampling sites.

Saher *et al*. (2012) studied pollution monitoring along Pahang river basin and concluded that the most effective approaches for water quality protection in a watershed is to identify the source of pollution and to develop an implementation plan to eliminate those critical sources.

Monitoring water quality for all parameters along the river system is difficult and expensive. This study aims to identify water quality on contribution of point sources and non-point sources along the river to predict the patterns of pollution concentrations of Sungai Semantan catchment using GIS. The spatial distribution enables to predict water quality parameter from recognized observed to potential scenario upstream to downstream of the river. Water quality index and sub-indexes were then calculated to determine the locations of major pollutant sources that contribute to water quality depletion in Sungai Semantan catchment.

The scope of work covers the chemical and physical properties of water quality using National Water Quality Standard in Malaysia (NWQS) and Water Quality Index (WQI). Land use data such as forestation, agriculture, residential and industrial at the catchment area were also focused.

Malakootian and Fatehizadeh (2010) observed that the presence of colour in water affects the consumer assurance toward the quality of drinking water. People atheistically do not accept coloured and smelly water. Water with high amount of colour and odour is not suitable for cloth washing, paper industry, beverages production, dairies and other food products, textile industry, as well as plastic production.

According to Mashagbah *et al*. (2012) the Kriging techniques in ArcGis are called the best linear unbiased estimator since it tries to get a mean residual error equal to zero. This method minimizes the variance of the errors and has strong advantage over other estimation methods like inverse distance weighting to estimate pollution in study area.

GIS is a set of computerized tools for collecting, storing, recovering, transforming and displaying spatial data. GIS is essentially between high-tech mapping and data base management system. Hornero *et al.* (2016) used GIS as a platform in the study to identify groundwater for aquifer management, under steady state conditions, at regional (aquifer) and sub-regional (spring catchment) scales. However Davis *et al.* (2009) use of spatial interpolation as procedure to support the prediction of events from known or observed event to possible situations is one of the advantages of GIS.

Sharma *et al.* (2017) mentioned that the Kriging interpolation method is applied to generate thematic water quality variation map and water quality index to see the spatial distribution of water quality in the river Yamuna. The main representative of interpolation method is to estimate the intermediate values from the true values.

Another study by Kadhem (2013) mentioned various physical and chemical parameters, pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), Total Hardness (TH), Total Alkalinity, and cations were analyzed and were compared with the standard guidelines recommended by National Water Quality Standard. Oke *et al*. (2013) also used GIS to produce maps of seasonal variations in 10 different water quality indicators as impacted by land-use types. GIS can efficiently be used for water quality management. Spatially referenced data regarding water pollution can be manipulated, stored and displayed using GIS. Overlaying techniques can be used with digital data layers.

Methodology

Study area and methods

This study was carried out at Sungai Semantan catchment as the main tributaries of Sungai Pahang. Its coordinates are 3°57'0" N and 101°51'0" E. Sungai Bentong is a stream (class H - Hydrographic) in Pahang, Malaysia (Asia) with the region font code of Asia/Pacific. Two major tributaries to Sungai Semantan are Sungai Kelau and Sungai Bentong (Figure 1). The water quality sampling was collected from nine sampling stations in areas with high pollution potential (Table 1). Sampling has been carried out third times during sunny and rainy seasons. Water samples were collected in polyethylene bottles. Sample were analyzed within 30 minute after collection. Temperature, dissolved oxygen (DO) and pH were measured in-situ as field parameters, while BOD_5, COD, TSS, turbidity, NH3-N, iron, and manganese were analyzed in the laboratory. The equipment were calibrated prior to use based on the manufacturer's directions. Water analysis was conducted at Loji Air Mempaga, Bentong Pahang.

Fig. 1. Location of Selected Station in Sungai Semantan Catchments

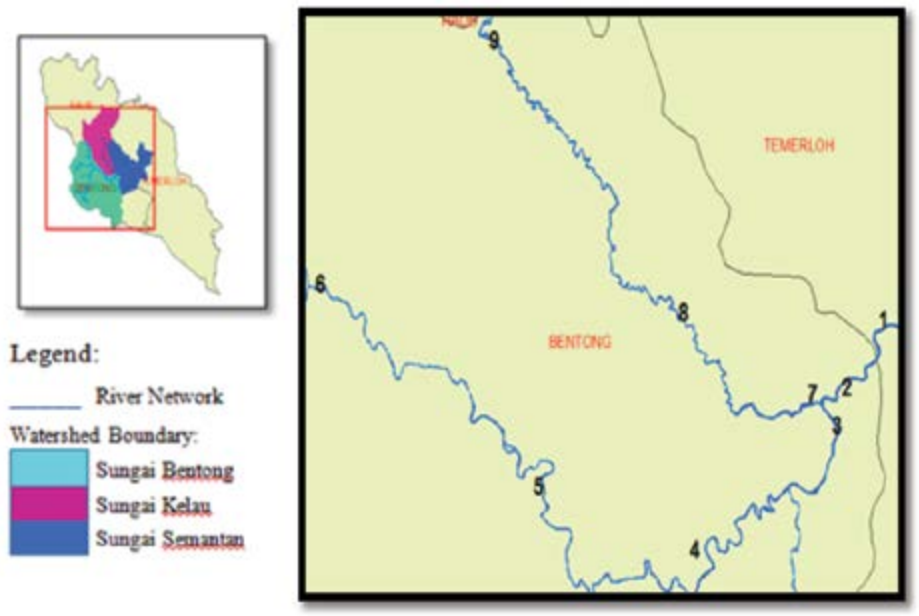

Table 1. The GPS Coordinates of the sampling stations.

Sampling Station	GPS Coordinates		
Station 1	3°29'8.51"	102°5'55.89"	Located 0.57 km before the Water Transfer.(PSWT)
Station 2	3°28'14.61"	102°5'16.39"	Upstream Sungai Semantan which location of fish pond in the area.
Station 3	3°27'43.61"	102°5'6.40"	Downstream of Sungai Bentong which agricultural/ Plantation area.
Station 4	3°26'2.88"	102°2'34.15"	After point of residential area.
Station 5	3°26'53.14"	101°59'46.18"	Residential areas of Bentong
Station 6	3°29'36.31"	101°55'51.79"	Fully developed area in Sungai Bentong which industrial area and commercial activities.
Station 7	3°28'8.76"	102°4'40.12"	Downstream of Sungai Kelau which agricultural activities.
Station 8	3°29'14.27"	102°2'21.89"	Agriculture/ Plantation activities and partially built up area
Station 9	3°32'53.35"	101°58'57.77"	Upstream of Sungai Kelau , after location of Kelau Dam

GIS Integration

The selection of parameters was based on their relation with the possible parameters present in surface water, agricultural runoff and anticipated waste from industrial activity. Land use information in study area was extracted from Landsat 8 OLI data dated 3-05-2017 path 127 row 57. Image downloaded from Earth Explorer website maintained by United States Geological Survey (USGS). The digital image processing using ERDAS Imaging 2014 to produce a land use map of Sungai Semantan as shown in Figure 2. The water quality parameters data have been converted into point data for interpolation to see the effective nature of changing water quality in the Sungai Semantan at different location.

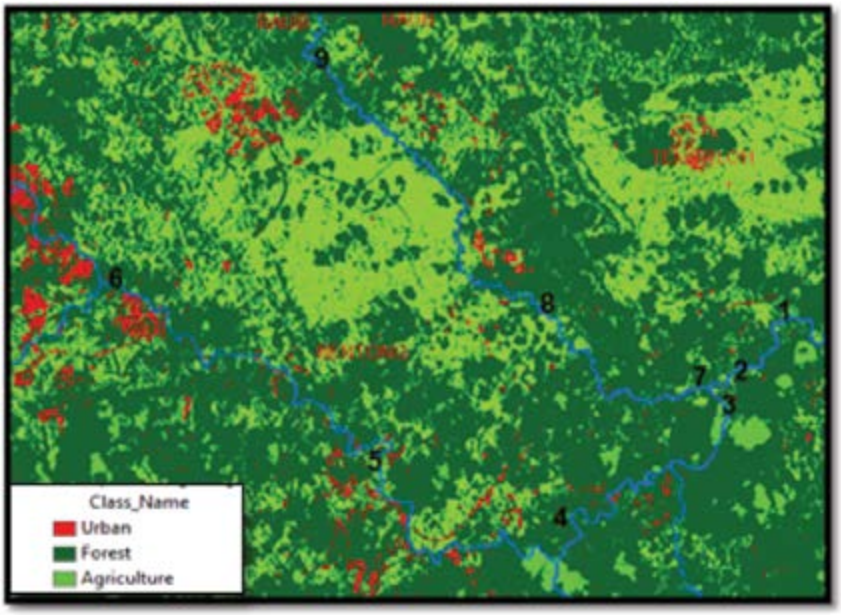

Fig. 2. Land use Map of Study Area

Evaluation of Water Quality Index

Water quality index (WQI) from Department of Environmental (DOE), Malaysia (Table 2) provides a single number to state overall water quality at a certain location and time, based on several water quality parameters. WQI is a useful indicator to measure the suitability of river waters for a variety uses such as agriculture and domestic use. In this study, six parameters (pH, TSS, DO, BOD, COD, AN) were chosen for the calculation of water quality index. The WQI approved by the DOE is calculated based on the six parameters above. Water quality data was used to determine the water quality status; clean, slightly polluted or polluted category, and to classify the rivers in class I, II, III, IV or V based on WQI and National Water Quality Standards for Malaysia (NWQS) every year (Table 3).

Table 2. DOE-WQI calculation formula (DOE,2015)

Subindex DO (SIDO) (in % saturation)	For $x \leq 8$	SIDO = 0
	for $x \geq 92$	SIDO = 100
	for $8 < x < 92$	SIDO = -0.395 + 0.030x2 - 0.00020x3
	for $x \leq 5$	SIBOD = 100.4 - 4.23x
Subindex for BOD	for $x > 5$	SIBOD = 108 * exp(-0.055x) - 0.1x
	for $x \leq 20$	SICOD = -1.33x + 99.1
Subindex for COD	for $x > 20$	SICOD = 103 * exp(-0.0157x) - 0.04x
	for $x \leq 0.3$	SIAN = 100.5 - 105x
Subindex for NH3-N	for $0.3 < x < 4$	SIAN = 94 * exp(-0.573x) - 5 * I x – 2 I
	for $x \geq 4$	SIAN = 0
	for $x \leq 100$	SISS = 97.5 * exp(-0.00676x) + 0.05x
Subindex for SS	for $100 < x <$ 1000	SISS = 71 * exp(-0.0061x) - 0.015x
	for $x \geq 1000$	SISS = 0
	for $x < 5.5$	SIpH = 17.2 - 17.2x + 5.02x2
Subindex for pH	for $5.5 \leq x < 7$	SIpH = -242 + 95.5x - 6.67x2
	for $7 \leq x < 8.75$	SIpH = -181 + 82.4x - 6.05x2
	for $x \geq 8.75$	SIpH = 536 - 77.0x + 2.76x2
WQI = (0.22 * SIDO) + (0.19 * SIBOD) + (0.16 * SICOD) + (0.15 * SIAN) + (0.16 * SISS) + (0.12 * SIpH)		

Table 3. National Water Quality Standards (NWQS) for Malaysia (DOE, 2015)

Parameter	Unit	Classes					
		I	IIA	IIB	III	IV	V
AN	mg/L	0.1	0.3	0.3	0.9	2.7	> 2.7
BOD	mg/L	1	3	3	6	12	>12
COD	mg/L	10	25	25	50	100	>100
DO	mg/L	7	5- 7	5 - 7	3 - 5	< 3	< 1
pH		6.5 – 8.5	6- 9	6-9	5 - 9	5– 9	-
TSS	mg/L	25	50	50	150	300	> 300
Colour	TCU	15	150	150	-	-	-
Turbidity	NTU	5	50	50	-	-	-
Fe	mg/L	Nature	1	1	1	1(leaf)5(other)	>1(leaf)5
Mn	mg/L	Level	0.1	0.1	0.1	0.2	>0.2

Class 1	Conservation of natural environment. Water Supply 1- Practically no treatment necessary.
Class IIA	Fishery 1 – very sensitive aquatic species Water Supply 11 – Conventional treatment required.
Class IIB	Fishery 11- Sensitive aquative species. Recreational use with body contact
Class III	Water Supply III- Extensive treatment required. Fishery II – Common, of economic value and tolerant species: livestock drinking
Class IV	Irrigation
Class V	None of the above

Result and Analysis

Quality of River Water

The highest spatial distribution variation of temperature was recorded at study area between 26.23 °C to 27.27°C. There was a general increasing trend in the temperature from downstream to upstream stations with an exception of station 1 and 2 which recorded high temperature for these two seasons. The highest temperature variation was due to fluctuation in sunlight and air temperature. The temperature value varied with a mean value 26.86 ± 0.31 (sunny) and 26.68 ± 0.04 (rainy).

The lowest DO was recorded at middle station 8 to station 9, while the highest value was at station 6 in the sunny season as in Figure 3(a) and 3(b). In the rainy sampling season, the maximum value was at station 4, while the least value was at station 9. In addition, these results are within the standard acceptable levels of NWQS for Malaysian river, which is more than 5mg/L. Furthermore, the concentration of DO in water body regulates the distribution of flora and fauna. DO concentration along Sungai Semantan among this sunny and rainy season varied between 7.52 to 7.69 mg/L and 7.15 to 7.7 mg/L respectively. The existence of DO is of importance in maintaining aquatic life and the aesthetic quality of water. In contrast to station 1 and station 2 along Sungai Semantan which were in Class II, the DO concentrations for most of the stations were in Class I.

Figure 3(c) and 3(d) shows the variation of pH along the downstream portion of the river. At the intersection of station 3 (Sungai Bentong) and station 7(Sungai Kelau) that enters Sungai Semantan, the pH was 6.26 to 6.36 at this point during rainy season but pH increased between 6.45 to 6.55 during sunny season. The pH values showed different values between the sunny and rainy season. The fall in pH can be due to the production of acid by anaerobic reaction. There was an increase in pH towards Sungai Semantan. This can due to the mixing of the main stream at Sungai Semantan. Lowest pH at Sungai Bentong is acidic at station 5 until 5.11 and increased to 6.76 unit during rainy season as this can be due to production of acid to downstream of industrial zones in Sungai Bentong. At station 6 was upstream of Sungai Bentong, pH was constant from 7.32 during sunny and 7.01 during rainy season.

During sunny season, the BOD and COD concentrations ranged from 2.53 to 5.35 mg/L and 7.42 to 18.63 mg/L, respectively. The lowest BOD and COD concentrations were observed at station 5, whereas the highest concentrations were recorded at stations 8 and 6. In addition, the mean BOD concentration was 3.85±0.43 mg/L whereas the recorded value for COD was 14.22+2.46 mg/L. Referring to figure 3(f) and 3(h) during rainy season, the BOD and COD concentrations ranged from 5.28 mg/L to 7.64 and 13.36 to 35.54 mg/L, respectively. The lowest BOD and COD concentrations were observed at stations 9 to 8, whereas the highest concentrations were recorded at stations 6 to 5. Seasonally, BOD and COD was found high during rainy. At these particular stations, station 6 and station 5 are located at industrial area in Bentong while station 8 is at Kelau dam. From this observation indicated that BOD was in Class III and became to class IV during rainy season while COD was in class II and became to class III contribute to climate factor respectively. This scenario indicated that location upstream and downstream of the station contributes to high values of BOD and COD where downstream users are at risk of upstream pollution.

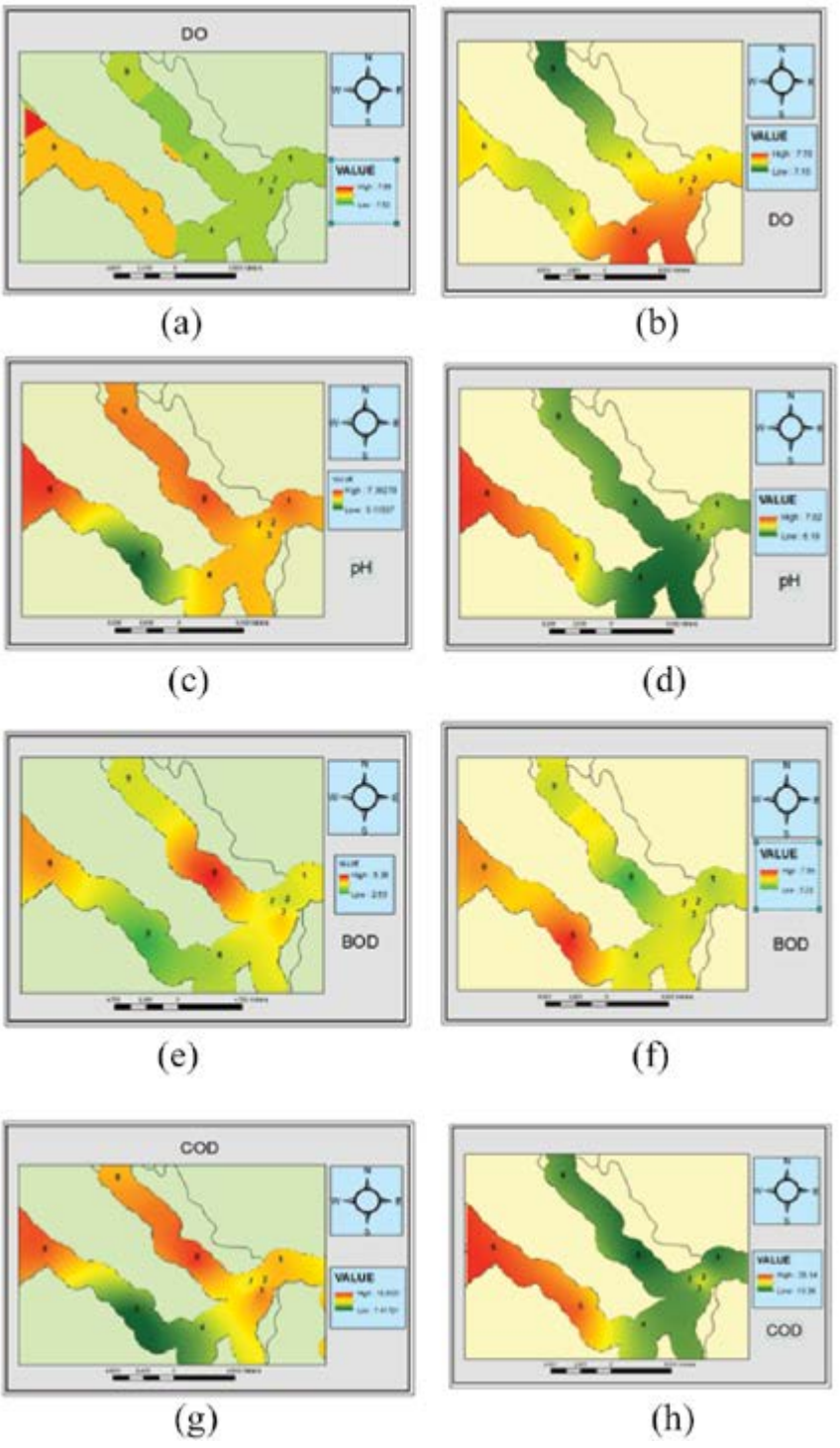

Fig. 3. Spatial distribution of water quality parameter at sampling stations.

a) DO (sunny season) b) DO (rainy season)
c) pH (sunny season)
d) pH (rainy season) e) BOD (sunny season)
f) BOD (rainy season)
g) COD (sunny season) h) COD (rainy season)

Figure 4(a) and 4(b) show the variation of Total Suspended Solid (TSS) in Sungai Semantan. During sunny and rainy, spatial distribution of TSS values ranged from 0.51to 20.06mg/L and 130.15 to 175.46 mg/L respectively. Although there was variability in TSS concentrations, the concentration of TSS increased in going from the upstream stations to the downstream stations. The mean values of TSS in the sunny and rainy season were 19.67 ± 0.51mg/L and 154.24 ± 12.65 mg/L respectively. The highest value obtained was 269 mg/L, recorded at station 3, and the lowest value obtained was 64 mg/L at station 1. With respect to TSS concentration, all stations were classified as Class I according to the NWQS classifications but increased immediately to class IV after rainy season. However, this phenomenon occurred due to the effluent from livestock farms, heavy precipitation, organic contamination and agriculture in which a high suspended matter content detected. Activities at the Kelau dam near station 9 has probably caused the soils of the river bank to become looser and easily eroded. As a result, the TSS concentration was higher at downstream station especially during rainy season.

During sunny and rainy seasons, spatial distribution of Ammoniacal Nitrogen (NH_3-N) values ranged from 0.04 to 0.17 mg/L and 0.09 to 0.22 mg/L respectively. Figure 4(c) and 4(d) shows that NH_3-N values infected station 1 and station 2 and it decreased towards upstream station. The minimum NH_3-N concentration was observed at Station 6 and station 9 in two seasons. From this observation, the NH_3-N concentrations for the all stations were in Class II. For sunny and rainy seasons, the mean concentration recorded during the present study was 0.11 mg/L and 0.15 mg/L respectively. Due to this scenario, ammonia is readily available as a nutrient for plant uptake. There is reduction in concentration of NH_3-N during the course of river towards Sungai Semantan. Ammonia in the environment originates from metabolic, agricultural and industrial processes and from disinfection with chloramine. Station 1 and 2 are located at the fish pond that can contribute to higher levels. Ammonia in water is an indicator of possible bacterial, sewage and animal waste pollution.

The turbidity concentrations ranged from 24.56 to 82.37 NTU and 176.37 to 192.21 NTU, in sunny and rainy season respectively shown in Figure 4(e) and 4(f). The lowest turbidity concentrations were observed at most of the stations during sunny season, but the highest concentrations were recorded within stations 9 to station 8 in rainy season. In addition, the mean turbidity value for sunny concentration was 36.31±1.82 NTU whereas the recorded value for rainy season was 186.79 $\pm$ 6.24 NTU. Turbidity is highest at Sungai Semantan during rainy season (192.21 NTU).

Colour monitoring is important for the analysis of raw water. There are differences in the levels colour of across the seasons as shown in Figure 4(g) and 4(h). The lowest level of colour was observed in the sunny season ranged from 339.56 – 413.62 TCU while the highest level of colour was observed in the rainy season ranged from 579.70 – 1067.10 TCU. For all the survey, the colour was found to be maximum at station 1 (sunny), station 2 and 4 (rainy) season.

Based on figure 4(h), the distribution during the rainy season was found to be more diverse and increased towards downstream. The mean values of colour in the sunny and rainy season were 383.30 ± 22.58 TCU and 832.09 ± 166.28 TCU respectively. Based on the NWQS classifications, all stations sampled were exceeding the limit of class IIA and class IIB.

The concentration of iron varied between 0.58 and 1.5 mg/L and 0.3 – 2.72 mg/L in sunny and rainy season respectively. Higher concentrations of iron were measured at station 2 and station 9

while lower concentration was noticed at station 5 during sunny season. The observed levels of iron concentration in the studied catchment were found to be higher levels observed in the rainy season.

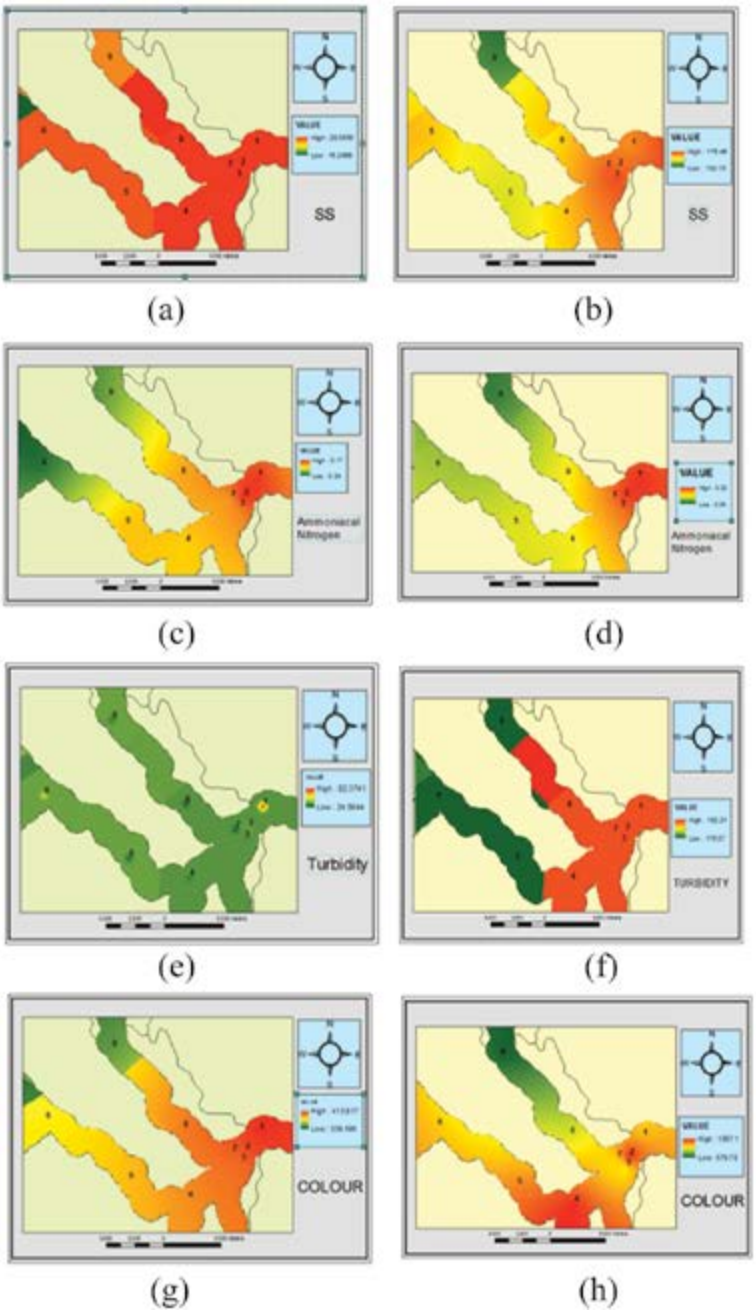

Fig. 4. Spatial distribution of water quality parameter at sampling stations.

a) SS (sunny season) b) SS (rainy season) c) NH3-N (sunny season)

d) NH3-N (rainy season) e) Turbidity (sunny season) f) Turbidity (rainy season)

g) Colour (sunny season) h) Colour (rainy season)

In general, higher concentrations of iron were recorded at the upper and lower parts of the catchment along Sungai Kelau to downstream study area in comparison with the Sungai Bentong. Figure 5(a) and 5(b) plots the variations concentration of Iron in Sungai Semantan Catchment. The mean concentration recorded during the present study was 1.12±0.26 mg/L(sunny) and 1.14 ± 0.66 mg/L (rainy). Based on the NWQS classifications, all stations sampled were classified as class IV except classified as class III only at station 6,5, and 4 which indicate contribute factor is not comes from urban land use. Majoring of the result show higher concentration in rainy season due to run off.

The presence manganese in drinking water can affect the taste, smell or colour in the water. Figure 5(c) and 5(d) show the variation concentration of manganese in surface water in Sungai Bentong varied between 0.42 and 0.81 mg/L in sunny season. Lower and higher concentrations of Mn were measured at station 5 and station 1, respectively. The mean concentration recorded during the present study was 0.6±0.09 mg/L. In general, higher concentrations of Mn were recorded at the downstream and lower parts of Sungai Semantan catchment in comparison with the upper basin stations. Station 1 recorded high concentrations for these parameters. Based on NWQS classifications, the Mn concentrations for most of the stations were in Class IV, with the exception of stations 3, 5 and 9 which were in Class III in rainy season. On the other hand, all stations were in Class V in sunny season. This condition indicates high amount of Mn in river water comes from urban settlements, agricultural emissions and industry and the concentration decrease among the rainy season.

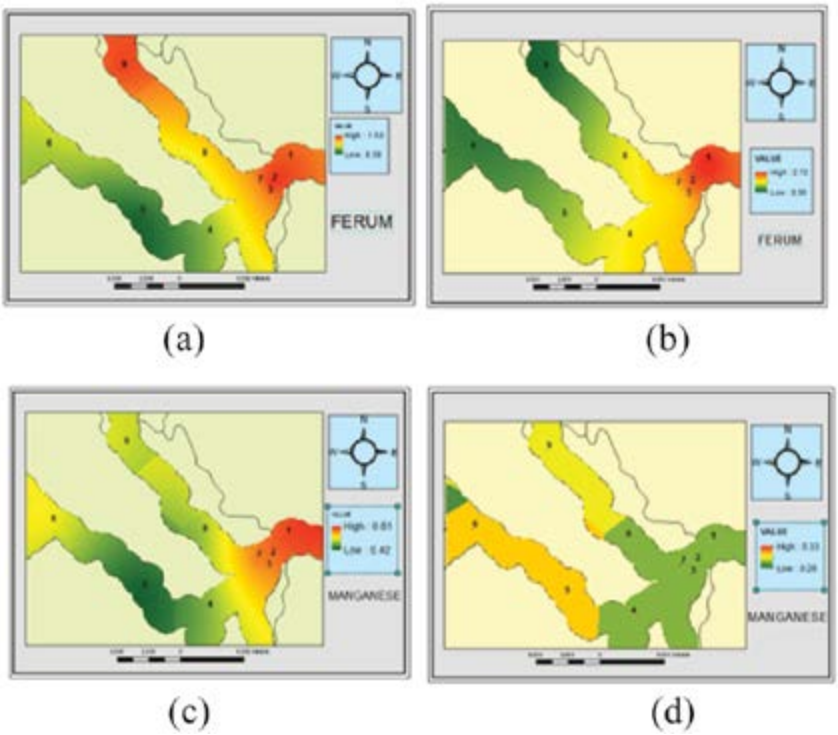

Fig. 5. Spatial distribution of water quality parameter at sampling stations.

a) Iron (sunny season) b) Iron (rainy season)

c) Manganese (sunny season) d) Manganese (rainy season)

Sub-Indexes of Water Quality Parameter

Referring to figure 6, Sub-indexes values of NH_3-N, pH and DO were obtained highest for all sampling station classified as clean. The lowest sub index values were TSS was found at station 1(53), followed by station 3(54) and station 7(55). The sub index of DO, NH_3-N and pH were mostly within the NWQS permissible limits class 1 for quality water of the river in Malaysia. However, BOD, COD and TSS were the parameter that greatly affected water quality in Sungai Semantan catchment. Factor affecting causing higher concentration of BOD, COD and TSS parameter in the river must identify and remedial measure must be taken on a priority basis.

Water Quality Index

Water quality index (WQI) is a standard method of measurement used by the Department of Environment (DOE) to evaluate water quality in Malaysia. The main parameters measured in the Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Dissolved Oxygen (DO) Nitrogen ammonia (NH_3-N), pH and Total Suspended Solid (TSS).The WQI were calculated using the formula in Table 2.

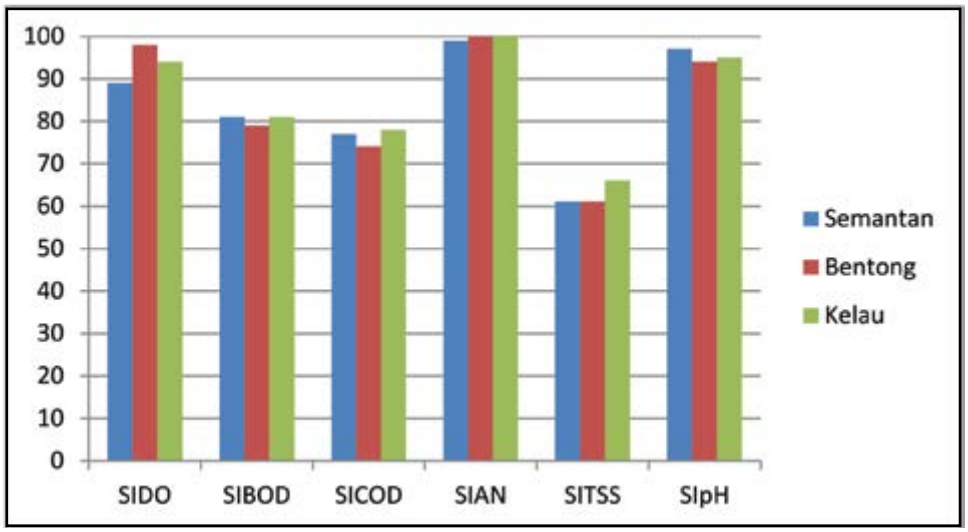

Fig. 6. Sub-indexes of designated location along study area.

Table 4. Water Quality Status and WQI in Sungai Semantan catchment

Water Quality Parameter	Unit	1	2	3	4	5	6	7	8	9
pH	mg/L	6.79	6.6	6.4	6.38	5.94	7.17	6.33	6.73	6.64
DO	mg/L	7.15	6.98	7.54	7.92	7.68	7.74	7.40	7.44	7.36
SS	mg/L	58.17	68.50	143.33	80.17	71.67	109.83	136.17	83.00	41.00
BOD_5	mg/L	4.17	5.50	4.50	4.50	6.00	6.33	5.50	4.17	4.50
COD	mg/L	15.33	19.17	17.17	14.83	20.33	26.33	15.67	16.00	16.33
NH_3-N	mg/L	0.22	0.26	0.15	0.13	0.15	0.09	0.15	0.14	0.08
Overall WQI		88.56	86.54	86.22	88.81	88.50	85.12	86.05	88.65	90.11
Class		II	II	II	II	II	II	II	II	II
Water quality Status		**Clean**								

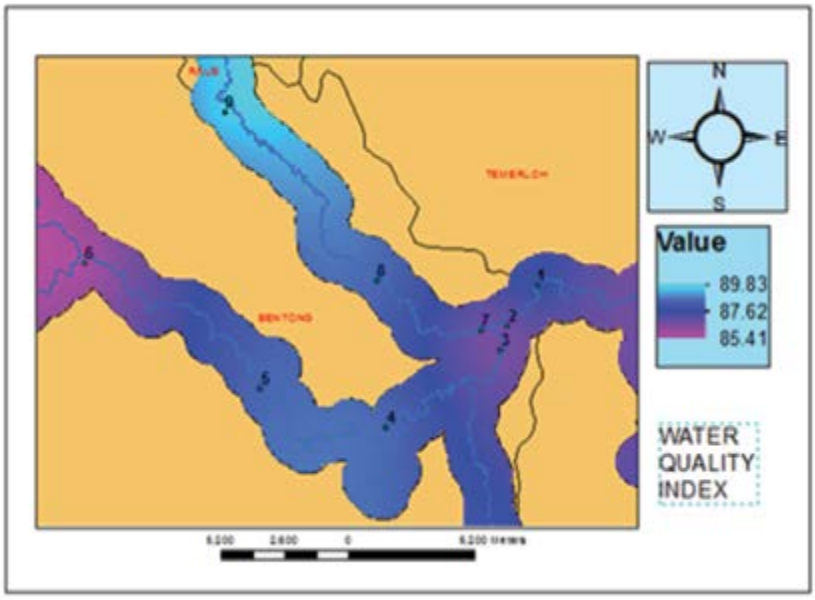

Fig. 7. Spatial variation of pollution level WQI for Sungai Semantan catchment.

The monitoring of DOE-WQI in the Sungai Semantan basin demonstrated that the water quality can be classified as slightly polluted with values ranging from 89.83 to 85.41 (mean 88.13). In contrast, high water quality was recorded at the upstream stations 9 of the basin (Sungai Kelau). Based on the NWQS, most of the parameters measured remained in Class II from the upstream to the downstream stations. Various activities have caused significant changes in the water quality of the basin. Therefore, the river water can be used for water supply with precaution and it is needed for conventional treatment to be used for domestic purposes. Data analysis involves the evaluation of the water demands for all social and economic sectors of the catchment comprising the following

rural and urban settlements, agricultural and livestock consumption. Livestock also come to the river to drink. These activities as mentioned above, have a bearing on the water quality especially during the growing season where there is rainfall. The irrigation requirements become critical of the low flow in the sunny season.

Conclusion

In conclusion, the WQI value integrated with GIS can be directly used to analyse and compare conditions in different stretches of river and to detect its quality by trends. It will be useful for indicating the impairment of water quality with the water quality management practices. The present study revealed that the river water quality in Sungai Semantan is slightly polluted due to land use activities from agricultural areas and industrial area. From the WQI and the obtained results for physical and chemical parameters, it can be concluded that the water in Sungai Semantan is disturbed due to presence of BOD, COD, TSS, colour, iron and manganese concentrations. WQI formula does not take into calculation some very important parameters such as heavy metals and colour concentration. All these parameters give impact of esthetical water in Sungai Semantan.

The GIS maps based on Kriging Interpolation clearly showed the hot spots in relation to the spatial-temporal characteristics of pollutants influx and enabled the estimation of levels of pollutants in all the river systems across the basins beyond the locations where samplings were conducted. The Geographical Information System (GIS) can be used as an effective tool to help the management authorities to assess the level of pollution concentration to make rational decision and objective.

For further study, there are recommend the researcher to do the water quality index to the other catchment area which is nearer to the site to see the pattern of the area.

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Review Of Understanding Semester One Students to the Serial and Parallel Circuit Load Resistor at Tanjung Piai Community College

Hasealah Binti Ishak 1,a, Mardiah Binti Morsin2,b

1KK Tg. Piai, Johor, Malaysia

2Politeknik Ibrahim Sultan, Johor, Malaysia

ahasealah@kktanjungpiai.edu.my, bmardiahmorsin@pis.edu.my

Keywords: Serial and parallel circuit;

Abstract. This paper is for publication in ICO-ASCNITECH 2018. Education is for all, no matter who, when, where and how it is done. Common knows that Community College is an institution that provides quality programs aligned with nation's requirement. Hands-on learning approach is suitable with nowadays skilled work force desired. Technical skills proclaimed as advantage and championing this institution require an effective teaching medium. Teaching and learning process of Computer System Certificate (SSK) is the one and only course being offered at Tanjung Piai Community College. A teaching and learning system must be applied in an overall context. Through this course, students are required to learn technical subject as Basic Electric and Electronic (SSK 1033). As known, this course has its own challenges such as getting students understanding since it involves numbers of formulas to be memorized. When a learning process involves formulas such as current, voltage and resistant in a serial and parallel circuit, focusing on understanding is a challenge itself. Confusion in student understanding is measured to recognize and sort out best method to assist them with it. Via this study, first semester's students comprehension of serial and parallel circuit formula concept is being the study ground. 14 respondents answering the distributed survey questions worked as an study instrument. Data was analyzed using Statistical Packages for Social Sciences (SPSS) version 23.0 in order to obtain mean average. The result shows mean average for both parts of the survey questions is 3.39. This demonstrates students overall understanding is at medium level. Details of this serial and parallel circuit became reference of understanding measurement and student readiness in learning theory and practical in overall context.

Introduction

The importance of learning a calculation method which interlink with formulas is clearly giving a challenge in ensuring effective basic understanding one student can obtain. Passion of someone on something can be portrayed via what it's like or dislike [3]. Electronic circuit is a closed route which is formed and interconnected by electronics components that can be streamed by electrical current. Basically this circuit is divided into two which is serial circuit and parallel circuit. Both circuits involve formulas calculation in order to determine value of voltage, current and resistant. A correct

method of calculation ensuring selected load for resistant will make it function precisely. Each person has their own unique style of learning as similar as individual thumb print [1][2][4].

Problems Statement

Learning from theory and practical is closely related in circuit theory. The first semester students in particular, need to understand the formulas for serial and parallel circuit in order to make lab practical easier. Calculation involved is related to load value of which resistor to be used. The seeking of current, voltage and resistant value will be obtained from accurate formula used. The problem is mostly regarding student confusion of which formula to be used correctly. The differences of serial and parallel circuit required students to understand and determine which circuit is provided. Students also may not know which formula to be used. Based on this problem, the calculation during lab practical became a long process and unnecessary time iswasted. This disturbs duration of lab practical to be completed within given time. The failure of student in mastering the formulas is related to a weak concept understanding from the beginning. Therefore, the students understanding of serial and parallel circuit should be gauged so a designated reference can be created to help students [5][6][7].

Objective of Study

- To identify the interest level of semester one SSK students at Tanjung Piai Community College in understanding serial and parallel circuit of resistor load.
- To identify the readiness level of semester one SSK students at Tanjung Piai Community College in explaining the concept of serial and parallel circuit of resistor load.

Scope of the Study

The study is limit to the syllabus contents of Basic of Electric and Electronic (SSK 1033) at Topic 2: Passive Semi-Conductor Basic Component. The assessment of student understanding and concept of serial and parallel circuit is accustomed only to Network and Computer System Certificate (SSK) course of 14 students in July 2017 session.

Methodology of the Study

This study is based on quantitative study because the data was analyzed using percentage, frequency, standard deviation and mean score analysis. Descriptive study can explain and clarify

certain items or conditions at stipulated time and helps solving certain problems through "cause and effect' approach [8]. Assessment frame is an imperative element in any kind of assessment [9]. Survey questions is used as instrument, where 14 respondent among students of semester one at Tanjung Piai Community College giving their feedbacks. Descriptive research is a research with an objective to explain a phenomenon that happened currently [10]. Research methods applied is a Sample of Descriptive Study. It stated that one of the purposes in preparing assessment design is to find answer towards assessment questions [11]. Thus, research method applied by researchers is with purpose of obtaining information and data for the research. Research data is in quantitative form which assessed students understanding of serial and parallel circuit. Quantitative research is used to find correlation between two variables in a population [12]. This study is a research method which can explain or clarify current situation [13].

Setting the total sample of study is based on total population [14]. Data is analyzed using *Statistic Package for Social Science (SPSS) version 23.0* software. The survey questions form consists of 35 questionnaires which display questions on two parts that are Part A (15 questions) and Part B (20 questions). Items arrangement of Part A and Part B using Likert Scale as below Table 1 and for mean score value, evaluation level Table 2 by [15] become reference in determining mean score value.

Table 1.Likert Scale

Scale	Assessment
1	Highly Not Agree
2	Not Agree
3	Not Sure
4	Agree
5	Highly Agree

Table 2.Guideline to Determine Mean Score Value

Mean Score Variance	Mean Score Value Level
1.00 – 1.49	Very Low
1.50 -2.49	Low
2.50 – 3.49	Moderate
3.50 – 4.49	High
4.50 – 5.00	Very High

Result

Analysis result obtained via survey questions by respondent is discussed in this part. 14 SSK student of semester one has been chosen to go through pioneer study. The objective of pioneer study is to get confirmation and high reliability coefficient. Analysis from data showing a Cronbach's Alpha value is 0.853 with 35 items. This proved that survey questions have high reliability coefficient and can be used in actual study.

A. Part A: Table 4 below is the result of the analysis for the interest of one semester SSK students in Tanjung Piai Community College to understand the circuit series and parallel load resistors.

Table 4. Level of Interest Semester One SSK Student,Tanjung Piai Community College about serial and parallel load resistor circuit

No	Item	Min	Standard Deviation	Quality Level
1	I don't understand the concept of serial and parallel load resistor circuit	3.36	.842	Moderate
2	I have no initiative in memorizing serial and parallel load resistor circuit	3.50	1.019	High
3	I'm not confident to explain about serial and parallel load resistor circuit	2.86	.949	Moderate
4	Serial and parallel load resistor circuit is a boring topic.	2.79	1.051	Moderate
5	My knowledge about the same topic not increase although is has been teach repeatedly.	2.79	1.122	Moderate
6	I can't give a full concentration when lecturer teach about serial and parallel load resistor circuit .	2.57	1.016	Moderate
7	I'm just depending on lecturer note about serial and parallel load resistor circuit topic.	2.64	1.082	Moderate
8	Lecturer give less tutorial on serial and parallel load resistor circuit topic.	2.79	1.188	Moderate
9	I'm not interested on formula and calculation of serial and parallel load resistor circuit topic.	3.43	1.016	Moderate
10	I don't understand the application of serial and parallel load resistor circuit in my mini project and practical work.	3.64	.929	High
11	I'm just memorizing the information regarding to serial and parallel load resistor circuit when practical work session.	3.57	1.016	High
12	I'm just memorizing the formula of serial and parallel load resistor circuit rather than understand the concept.	3.36	.929	High
13	I'm not attempted to solve the serial and parallel load resistor circuit question.	2.86	1.099	Moderate
14	I'll ask my friend to answer the hardest question regarding to serial and parallel load resistor circuit	3.14	.770	Moderate
15	I've minimal understanding about serial and parallel load resistor circuit in Computer and Networking Certificate.	2.86	1.027	Moderate
	Average Min	3.08		

There are three characteristics to raise the students' interest in the subjects, namely the experiential subjects of learning, the problems and goals of the students. These three features can actually be attributed to the aspects of our life [16]. The result shows the value of 3.08 which is the overall understanding of students' interest in understanding the serial and parallel circuit at a moderate level. Student initiatives in understanding the formula available on series and parallel circuit at a high level. However, the students' initiative in understanding is more than memorization. Students also do not understand the links between series circuits and in parallel with the mini projects they will make. Simplicity in student effort to master the series and parallel circuit causes the relationship between subject sustainability as well as moderate. However, the overall level of one student study at the Tanjung Piai Community College is at a good level.

B. Part B: Table 5 shows the level of readiness of one semester SSK students in Tanjung Piai Community College to explain about circuit series and parallel load resistors

Table 5. Level of readiness level of semester one SSK students at Tanjung Piai Community College in explaining the concept of serial and parallel circuit of resistor load

Bil	Item	Min	Standard Deviation	Level of Quality
1	Serial and parallel load resistor is an interesting topic to be understand	3.43	1.284	Moderate
2	Serial and parallel load resistor is my favourite topic	3.71	1.069	High
3	Serial and parallel load resistor formula are easy to understand	4.21	.699	High
4	I'm confuse with the term in serial and parallel load resistor topic	3.79	.975	High
5	Most of the term in Serial and parallel load resistor topic can be memorized	3.64	1.082	High
6	Every serial and parallel load resistor question raised by lecturer and collegeous can be answered easily	3.50	1.160	High
7	I ask my lecturer and collegoues to help me when faced a problem with serial and parallel load resistor topic	3.79	.802	High
8	I like to do a tutorial on serial and parallel load resistor topic.	3.79	1.122	High
9	I will always pass serial and parallel load resistor test.	3.64	1.008	High
10	I understand my lecturer explanation about the serial and parallel load resistor topic	4.21	.699	High
11	I will not give up to understand about serial and parallel load resistor topic.	3.64	1.082	High
12	I will study more before explaining about serial and parallel load resistor topic to my collegeous and lecturer.	3.29	1.139	Moderate
13	I will make a revision at home if not understand about serial and parallel load resistor topic.	3.29	1.326	Moderate
14	I'll ask my lecturer and colleguous if i not understand about serial and parallel load resistor topic	3.50	1.019	High
15	It is fun to know about the function of serial and parallel load resistor topic.	3.50	.855	High
16	Explaining about the function of serial and parallel load resistor is fun and interesting.	3.79	.893	High
17	I can't wait to learn about serial and parallel load resistor topic	3.57	.938	High
18	I will bring revision book when study about serial and parallel load resistor topic	3.79	1.051	High
19	Knowing about serial and parallel load resistor will help me to apply my understanding in mini project and computer troubleshooting.	3.79	1.051	High
20	I can explain well if been ask by my lecturer and colleguoues about serial and parallel load resistor topic	4.07	.997	High
	Average Min	3.70		

In this section the level of readiness of students is at a high level overall although some of the item in moderate level. This shows that although the level of understanding of the students is moderate, the readiness of the students in explaining the concept of serial and parallel circuit is high. The attitude of the student in forming confidence in preparing for conveying a known concept is at a good level. This should be given praise, because through the readiness of the students to communicate the concepts they are aware of, it is easy to communicate and easy to fix if there is an error.

Discussion And Conclusion

Through the results obtained, overall the students are keen to understand the series parallel to the resistance load. However, students still can not fully remember the concepts and formulas. Dependence on lecturer notes is still the solution for the student. According to [17], a responsible and effective student needs to have the ability, skills, learning and good attitude and always keep abreast of current developments in the field of education in order to master the demand for learning curriculum and to have appropriate and effective expertise in the learning session. Through the second part results obtained, the level of readiness of students is at a high level in the responsibility of describing circuit series and parallel load resistors. Student initiatives in the effort to understand the concept of serial circuit and parallel load resistors need to be seen as a positive effort that adds value to the tendency to master this concept. It can be concluded that teaching is a purposeful activity that teachers do and are aware of the teaching [18].

Through this study some suggestions for strengthening the level of understanding and readiness of students in the concept of serial and parallel circuits are revealed. Firstly, the lecturers are still continuing to provide a repeat of the concept of series circuit and parallel load resistors before starting practice.Secondly, a simple table with schematic sketching features for series circuits and parallel load resistors and the involved formula is collected in one card as teaching aid [19]. These cards are placed in the lab and will be released in helping students to facilitate access when practical or incidental to circuit series and parallel load resistors take place.

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Fabrication and Measurement of Switchable Dielectric Resonator Antenna Array for 5G Applications

N.H. Shahadan[1, a], M.H. Jamaluddin[2, b] and M.R. Kamarudin[3, c]

[1]Politeknik Ibrahim Sultan, Pasir Gudang, Johor, Malaysia

[2]Universiti Teknologi Malaysia, Johor, Malaysia

[3]Cranfield University, Shrivenham, United Kingdom

[a]norhidayu@pis.edu.my, [b]haizal@utm.my, [c]Ramlee.Kamarudin@cranfield.ac.uk

Keywords: Dielectric Resonator Antenna; Switchable antenna; Antenna array

Abstract. This paper describes the fabrication and measurement of switchable dielectric resonator antenna array for 5G applications. 5G has a small size of antenna due to its shorter wavelength compared to the previous generation. This small size causes difficulty in obtaining precision in the fabrication process as well as measurement. In this research, the dielectric resonators (DR) are painstakingly aligned on the ground plane slot by using the tracing paper. This simple technique had successfully enhanced the accuracy of the DR position since the misalignment between the DR and the feeding network is minimized. The performance of the reflection coefficient of the fabricated antenna are verified by connecting the port directly to the Vector Network Analyzer (VNA) to minimal the additional losses during the measurement. The results of the reflection coefficient showed that the losses for five various switching angles have been reduced in the range of 2 to 3 dB. Subsequent to this, the switchable dielectric resonator antenna array achieved a maximum gain of 9.25 dBi by using the gain transfer method.

Introduction

5th Generation (5G) has a variety of services and applications to complete the 4G technology and expected to be deployed beyond 2020 [1]. It also draws attention to millimeter-wave bands with a frequency spectrum from 3 – 300 GHz that shrinks the wavelengths from 100 to 1 mm [2]. With shorter wavelengths compared to the previous generation, more antennas can be packed into same area to compensate for the anticipated loss [3].

Nevertheless, the decreasing size of antenna in 5G has a difficulty in obtaining precision in the fabrication process as well as measurement. The conventional method is less suitable for use in 5G technology as it will introduce losses in the measurement process [4, 5]. Therefore, an appropriate of the fabrication methods should be implemented in order to obtain accurate measurement results. Then, the performance of the reflection coefficient of the fabricated antenna can be verified using Vector Network Analyzer (VNA) while the antenna gain can be tested in an anechoic chamber [6].

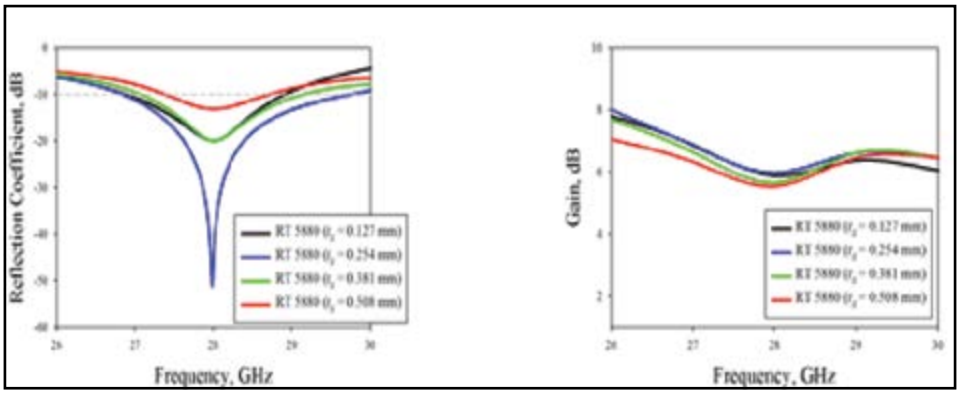
In this paper, the simple fabrication and measurement technique are presented to show a better

performance compared to the conventional techniques.

Substrate Selection

Substrate selection is essential to ensure that the devices can satisfactorily operate at the designated frequency. For this research, substrate selection is based on the dielectric constant, power loss, manufacturability and cost as listed in the data sheets produced by the manufacture [7]. Besides that, RT/Duroid 5880 substrate has a low dielectric constant that extends its usefulness at higher frequency design (8 GHz - 40 GHz) [7]. Other than that, the substrate selection also takes into account achievement of the gain and directivity performance from the previous study. Research in [8] is clearly presented that RT/Duroid 5880 substrate offers highest gain and directivity better than Teflon substrate. Consequently, RT/Duroid 5880 with a dielectric constant () of 2.2 was selected based on its performance and the capabilities in higher frequencies.

Performance of Different RT/Duroid 5880 Thickness. Prior to that, selection of an appropriate substrate thickness () is one of important task in the antenna design. Accordingly, an investigation was done to the single element dielectric resonator antenna with the best feeding technique [9], to identify the effect of varying the RT/Duroid 5880 substrate thickness. In this regard, the performances of the reflection coefficients, gain and directivity at 28 GHz were analyzed by varying the standard thickness, at 0.127 mm, 0.254 mm, 0.381 mm and 0.508 mm as supplied provided by the manufacturers [7]. As the thickness of the substrate decreased, surface wave and spurious feed radiation also decreased [10, 11]. Therefore, the thickness of the substrate should be kept as small as possible. From the Fig. 1, it can be seen that RT/Duroid 5880 substrate with a thickness of = 0.254 mm produced the best performance in the reflection coefficient, gain and directivity at 28 GHz.



(a) (b)

Fig. 1. Simulated (a) reflection coefficients and (b) gain for different thickness of substrate

Antenna Fabrication Process

There are several processes involved for the proposed antenna to be built as a prototype. The

design is printed on the transparency film and placed onto the board for laminating process before being exposed to the ultraviolet (UV) light. Then, the substrate board is submerged into a developer solution until the shape of a feeding structure can be seen. Next, the board is etched using chemical photoresist stripper to eliminate the unwanted copper from the plated board. Fig. 2 shows the fabrication process and the equipment used.

Meanwhile, the glue with thickness about 0.05 mm is used to attach the DR to the ground plane. In this regard, the surface of the ground plane must be properly cleaned to prevent any air gap formation between the DR and the ground plane. In this process, the DRs were painstakingly aligned on the ground plane slot by using the tracing paper as depicted in Fig. 3. This enhances the accuracy of the DR position since the misalignment between the DR and the feeding network is minimized.

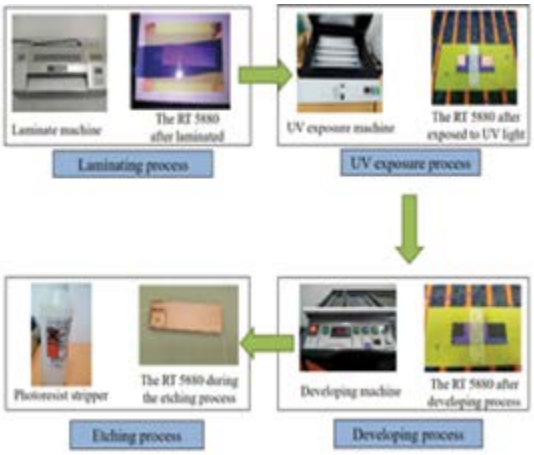


Fig. 2. The antenna fabrication process

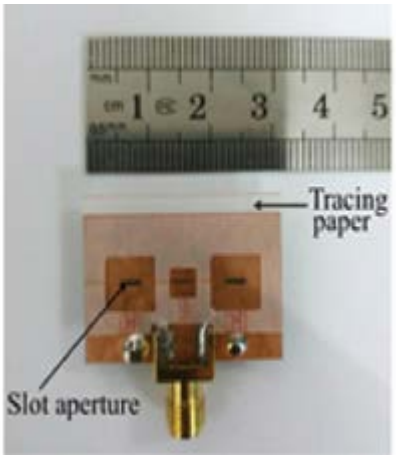


Fig. 3. The process to attach the DR

Antenna Testing and Measurement Process

Several parameters need to be observed during verification process of the proposed antenna design. In this research, the most important results to be acquired are reflection coefficient, radiation patterns and gain. Therefore, the performance of the fabricated antenna design is indispensable to be measured, so that the comparison with the simulation result can be observed to ensure the performance of the antenna is as required.

Reflection Coefficient Measurement. Fig. 4 shows the Rohde&Schwarz ZVB20 VNA that uses frequency range from 10 MHz to 20 GHz in obtaining the resulted reflection coefficient. The reflection coefficient is measured by connecting the proposed antenna to one of the provided ports in the VNA. There is a calibration process required prior to the measurement. The calibration is conducted on one port calibration which is an open, short and load. In this light, the port is connected directly to the VNA to minimal the additional losses during the measurement. Since the measurement of radiation pattern and the antenna gain are also important instead of the , thus, the following section explains these measurements of the fabricated antenna.

Radiation Pattern and Gain Measurement. In this research, the radiation pattern and gain

of the fabricated antenna is measured in an Anechoic Chamber at Electromagnetic Compatibility (EMC) Lab of Universiti Tun Hussein Onn Malaysia (UTHM). The interior surface of the chamber is covered with the radiation absorbent material to prevent reflection of the electromagnetic waves. The measurement steps started with setting up the calibration that measures radiation pattern and gain of the antenna. For calibration purpose, two identical horn antennas are used. One of the horn antenna acts as the transmitter and another horn antenna referred as reference antenna that acts as the receiver. The reference antenna is then replaced with the proposed antenna as shown in Fig. 5. The radiation pattern is automatically measured by rotating turning table at two planes which are *E* and *H*-plane at desired frequencies. Antenna in the horizontal condition is measured in getting the *E*-plane radiation pattern. Likewise, the vertical configured antenna is then tested for *H*-plane.

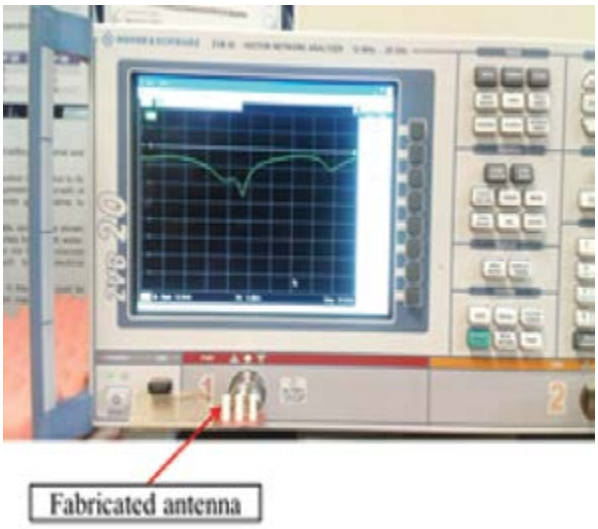


Fig. 4. The S-parameter measurement using a VNA

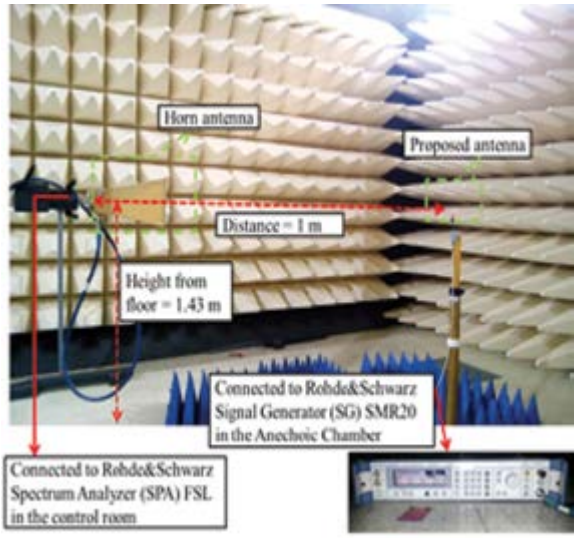


Fig. 5. The setup for radiation pattern and gain measurement

In the meantime, the measurement process can be monitored from the control room that is equipped with radiation emission measurement system complete with display monitor, spectrum analyzer and an Automatic EMI software as shown in Fig. 6. During the measurement process, this software extracts all data and produce the results accordingly. In this case, the gain-transfer method is used to measure the gain of the proposed antenna [12]. This method utilizes a gain standard to determine absolute gain as illustrated in the Fig. 7. Then, the value of the antenna gain can be obtained by using Eq. 1.

$$(G_T)_{dBi} = (G_S)_{dBi} + [(P_T)_{dBm} - (P_S)_{dBm}]$$

where $(G_T)_{dBi}$ and $(G_S)_{dBi}$ are the gains of the test and standard gain antenna, respectively. While $(P_T)_{dBm}$ and $(P_S)_{dBm}$ are the received power into a matched load for the test and standard gain antenna, respectively.

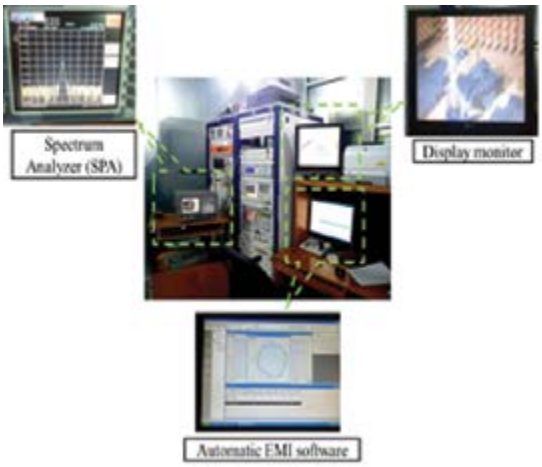


Fig. 6. The control room setup

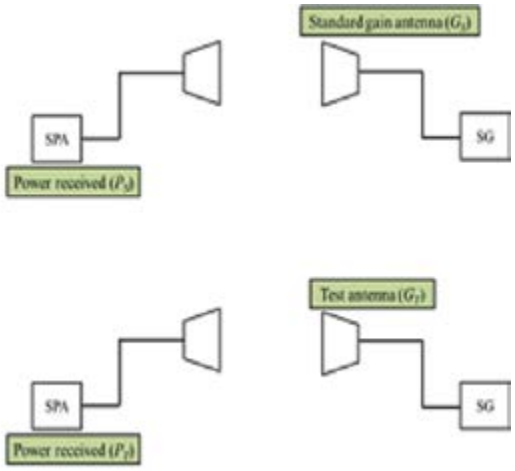
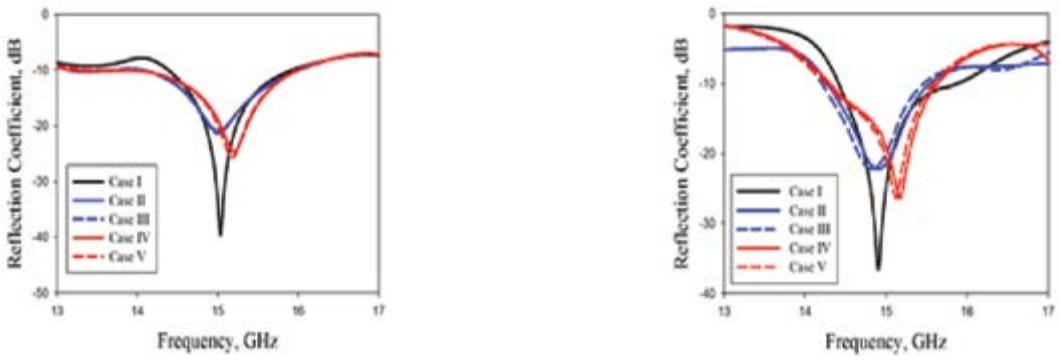


Fig. 7. The block diagram of gain-transfer method

Result

The measured reflection coefficient reactions at different switching angles are depicted in Fig. 8. It can be perceived that there is a slight difference in the simulated and measured reflection coefficient at different switching angle. However, by connecting the port directly to the VNA, the results of the reflection coefficient showed that the losses for five various switching angles have been reduced in the range of 2 to 3 dB. Meanwhile, the switchable DRA array has produced acceptable measured gain which are 8.45 dBi, 8.95 dBi, 8.85 dBi, 9.25 dBi and 9.15 dBi at 0°, -19°, +19°, -32° and +32°, respectively.



(a) (b)

Fig. 8 Reflection coefficient of various angle (a) Simulated and (b) Measured

Conclusion

The fabrication and measurement process of switchable dielectric resonator antenna array for 5G applications has been presented. The result has clearly indicated the better performance achieved from the proposed technique compared to the conventional technique. Besides, the misalignment between the DR and the feeding network is also minimized.

Acknowledgements

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Evaluation of Mechanical Properties of Sugarcane Fibre Reinforced Composite with Unsaturated Polyester (PE) Resin

T.H. Yap1,a, S. Ishak2,b, M. Marzuki3,c, M. Ibrahim4,d and M. H. Idris5,e

1,2,3,4Department of Mechanical Engineering, Politeknik Ibrahim Sultan, 81700 Pasir Gudang, Johor, Malaysia.

1.5Faculty of Mechanical Engineering, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia.

ayth1972@gmail.com, bmatyeen@gmail.com, cmmaryatimarzuki@yahoo.com dmudaking@yahoo.com, , ehsbullah@fkm.utm.my

Keywords: Sugarcane fibre, composite, polyester resin, hardener, mechanical properties

Abstract. This research was conducted to study the tensile, impact strength and hardness property of sugarcane fibre reinforced with unsaturated polyester resin for the purpose of produce composite materials. Sugarcane fibre is taken from the waste of a sugarcane stem after extraction. The fibre will cut into fine strips form and then soaked and cleaned with bicarbonate soda. Strips of sugarcane fibre then dried and mixed together with binder and hardener at random orientation in a matrix. The matrix material of polyester resin and hardener material added to the arrangements of the fibre with weight percentages of 10, 20, 30 and 40 wt. %. The mixtures left at room temperature in 24 hours to allow become hardened and cured into a solid. The tensile test, impact test and hardness test conducted to evaluate the mechanical properties of these mixtures. The results showed that the maximum strength of the composite material increases with increasing the percentage of weight matrix resin in the composite i.e. 2.48 MPa, 4.40 MPa, 6.08 MPa and 7.50 MPa respectively while the toughness to failure found was higher compared to smaller weight matrix resin i.e. 1.55 J, 2.61 J, 3.68 J and 4.77 J respectively. The hardness value (HB) also increase with increasing of wt. % fibres content. The 40 wt. % gave the best hardness property with value of 42.5 HB. The results were shown that the weight percentages of fibre in polyester resin matrix significantly affect the mechanical properties of this composite material.

Introduction

Malaysia has large amounts of untapped natural fibre materials available from the agricultural sector. These fibres range from coconut trunk fibres, kenaf, rice husks, oil palm fronds (OPF), empty fruit bunches (EFB) and oil palm trunks (OPT). Fibre have the potential to be commercially manufactured into a range of composite products to fibre-filled thermoplastic and thermoset composites. These fibres can serve as alternative resources for the future which would otherwise not be utilized and therefore be considered waste materials. Generally, natural fibres have excellent physical and mechanical. Therefore utilization of biocomposite materials would be considered as being environmentally friendly products. Thus, natural fibres are the main next generation of

biomaterial [1].

Malaysia is located in a tropical region and produces a large amount of agricultural industrial cops. Sugarcane is one of the main agricultural crops in Malaysia. The most popular sugarcane variety comes from species Saccharum officinarum L. According to Department of Agriculture (DOE) Malaysia, in 2012 more than 146,164.2 tonnes of sugarcane are produced over 4,345.7 hectares (2.6%) land of the totals planted area [2]. However, these industries are produced in large quantities of residue. These residues are generated after extracting sucrose from sugarcane. The residue is called as bagasse and normally contains highly fibrous residue [3]. Generally, 1 tonnes of sugarcane generate 280 kg of bagasse. These large amounts of untreated bagasse accumulation present a waste problem, especially contaminated land, water and air [4]. As one of the natural fibre, bagasse can be utilized as an economic and more environmental friendly material in several areas. The bagasse fibre density is 1.25 g/cm3 and the tensile strength and Young's modulus are 290 MPa and 17 GPa respectively [5].

Natural fibres present important advantages such as low density, appropriate stiffness and mechanical properties, high disposability and renewability. Moreover, they are recyclable and biodegradable [6]. According to Kusumastuti A [7], natural fibres can be disposed of and recycled without polluting nature also as an alternative composite filler for a variety of composite polymers due to its superiority over synthesis fibre. Natural fibres such as bagasse are readily available at low-cost, easy to process, low density, environmentally friendly, biodegradability and also lower energy inputs in production per units [5].

Composites are produced when two or more materials or phases are used together to give a combination of properties that cannot be attained otherwise. These materials are formed by blending two materials in distinct phases causing a new material with different properties from either parent. Composites materials are classified into one of three categories: (i) fibre-reinforced, (ii) particulate, and (iii) laminar [8][9]. The composite consists of two parts i.e. (i) fibre as the basic individual filament of raw material and (ii) matrix as binder material to protect the fibres without itself fracturing [10]. Most of the fibre reinforced composites will use the polymer material as matrix phase. These materials are thermosetting type polymers [11]. The widely uses resin in the forming of composite materials is unsaturated polyester resins. The composite were transformed into a hard and brittle solid formed by the formation of a chemical crosslinking that forms a very strong bonding polymer chain [12]. According to Jacobs J A. et al.[10], the maximum operating temperature for these resin as a matrices fibre-reinforced composites is at room temperature.

The properties of composite materials are strongly influenced by the nature and distribution of the constituent elements. Besides that, shape, size, orientation and distribution of the filler also affected the properties of composite materials. Mechanical properties are one of the most important composite material properties. Thus, the main role of fibre-reinforced composites is to transfer tensile strength between the fibres, providing resilient environmental damage and maintaining the surface of the fibres [11].

From the previous researchers, applications of bagasse have been successfully incorporated into commercial panels. Oliveira S.L. et al. [13] proven that that panels made from bagasse showed

comparable with or superior physical and mechanical properties to those made from Eucalyptus and Pinus, and have great potential for use in the furniture industry. Bagasse is a highly potential natural composite in loading on the mechanical properties after reinforced with polypropylene and reduce the weight of original polypropylene but have the greater amount of mechanical strength [14]. The applications of bagasse in forming of polymer composites were focused on the binding of the natural fibres with polystyrene which can increase the strength of bagasse fibre board. The combination of bagasse fibres as a filler with polystyrene resin as an alternative fibre-based composites panel can increase the strength of bagasse board. These study has shown that the different methods of incorporating bagasse into polymer compositions able to modify their properties and to decrease their cost [15].

The development of fibre-reinforced composites is the best choice to reduce the use of panel from wood beside to sustain of material resources as an alternative solution in the future. Therefore, the objective of this work is to study the incorporation of sugarcane fibre in polyester resin for the production of composite materials. The mechanical properties of composite were determined and discussed.

Experimental Method

Raw Materials. The sugarcane fibres used in this work is from species Saccharum officinarum L. The fibres was collected from a juice maker from a local hawkers centre in Pasir Gudang, Johor, Malaysia. After the collection, the fibre was cleaned with water several times to remove all the dirts. The fibres has been immersed in the sodium bicarbonate (NaHCO3) solution for alkali treatment for 24 hours. Then, the fibre has been dried under the sun for several days until it is completely dried. The dry fibre is collected and have been crushing by crusher machine to smaller pieces with an average size from 5 to 20 mm in length and 1 mm in diameter. After being dried and crushed, the fibres was found. Then, all the fibres are secondly dried using oven at temperature 105oC about three hours to removed all the moisture from the fibres. The fibre was then stored in sealed plastic bags at room temperature.

Preparation of Composites. Fig. 1 shows the step of preparing of sugarcane fibre reinforced composite. Polymer resin was prepared using unsaturated polyester resin (PE) (gelcoat) type general purpose 4 - 6 poise viscosity and 58 – 62 solid % will be used together with hardener as a matrix composite. The Methyl Ethyl Ketone Peroxide (MEKP) hardener is added to cure and also to harden the resin with mixing ratios 2 parts MEKP on 100 parts PE. Sugarcane fibres were mixed with PE by weight ratio of 90:10, 80:20 70:30 and 60:40. The composites composed of the fibres and PE solvent were mixed. The mixing process took place by hand drill mixer for 10 minutes (Bosch CSB 550 RE, Germany). A steel mould was designed to produce the composited with the length of 300 mm, a width of 200 mm and thickness 10 mm which are capable of fabricating specimen according to standard size. The internal part of mould were wiped using mould release wax (Meguiar's M08, USA). The mixtures of PE and fibres were put into the mould separately and the mixture were pressed under pressure. The mixtures were allowed to harden and cure into solid at room temperature for 24 hours. The specimens were taken out from the mould and then cut by using the cutter (BAS 315/4 WN55, Elektra Beckum).

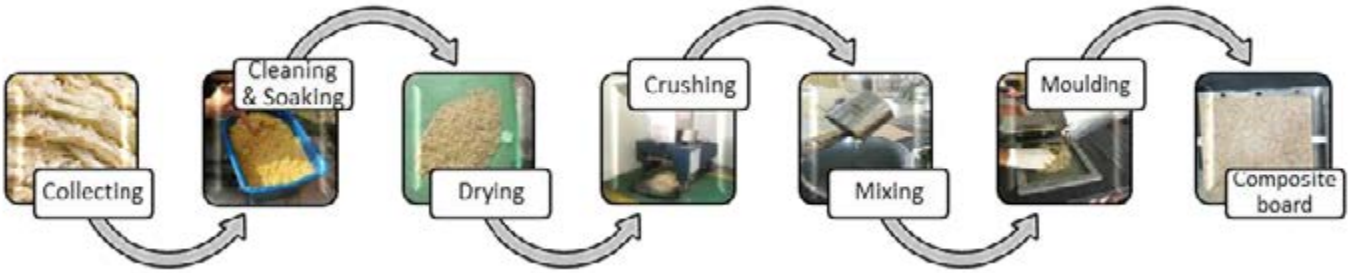

Fig. 1. Preparing of sugarcane bagasse fibre reinforced composite material

Mechanical Testing of Composite Samples. To obtained the mechanical behaviour of sugarcane fibres-reinforced PE composites, samples were prepared for tensile, impact and hardness tests. The tensile test determines the behaviour of materials under uni-axial loads. The test was conducted using a universal tensile machine (UE34100-100kN, China) at a fixed crosshead speed of 1 mm/min in room temperature 25oC. The specimens were analyzed with dimensions according to ASTM D3039. For fibres under random-discontinuous orientation, the recommended dimensions of specimens are approximately 250 mm length, 25 mm width and 2.5 mm thickness. The impact test determines the resistance of the material under suddenly applied loads. The test was conducted on Charpy Impact Tester (LS-22006-50J, Malaysia) with 8.607 kg hammer mass, 3.4 m/s hammer speed and 120o hammer angle in room temperature. The geometry of specimen was 10 mm square, 55 mm length with 45o V notch and 2 mm deep at its centre according to ASTM E23-92. The hardness test determines the resistance of the materials to surfaces indentation, wear and abrasion. The samples were indented using Universal Material Tester (WP 300-20 kN, Gunt Hamburg, Germany) following ASTM E10-84 standard of hardness measurement, using a hardened steel ball indentor with 10 mm in diameter. The geometry of hardness specimen was 30 mm length, 30 mm width and 10 mm hight. The test was carried out at room temperature by test force 9800 N through three readings were taking for each sample and average values were measured. The test force was applied to the sample for at least 10 – 15 seconds and the increase in the test force to its maximum should last at least 5 seconds. The indentation was measured by Optical Profile Projector (PJ-3000, Mitutoyo, Japan) and hardness was calculated.

Results and Discussion

Fig. 2(a) shows the result of variation of the ultimate tensile strength (UTS) for various sugarcane fibre samples produced. It was observed from the results that the UTS increase as the fibre weight content increase gradually. As shown, the large wt. % of fibres in reinforcement has the highest UTS and gave better results compared to 30 wt. % followed by decrease from 20 wt. % and 10 wt. % fibers content. The bonding strength of the fibre in the matrix are touch properly by the polyester resin and there are more fibre bonding one another. At higher fibre content, the fibre bonding one another leads to giving the higher strength of the fibre and PE, and as the same time reduce the density of the compositions. The findings also agreed as reported in Mubarak A. [12], Subramonian S. et al., [14] and Oladele I.O.[16]. The fibres provide reinforcement effect in the PE matrix composite by stiffer the material and hence produce the greater UTS besides lower the density of the material. The results show that the UTS for 40 wt. % reinforced PE matrix sample

giving the best value of 7.5 MPa compared to 10 wt. % with a value of 2.48 MPa. The additional of the fibre can improve the weaker of PE.

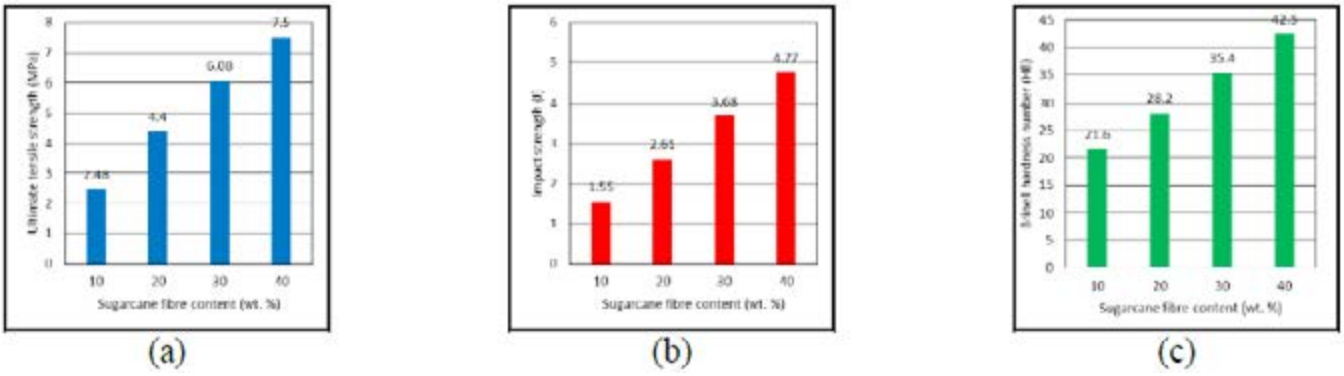

Fig. 2. Effect of sugarcane fibre-reinforced polyester on (a) ultimate tensile strength, (b) impact energy and (c) Brinell hardness value with different composition of sugarcane fibre content (wt. %)

Fig. 2(b) shows the impact test result of variation of impact strength against sugarcane fibre content (wt. %). The variation of fibre with PE resin content from 10 to 40 wt. %. The results found that the impact energy varies from 1.55 Joules to 2.61 Joules and 3.68 Joules to 4.77 Joules from the fibre weight percent respectively as mentioned above. The impact energy increase with increasing of the fibre wt. % content. The impact resistance increasing because the fibres able to absorb a large amount energy before it fails. The fibres were deform plastically during plastic deformation and will carry the impact energy on the reinforced composite. The highest impact strength obtained was 4.77 Joules which is 40 wt. % of fibre with PE resin. The impact strength decrease with increasing of PE resin content which is 3.38 Joules for PE resin with 30 wt. % fibres, 2.61 Joules for PE resin with 20 wt. % fibres and the lowest was 1.55 Joules for PE resin with 10 wt. % fibres. The findings also agreed as reported in M. S. et al. [17]. The incorporation of fibre with PE will make the composite more tough for the impact loading purposes.

Fig. 2(c) shows the Brinell hardness testing result of variation of Brinell number (HB) against sugarcane fibre content (wt. %). The figure showed the increasing from 21.6 HB to 42.5 HB with increasing of fibre from 10 wt. % to 40 wt. %. The maximum Brinell hardness obtained from 40 wt. % fibre content with 42.5 HB. The result shows that hardness increase with increasing of fibre content. The findings also agreed as reported in Subramonian S. et al., [14] and EL-Wazery M. S. et al. [17]. Polymer resin has low hardness value i.e. approximately around 25HB before reinforcement process [17]. The bonding between the fibres become more tightly. From the results above, it found that the fibre improved the value of hardness number.

Conclusion

This work was studied the mechanical properties of reinforced composites made from sugarcane fibre were incorporated with unsaturated polyester resin. Based on the research results, it can be concluded that optimum composition for composite obtained at fibre 40 wt. % and PE

60% wt. %. The test result shown that the matrix mixture that characterizes resistance to the mechanical load. The tensile test showed that fibre reinforced composite has an ultimate strength of 7.5 MPa. Impact test showed that the toughness of composite is 4.77 Joules. The hardness value (HB) exceeding of unsaturated polyester resin hardness value. The utilization of fibre waste reinforced with PE resin matrix significantly enhance the mechanical properties such as strength and toughness besides that improved the hardness values of the composite. Through commercialization of sugarcane fibre as a biocomposite material, this would open up new areas of growth a new industry based on natural fibres and biomaterial. This bagasse when managed properly can be transformed into a beneficial material to become as environmentally friendly products, furthermore provides an alternative disposal method to reduce the agricultural waste.

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A Study on Fired Clay Brick Reinforced with Waste Plastic

T.H. Yap1,a, S. Ishak2,b, M. Ibrahim3,c, M. Marzuki4,d and M. H. Idris5,e

1,2,3,4Department of Mechanical Engineering, Politeknik Ibrahim Sultan, 81700 Pasir Gudang, Johor, Malaysia.

1,5Faculty of Mechanical Engineering, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia.

ayth1972@gmail.com, bmatyeen@gmail.com, cmudaking@yahoo.com, dmmaryatimarzuki@yahoo.com, ehsbullah@fkm.utm.my

Keywords: Brick, clay, waste, plastic bottle, polyethylene terephthalate

Abstract. This research was conducted to study the compression strength and water absorption of brick from disposal plastic material for the purpose of produce environmental friendly composite clay brick materials. The plastic material is taken from the disposal drinking plastic bottle type from polyethylene terephthalate (PETE). The plastic bottle will cut into fine strips and particles form. The strips and particles will grind into powder form and then mixed with clay and water and fabricated into a brick in a mould. The composition of plastic powder and clay added to the arrangements with the weight percent of 10, 20, 30, 40 and 50 weight (wt.) %. The mixture will leave at room temperature in 7 days to allow become dry and burn at 1050°C in 9 hours in the furnace. The compression tests conducted to evaluate the mechanical properties of these mixtures. The results showed that the maximum compressive strength of the composite material increases with increasing of the percent of weight plastic powder in the composition i.e. 6.38 MPa, 8.21 MPa, 10.98 MPa, 9.25 MPa and 7.29 MPa respectively compared to original clay. The PETE with 30 wt. % given the highest compressive strength while the compressive strength then decreases to 40 wt. % PETE and the lowest was 50 wt. % PETE. The percent of water absorption range from 10 % to 6.8 % where water absorption decrease with increasing of the plastic waste ratio vice versa. The results were shown that the weight percentages of plastic powder in the composition significantly affect the compressive strength and water absorption level of this plastic waste brick.

Introduction

Plastics from petroleum resources is now a major challenge globally. As a most common use material currently for daily living, without properly managed, plastic waste will increase day by day becomes a pollutant to the environment. This non-bio-degradable substance can remain on earth for 4500 years without degradation which takes 500 of years to decompose and pollutes the environment hence creating land pollution as well as water pollution [1][2]. Disposal of waste plastic is now a serious problem through the over dumping and increasing in landfills. Malaysians on average produce an estimate of 19,000 tonnes of solid waste annually and plastic waste represents

24% of total solid waste [1].

Plastic wastes are one the most type of materials recycled in Malaysia when compared to other waste such as paper/cardboard, cans, glass and other materials [2] and included Polyethylene terephthalate (PETE). PETE is the largest component of plastic waste [3]. This material is the most common plastics where the highest amount is in containers and packaging for liquids include water, juices, soda and water bottles, medicine, packaging, cup etc. The disposal of a large number of plastic bottles has emerged as a serious environmental challenge.

In the previous years of research, plastic waste was chosen as an optional to enhance the properties for brick or concrete mix. Brick is the simplest building materials from ancient toward the modern civilization. Bricks are made by shaping a mass of clay and water and then finished by hardened through drying and firing. This raw material, i.e. clay can be moulded into a wide range of shapes and sizes besides that has low in cost. Normally clay sand bricks with 35% green core and 25% green sand fired at 1050°C have the better physical properties values [4]. The compressive strength of clay brick between 3 to 5 N/mm^2 [5] and the good quality of bricks shall not absorb more than 20% of water [6].

Numerous studies have been done to improve the characteristics of a brick through modification and addition of the brick material. From the previous researchers, applications of the waste plastic bottle have been successfully incorporated into production of bricks. In the past research, the composition has been done through the addition and replacement with plastic waste in shredded particle either in a course or powder form by weight or volume percent. Most of the results generally showed the increased in compressive strength as the increased of the plastic waste content [5] [7][8][9]. The results also showed that the increased of plastic waste content decreased the water absorption level and enhanced the quality of the bricks [6][10].

In a study on the utilization of the waste plastic n manufacturing of bricks and paver blocks in India, they produced plastic sand bricks and plastic sand paver blocks from the waste plastic of high density polyethylene (HDPE) and polyethylene (PE) [3]. In this study, they mixed plastic waste in hot liquid form in the ratio of 1:2, 1:3, 1:4, 1:5 and 1:6 by volume with river sand and obtained the compressive strength of 4.65 MPa, 4.78 MPa, 5.12 MPa, 4.92 MPa and 3.17 MPa respectively. This results also indicated that the 1:4 plastic brick given the highest strength with 1.10 % of water absorption level compared to burnt brick with only 3.15 MPa compressive strength and 9.086 % of water absorption. The inclusive of plastic waste in brick can reduce the problem of dumping beside can improve the quality of bricks.

A study on utilization of plastic bottle waste in sand bricks in order to determine the compressive strength of the plastic waste [6]. They found the reduction in compressive strength, due to the replacement of sand by the waste plastic bottle is minimal i.e. comprehensive strength decreases with increasing waste plastic ratios which 5%, 10% and 15% plastic waste are 236.67kN, 121.33kN and 60.67kN respectively. However, it can be enhanced by the addition of super plasticizer. The water absorption and efflorescence showed excellent performance in the range from 14.46% to 9.52%. However, the mixes of sand bricks and plastics waste seems possible because of water absorption of less than 15% for all ratios.

Singh L. (2017) has concluded that experiments have been carried out by plastic waste materials from waste compact disc (CD) for the manufacturing of the brick. The waste plastic was cut into

small pieces and with sand in a proportion of 1:1.5 (1 plastic: 1.5 sand) by weight and heated in separated containers at approximately 200°C, moulded and then cooled in a mould. The brick making from sand and waste plastics can be an alternative to replace the available traditional clay bricks and the other hand can help to reduce the waste hazardous plastic from the environment [7].

Hence, to protect the environment as well as to learn the advantage of plastic, recycling procedure is applied. The Recycling is processing waste into new products to prevent waste of potentially useful materials. The use of waste plastic, like bottles for the production of bricks, is an optimal method to solve the problem of storing waste materials. Therefore, the aim of this research is to study the fired clay brick produced from a disposal plastic material for the purpose of produce environmental friendly composite brick. This work focuses on five different weight ratio in compositions between the clay and plastic waste from the disposal drinking bottle type from PETE. The compressive strength and water absorption tests were performed on the brick specimens and the properties are measured and characterized.

Experimental Method

Raw Materials.

Fig. 1(a), 1(b) and (c) shows the raw material and steps of preparing of plastic waste brick. The type of plastic material used in this study is from Polyethylene terephthalate (PETE). The drinking plastic bottles were collected from a local market in Masai, Johor, Malaysia. After the collection, the bottles were cleaned with water several times to remove all the dirt and contaminants. The bottles have been dried under the sun for several days or dryer at indoor until it is completely dried. Then, the dry bottles are collected and have been crushing by crusher machine to smaller pieces with an average size from 2 to 5 mm in length and width. After being dried and crushed, the small strips and particles were found. Then, all the strips and particles will grind into powder form. The powder from the process is then sieved using vibratory sieve shaker machine (Octogon, England) into 63 μm sieving size in the British Metric series (BS410:1976). The powder was then stored in sealed plastic bags at room temperature until it was used in the experiments.



(a) (b) (c) (d)

Fig. 1. Preparing of plastic waste brick using (a) 1500ml drinking bottle (b) fine mesh plastic

powder (c) wooden mould and (d) drying process using an oven

Preparation of plastic waste clay bricks.

In the mixing process, hand mixing was used. The clay brick was prepared using PETE plastic particle in powder form and powdered bentonite clay. The water is added to ensure the clay incorporated with the plastic powder. The bentonite clay was mixed with PETE by weight ratio of 90:10, 80:20 70:30 60:40 and 50:50. The mixing process took place by hand drill mixer for 10 minutes (Bosch CSB 550 RE, Germany). Moulding process used to prepare the brick in uniform sharp consistently. A steel or wooden mould was designed to produce the clay brick with the length of 40 mm, a width of 40 mm and thickness 40 mm which are capable of fabricating specimen according to ASTM C67. After that, the mixtures of bentonite clay and PETE powder were poured into the brick mould and the mixture was pressed under pressure. The surface of the mould is finished using a trowel and before placing the mixture into the mould, the side of mould are oiled to easy demould of the brick. For curing process, the mixtures were allowed to harden and cure into solid at room temperature for a period of 7 days [11]. Fig. 1(d) shows the furnace used in drying and firing process of preparing of plastic waste brick. The brick specimens were dried for 24 hours in the oven at 105°C prior to heating and finally fired into the solid form at 1050°C for 9 hours (Vecstar furnace, UK)[4].

Compression testing of plastic waste clay brick samples.

To obtained the compressive behaviour of plastic waste fired clay brick, samples were prepared for the compression test. The compression test determines how a material reacts when it is compressed, squashed, crushed or flattened under a compressive load. The test was conducted using a universal tensile machine (UE34100-100kN, China) at a fixed crosshead speed of 1 mm/min in room temperature 25°C through compressive mode (Refer with : Fig. 2(a)). All the brick specimens are tested through three samples one by one and the load at crushing was noted. The compressive strength was taken for each sample and average values were measured. The specimens were analyzed with dimensions according to ASTM C67.



(a)



(b)



(c)

Fig. 2. Testing on brick (a) compressive strength through a universal tensile machine (b) Immersing the brick sample in the water and (c) water absorption test

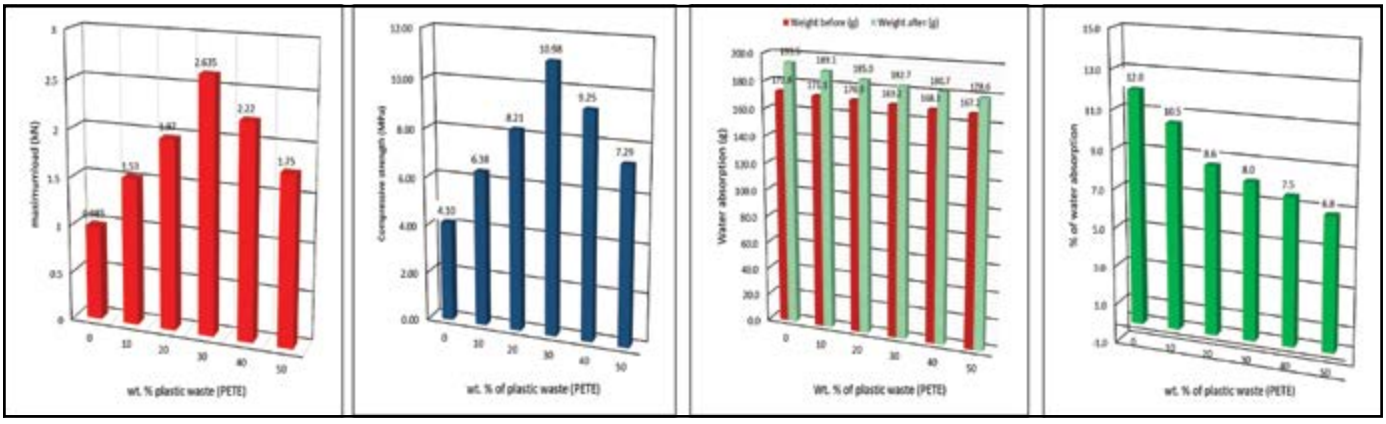
Water absorption test.

The water absorption test determines the water absorption in percent by weight for plastic waste clay brick. The samples were dried in the oven at a temperature of 105°C to 115°C. After that, the dry condition samples were placed on the tray and cool at room temperature. Weight the cool brick with digital balance (W_1) (Kern PCB, Germany)[4]. The test was carried out at room temperature by immersing the dry brick in clean water for 24 hours (Refer with : Fig. 2(b)). The brick was removed and wipped out with cloth from water and weight immediately (W_2). The difference shown the weights is the water absorbed by the brick (Refer with : Fig. 2(c)). The difference between the dry and wet bricks percentage was calculated. Water absorption in percent (%) = ($W_2 – W_1$) x 100.

Results and Discussion

Effect of Different Wt. % of Plastic Waste on Compressive Strength

Fig. 3(a) shows the value of maximum load (kN) and compressive strength of different wt. % of the plastic waste content for the fired clay brick specimens produced. From the compressive testing, the result clearly showed that the compressive strength increase with the plastic weight content increased. As shown, the 30 wt. % of plastic in the composition has the highest compressive strength (10.98 MPa) and gave better results compared to 20 wt. % (8.21 MPa) followed by the decrease from 10 wt. % (6.38 MPa) and 0 wt. % (4.10 MPa) plastics content (refer with: Fig. 3(b)). The 30 wt. % of plastic waste brick is stronger. The bonding strength of the brick in the compositions are touch properly by the PETE powder and there are more bonding one another. However the value of compressive strength decrease as the ratio of plastic waste increase after 30 wt. %. The results show the trend that the compressive strength for 40 wt. % PETE plastic decrease gradually and giving the value of 9.25 MPa compared to 50 wt. % with the lowest value of 7.29 MPa. The findings also agreed as reported in Mohan C.G. et al, [12].



(a) (b) (c) (d)

Fig. 3. Effect of plastic waste on (a) maximum load, (b) compressive strength with different, (c) water absorption in gram and (d) water absorption in % with different composition of PETE content (wt. %)

Effect of Different Wt. % of Plastic Waste on Water Absorption Test

Fig. 3(d) shows the value of the percentage of water absorption of different wt. % content for the fired clay brick specimens produced. From the water absorption test result of variation of water absorption level against plastic waste content (wt. %), the results found that the weight of water absorption level varies from 20.7g to 18g, 14.7g to 13.5g and 12.6g to 11.4g. Weight in gram from the plastic weight percent respectively as mentioned in Fig. 3(c) above. It's was showed that all of the bricks indicate of absorption of water. The percentage of water absorption decrease with increasing of the plastic ratio vice versa. The highest water absorption obtained was 20 g which is 12 % of brick weight after testing. The percent of water absorption range from 12 % to 6.8 %. According to Wahid S. A. et al., the good quality of bricks shall not absorb more than 20% of water [6]. The findings also agreed as reported in K. Dinesh.S and Dinesh.A [3]. From the results above, it found that the addition of plastic waste in the bricks will improve the quality and performance of the bricks.

Conclusion

This work was studied the compressive strength and water absorption of brick from disposal plastic material for the purpose of produce environmental friendly fired clay brick materials. Based on the research results, it can be concluded that optimum composition for brick at 30 wt. % PETE. The test result shown that the mixture that characterizes resistance to the compression load. The compression test showed that plastic brick has a compressive strength of 10.98 MPa. Water absorption test of bricks was reduced and range from 6.8 to 12 %. The results showed that the addition of plastic waste with clay in composition significantly increase the compressive strength of

brick beside reduce the water absorption enhance the quality and durability of the brick. Through the utilization of plastic waste as a mixture material, this would reduce the plastic waste disposal problem and converts the waste into a useful product besides reduces the environmental pollution, furthermore provides an alternative disposal method to reduce the plastic waste.

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The Study of Design and Layout Space at Maternity Ward (O & G), Hospital Raja Permaisuri Bainun Ipoh, Perak

Siti Salwana bt Mohd Nawayai

Politeknik Sultan Salahuddin Abdul Aziz Shah

wana_9199@yahoo.com

Keywords: Space planning; Hospital; Facilitiesmanagement.

ABSTRACT: Design, arrangement and facilities constitutes as important parts for interior to function according to its purpose. Often demands from users will increase as service is expanding. In space planning, designer specialized in internal space is responsible to define circulation patterns and develop layout for placement of furniture as well as equipment. Space planning service in hospitals are very crucial as consideration were in various design parameters. It includes project goals and priorities, fulfilling customer's need in relation to organizational structure, space allocation criteria, building codes and access for disabled people, standard furniture, circulation and workflow, constraints as well as other elements of building. Aspects or element that were associated with space management related to patients in maternity ward such as physical elements, facilities and space design were very important as they provide comfort for users. Therefore a study was conducted to identify the relationship between physical aspect in maternity ward and patient's comfort. This research conducted in the vicinity of Hospital Raja Permaisuri Bainun Ipoh, Perak is to determine the level of user's comfort for space management in maternity ward. Questionnaires were distributed to 86 respondents in accordance to Krejcie and Morgan schedule. The stratified sampling method consists of questions about design elements and its relation to the needs of patients. Structured observation method through the use of space audit form were also conducted to observe areas in maternity ward. From this study, it was concluded that this ward provide cozy atmosphere and the impression of less comfort to users is irrelevant. However, there are still some elements that need to be improve especially in aspects of wall painting and selection in colour hues. This study may be significant as a guidance to other that aim to increase comfort level in maternity wards as well as to improve their service to patients.

INTRODUCTION

Space planning are integral part of the interior design process, but demand for it as a discrete service is growing. Purpose of maternity ward is to accommodate women before and after birth. So the comfort of mothers depended on the atmosphere and facilities available in the ward, where women will feel comfortable when the space, arrangement and facilities provided are in good condition and complete.

In the 1990s the importance of spatial planning driven by increased levels of organizational

change, the desire to accommodate the new management strategy to enhance creativity and productivity, and the continuing need to integrate new technologies into the workplace as in this case, hospital buildings. Spaces should be expandable to accommodate more purposes in order to serve increasing number of patients.

Problem Statement

According to Datuk Seri Dr S. Subramaniam, ministry has provided enough beds and all equipment but the juxtaposition relatively close to each other so as to cause the ward to be compact, thereby affecting the comfort of patients and visitors [1]. This study focused on level of comfort to the design, arrangement and facilities in the maternity ward. Placement of furniture, such as tables, beds, cabinets and many others as well as the design of appropriate space in maternity ward must reach required standard, as this will affect the feelings and comfort of the users.

Objective of Research

1. Determine the level of user's comfort in space management of maternity ward.
2. Produce proposal to improve space management of maternity ward at Hospital Raja Permaisuri Binun, Ipoh Perak.

Literature Review

In reference to Dictionary Board, Fourth Edition (2005), a sense of comfort is not referring to being narrow and broad. Comfort also means the situation is not narrow, wide, broad, hearty, delicious and fun. According to House Dictionary, Second Edition (1992), comfort suggests the lessening of misery or grief by cheering, calming, or inspiring with hope.

On the other hand, space planning is a fundamental element of interior design process. It starts with an in-depth analysis of how the space is to be used. The designer then draws up a plan that defines the zones of spaces and activities that will take place in those zones. The space plan will also define the circulation patterns that show how people will move through the space. The plan finished by adding details of all furniture, equipment and hardware placement. [2]

Space planning is essential for the success of any project. However, when it comes to establishing critical facilities or altering existing areas, it often happen that there are not enough space to include various aspects of how much space is required for each equipment. Best practices should also be considered during the planning process because it facilitates the movement of users in a room, ward or in the building. The ideal room design makes a big difference to where you live and work like any furniture, appliances or colour of the walls can be made.

Factors Contribute To the Effectiveness of Space Management in Maternity Ward

There are six constructs established within the framework of this study. The framework of this study are shown in Fig. 1.

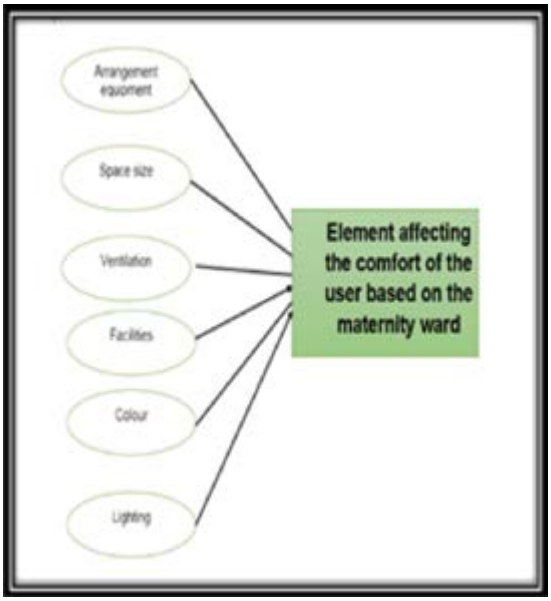

Fig. 1. Conceptual Framework

RESEARCH METHODOLOGY

This study employed the survey research method. The quantitative data collection technique that consists of closed ended questions was used to gather data on level of patient's comfort. The factors that contribute to the effectiveness of maternity ward were determined by referring to constructed conceptual framework. In order to measure the level of user's comfort in space management of maternity ward, two criteria were observed:

(1) The required guidelines and rules by Ministry of Health Malaysia.

(2) The layout of maternity ward in Hospital Raja Permaisuri Bainun which was built in 1942 with three (3) floors and each floor consists of 10 rooms.

Questionnaire Design

A structured questionnaire was used to collect data. Questions was designed to consist 3 parts. Part A is the demographic background. Part B are elements related to lighting, colour, facilities,

ventilation, layout and size of rooms. Part C deals with the necessary facilities additional to maternity ward.

A pilot study was conducted on 30 patients (who are not involved as respondents) to measure the reliability of items in questionnaire. Data obtained from this pilot study are analyzed and improved. Thus reported reliability scale adopted from Alpha Rate Coronbach by Mohd Najib Abdul Ghafar [3] is .816.

Observations

A structured observations method is also used in collecting data. It is a method equipped with tools/instruments that help researcher collect data effectively through the use of space audit form. Space audit form also involve execution of testing using specific equipments.

Data Collection Procedures

86 questionnaires were administered directly to the occupants during bed-to-bed visits and requiring their immediate completion. Hence, after the respondents had completed the questionnaires, taking advantage from the face-to-face survey where the researcher has asked an open-ended question to the respondents. It was done as an expansion to the questionnaire.

RESULT AND DISCUSSION

Element of Space Management in Maternity Ward

The most important element in design is the size of the space, where it gives comfort to those who use the space. According to Su Soon Ming [4], space and the layout of the furniture should be in accordance with the capacity of the user. Increasing number of users that exceed the maximum capacity of the room may cause discomfort atmosphere. Size of rooms must be determined by knowing number of users who will use the room. Thus, researcher calculated number of suitable patients for each room size by referring to Guidelines and Rules for Planning and Building of the Year [5]. To determine suitable furniture layout for effective ward space, researcher referred to Time Saver Standards for Building Types [6] due to variation in types of tables and chairs layout.

Lighting factor was analyzed in terms of brightness and its suitable type with reference to 1525/2007 Guidelines Malaysian Standard (IES Lux Level). This study calculates the total luminous flux to the surface, per unit area as it is a measurement of light intensity observed. Similarly, the

emissivity of the sparkling luminous flux per unit area emitted .SI derived unit, both measured using the unit lux (lx), or lumens per square meter (cd · sr · m-2) [6].

The next element is very important as temperature and ventilation reflected to high impact in determining patient's comfort. If the temperature and ventilation is too hot or cold, it will affect comfort of the space. Standard room temperature is concluded as appropriate as referred to Indoor Air Quality Code of Practice 2010 [6].

Other facilities are also taken into account in supporting and assisting patient such as fans, air-conditioning, television and internet networks (Wi-Fi). Through discussions they has been identified as the basic facilities needed in the hospital. According to Hayward [7], all equipment are placed in an optimal location for its purpose. It depends on the characteristics of users, such as their size, and movement, vision and hearing ability.

The last element is colour factor which plays an important role in any space, this can be proved by referring to past researchers in their study that strongly argue the influence of colour in person's emotions, especially patients in the maternity ward.

Determine the Level of User's Comfort in Space Management of Maternity Ward.

Design	Item	Mean	Level
Space size	Space size comfortable	3.23	High
	Space size suitable	3.31	High
	Space size comfort	3.29	High
Arrangement equipment	Arrangement suitable	3.38	High
	Arrangement comfort	3.42	High
	Equipment completed	3.21	High
	Equipment easy remove	3.15	High
Ventilation	Temperature optimum	2.74	Medium
	Air-conditioning and fan function	2.79	Medium
Lighting	Optimum lighting	3.10	High
	Nature lighting	3.53	High
Facilities	Quantity toilet suitable	3.27	High
	Equipment completed	3.30	High
	Facility comfort	3.29	High
	Facility function	3.35	High
Colour	Colour attractive	2.04	Low
	Colour fuscous	2.02	Low
	Total mean	**3.08**	High

Table 1: Analyzing overall design and facilities of maternity ward

*Mean refers to the four-scale minimum, and maximum 1, 4. The mean score was set 1:00 to 2:00

(Low), 2:01 to 3:00 (medium) and 3:01 to 4:00 (High).

Facilities	Mean	Level
Air-conditioning system	3.49	High
Television	3.33	High
Lighting	3.57	High
Total mean	**3.46**	**High**

Table 2 : Other available facilities in maternity ward

*Mean refers to the four-scale minimum, and maximum 1, 4. The mean score was set 1:00 to 2:00 (Low), 2:01 to 3:00 (medium) and 3:01 to 4:00 (High).

Table 1 show summary result from data analysis for overall 3-storey maternity ward. Perception ranks data scored high marks because mean value exceeds 3.01. However, two aspects with simple mean score (less than 3:01) are ventilation and colour factor. Analysis concluded that majority of patients feels the room size, layout, and facilities achieved a high level of comfort as well as brightness lightings are in optimum condition. Facilities such as internet for networking gave the most affect to patient's comfort. Majority of patients stated that ventilation system could be improve and selection of colour on wall is not attractive at all. The relationship between design elements and patient's comfort were displayed in Figure 1.

Proposal and Scope for Further Research

The finding of this research clearly indicate that aspect ventilation and colors have a low score mean. Through observation by audit form, each rooms were painted with whitish hues. Although it may look soft and neutral, majority of respondents thought that it was pale and unattractive. Researcher suggest improvements by selections of pastel colour paints (refer fig.2). Decorating the ward rooms with patterned or colorful illustrations poster words of encouragement will create a visually appealing effects too (refer fig. 1). Other methods that can be proposed is to invite Corporate Social Responsibility (CSR) activities which involves citizens volunteering to do the work of art in maternity ward.



Fig. 1. Recommendation of soft colour with some decoration in maternity ward



Fig. 2. Example of soft / pastel colours

This research conducted on one single state government hospital only. It cannot be regarded as a decision which describe all government hospital as a whole. Therefore, further studies should be conducted to assess the situation at more hospitals. If studies can be carried out in other hospitals located at different states of Malaysia, the result can reflect the actual situation of hospital buildings in Malaysia.

CONCLUSION

This study adds to the knowledge of building design physical aspect in maternity ward and patient's comfort. It shows the complex interactions between space management and its impact to users of the space. The findings hold strong implications for governing bodies, industry practitioners and service providers as they magnify the need for new and holistic strategies to fulfill patient's need and comfort in developing innovative building design. The impact of this research, it was known that Perak government exercise a good space management practice to provide comfort for their patients in maternity ward located at Hospital Raja Permaisuri Bainun. However, there are certain aspects

that can be upgrade in future to create better service.

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POTENTIAL OF CACAO PEELS AND BAGASSE FOR PARTICLE BOARD WITH ISOCYANATE ADHESIVE

Yuli Yetri*1a, YeniFathatun Najihah2b, Dwi Puryanti2c, Rahmi Hidayati3d

1Mechanical Engineering Department of PoliteknikNegeri Padang, Padang, Indonesia

2Physics Department, Andalas University, Padang, Indonesia

3Civil Engineering Department of PoliteknikNegeri Padang, Padang, Indonesia

E-mail: a*yuliyetriyetri@gmail.com, byenifathatun@gmail.com,

cdwipuryanti@yahoo.co.id, dmimi_rainbow38@yahoo.com

Abstract: This research attempts to determine the best material composition on physical and mechanical properties of cacao peels and bagasse mixture particle board with isocyanate adhesive. In this study, two variations of material treatment were utilized, namely the ratio of material composition and the number of adhesive.The variation in the material composition taken between cacao peels and bagasse was 100:0%, 75:25%, 50:50%, and 12%, 14%and 16% for the isocyanate adhesive content. The length of the used bagasse fiber was 3 cm. Meanwhile the measured parameters were moisture content, density, water absorption, fracture toughness, modulus of rupture (MOR), compressive strength of the parallel surface (CSPS), and internal bonding (IB). The best particle board was obtained by having comparison of 50:50% material composition with 16% adhesive content.The results showed that the produced physical and mechanical properties complied with JIS A 5908 (2003), SNI 03-2105-2006, and FAO (1996) standards. Based on the percentage of particle board density, the resulting particle board was included intothe medium density type of particle board up to the high density one.

Keywords: *Particle board, Cacao peels, Bagasse, Adhesive*

Introduction

Particle board is a wood replacement material made of natural fibers containing lignocellulose, such as sawdust, rice husk, sago pulp, bagasse or other fibers. The bagasse and cacaopeels are very abundant waste in the field, the that meets the requirements for particle board, as it also contains lignocellulose (Figueira A, 1993)

So far, sugar cane utilization is still limited to the sugar industry by taking only sugarcane juice, whereas the dregs of 35-40% of the milled sugarcane mass are only used as industrial fuel or may be disposed of as waste. The bagasse fiber is not soluble in water, therefore the bagasse meets the requirements to be processed into an artificial board (Maiwita et al, 2014). While the cacao fruit to date that is taken seeds and waste skin has not been utilized to the fullest. Increased

cacao production becomes a boast for the Indonesian state but the increase in production also leads to an increase in the amount of cacao peels waste. The largest component of cacao peels comes from the skin of the fruit, which is 75% of the total fruit. If viewed from the data of cacao fruit production in 2017 which reached 1.5 million tons, the waste of cacao peels produced is 1.1 million tons (Agriculture department). If the waste is not handled properly then it can cause environmental problems (Yetri Y, 2015).

Through the manufacture of particle board from the skin of cacao and bagasse is expected to increase the added value of sugarcane and cacao waste, thus reducing the environmental pollution caused by the waste. Research on particle board has been done by Malau (2015) with variation treatment of phenol formaldehyde (PF) adhesive to get the best result at 16% PF adhesive. Marpaung (2015) obtained the best particle board using 14% adhesive, with density 0.76 g/cm^3, moisture content 6.33%, water absorption 26.38%, Modulus of Rupture (MOR) 99.31 kg /cm^2, and Internal Bonding (IB) of 1.6 kg/cm^2. Based on the previous research, there will be research about the effect of material composition, fiber length and adhesive on the physical and mechanical properties of particle board. In this research, mixing the two waste to get the best particle board result

Research Methods

The materials used in this research are cacao peels obtained from smallholder plantation in Kecamatan V z**CONCLUSION** Koto Kampung Dalam Padang Pariaman District, isocyanate adhesives, water and other materials for analysis. Peels of cacao sliced thin and then dried for 7 days, then grinding to minimize the size so that the particle obtained with the desired size. Particles used are particles that pass 60 mesh sieve. While the bagasse was taken from the waste of sugarcane traders. The bagasse is soaked for 2 hours to remove the sugar that is still stored in the bagasse, then air-dried. Further cleaned, shredded, and cut with a length of 3 cm.

The particle board to be made is 20 cm × 20 cm × 1 cm with a target density of 0.8 g/cm^3. The mass for one board is 320 grams with the calculation: 20 cm × 20 cm × 1 cm × 0.8 g /cm^3. This research uses two variations of material treatment that is variation of material composition and adhesive level. Variations in the composition of the materials between cacao peels and bagasse are 100: 0%, 75: 25%, and 50: 50%, while adhesive variations are 12%, 14%, and 16%.

The process of making particle board starts from weighing the material as needed, mixing with adhesive, stirring perfectly, and finally the mixture is poured into the aluminum mold and above it covered with aluminum. Then cold forged to form a sheet of board with a thickness of approximately 1 cm, then put in heat for 6 minutes, and conditioned in room temperature for approximately 7 days. Then opened and tested the physical and mechanical properties.

Testing of physical and mechanical properties of particle board is done according to JIS A 5908-2003, SNI 03-2105-2006, and FAO standard (1996). The particle quality parameters tested for the physical properties are moisture content, density and water absorption. As for the mechanical properties tested is the fracture strength (MOR), the compressive strength of the parallel

surface(CSPS), and the adhesive strength/ internal bonding (IB).

Resultand Discussion

Water content

The water content is the result of the difference between the mass of the particle board before and after oveningwhich is divided by mass after the covenant. The test results show the value of water content of 0.05-0.117%. The highest water content is produced by particle board with the composition of cacao peels and bagasse 100: 0% with 12% adhesive content. The lowest water content is obtained by particle board with the composition 50:50% with adhesive content of 16%. The increase in adhesive level will minimize the particle water content, as shown in Figure 1.

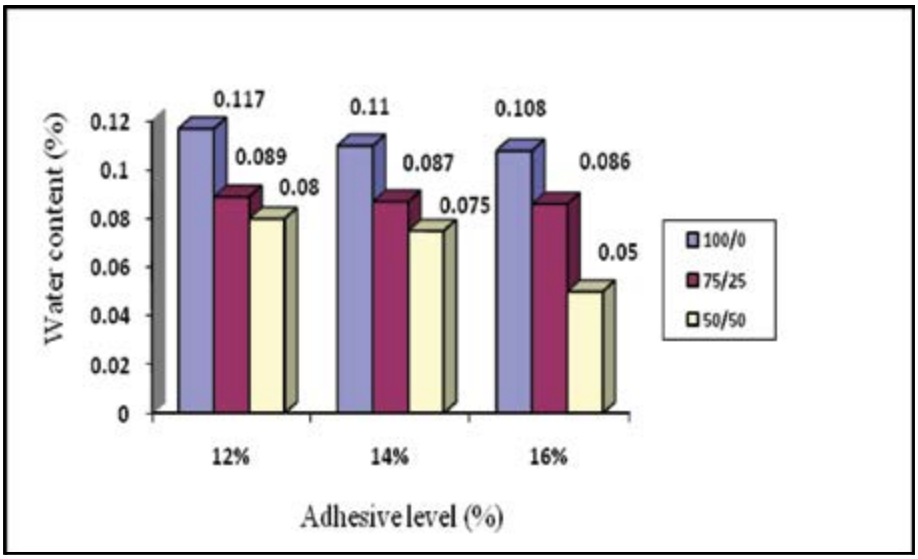

Figure 1. Effect of Cacao Peels, Bagasse, and AdhesiveComposition to Water Content of Particle Board

This is supported by research by Marpaung (2015) and Sulastiningsih et al. (2006) examined the effect of urea formaldehyde adhesive on bamboo particle board properties with minimum water content of 7.01% with the highest adhesive content of 12%. In addition, the composition of the material also affects the value of water content, the higher the number of fibers the lower the value of water content. The value of particle water content of the resulting particle meets the JIS A 5908-2003 which requires 5% -13% water content, and SNI 03-2105-2006 with a maximum water content of 14%.

Density

The density value of a board in the standard is usually expressed within a certain range, and the test is carried out under dry conditions. Figure 2 shows that the higher the adhesive content the higher the particle board density, where the resulting density values range from 0.820-0.968 g/cm^3. The effect of adhesive on density is suspected because of the chemical bonds that occur between the isocyanate adhesive and the matrix (Marpaung, 2015). The highest density values were obtained on particle board with 16% adhesive content. This result is in accordance with research that has been done by Sulastiningsih et al. (2006) yielding a density of 0.71 g/cm^3 bamboo particle board with the highest UF adhesive content of 12%. In addition to the adhesive level, the particle board density is also influenced by the water content and material composition shown in Figure 2, where the lower the amount of fiber the higher the particle density value. The test results can be seen that the density value, particle board obtained can be classified into medium density particle board with standard 0,4-0,8 g/cm^3 and high density particle board with standard> 0,8 g/cm^3. The resulting density values have fulfilled the standard of SNI 03-2105-2006, JIS A 5908 (2003) 0,4-0,9 g/cm^3, and FAO standard (1996) thatis 0,42-0,80 g/cm^3.

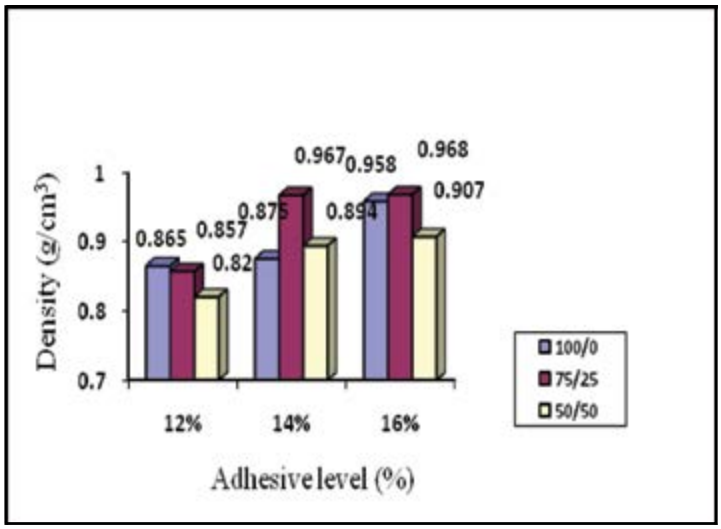

Figure 2. Effect of Cacao Peels, Bagasse, and AdhesiveCompositionto Particle Board Density

Water Absorption

Water absorption is the ability of the board to absorb water for 24 hours. The 5 × 5 × 1 cm particle board is weighed to determine the dry mass, then the board is immersed in water for 24 hours, then weighed again by wet mass. The water absorption value generated from the particle board ranges from 0.283 to 1.164%. The lowest absorbency value on the particle board with the adhesive content of 16%, the composition of 50:50%, and the highest water absorption value is produced by the board with 12% adhesive content with 100: 0% composition. This indicates that the adhesive level has an effect on the particle water absorption value of the particle board, the higher

the adhesive level the lower the water absorption value. Sucipto et al. (2010) conducted a particle board study of palm stem waste with 10% adhesive content yielding a water absorption value of 9.27%. Figure 3 shows that the more fibers the less likely it is for the particle board to absorb water. From the test results the average water absorption of particle board has met the FAO standard (1996) is 6-40%, while the SNI and JIS do not require testing the value of water absorption.

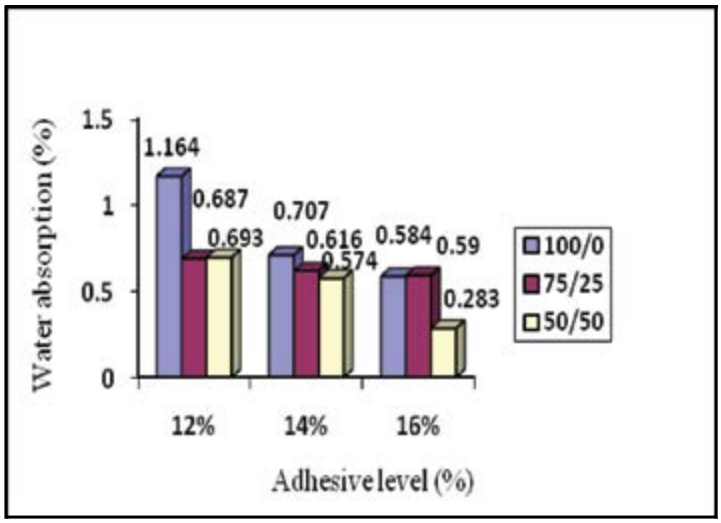

Figure 3. Effect of Cacao Peels, Bagasse, and AdhesiveCompositionon Water Absorption of Particleboard

Modulus of Rupture

Fracture is a degree of firmness of the particle board in receiving load perpendicular to the surface of the board (Marpaung et al., 2015). From Figure 4 it can be seen that a particle board with a 50:50 composition with an adhesive content of 16% yields the highest MOR value. While the lowest MOR value is generated from boards with 100: 0% or no fiber with 12% adhesive content. MOR test results show that the higher the adhesive level in the board the MOR value is also higher. This data by Marpaung's (2015) research results using sawn waste for particle board, the highest MOR value of 99.31 kg/cm^2, is produced by particle board with the highest adhesive content of 14%. Figure 4 shows that the addition of fiber affects the MOR value of the particle board, the more fiber is added to the particle board the higher the MOR value of the particle board is produced. MOR values of 100: 0 and 75:25% compositions with 12% adhesive levels have not met the SNI 03-2105-2006, JIS A 5908 (2003) which requires a minimum of 82 kg/cm^2 and FAO 1996 provided that the MOR value ranges from 108 -280 kg/cm^2. The low MOR values are thought to be due to the effect of particle size of the particle board in this study.

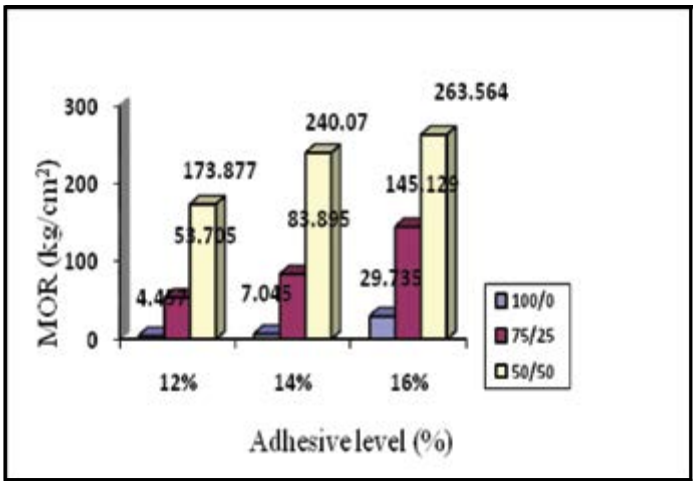

Figure 4. Effect of Cacao Peels, Bagasse, and AdhesiveCompositionto MOR Value of Particle Board

Compressive Strength of the Parallel Surface (CSPS)

Strength compressive tests are performed using UTM (Universal Testing Machine). The compressive strength test is used to determine the compressive strength of the test sample. From Figure 5 it can be seen that significantly the value of CSPS increases with the increase of the amount of adhesive and the amount of fiber. The value of CSPS generated ranges from 4.358 kg/cm^2-38,874 kg/cm^2. Particle board with composition 100: 0% and 12% adhesive content has the lowest CSPS value, while the highest CSPS value is obtained from particle board with 50:50% composition and 16% adhesive level. In addition, the value of CSPS is also influenced by the moisture content and particle board density produced. The CSPS value of the cacao peels particles and the bagasse obtained is not much different from the research by Muryati (2017) about the difference of percentage of baggage processing of gambir and empty palm oil bunches on the nature of particle board without adhesive which produces SCPS values ranging from 21.68 kg/cm^2 to 47.34 kg/cm^2. The same is done by Ferdana (2016) on the effect of different concentrations of hydrochloric acid on the manufacture of particle board without glue of corncobs that yields a compressivestrength of parallel surface value ranging from 18.09-29.12 kg/cm^2. While SNI 03-2105-2006, JIS A 5908 (2003) and FAO (1996) do not require CSPSof the particle board.

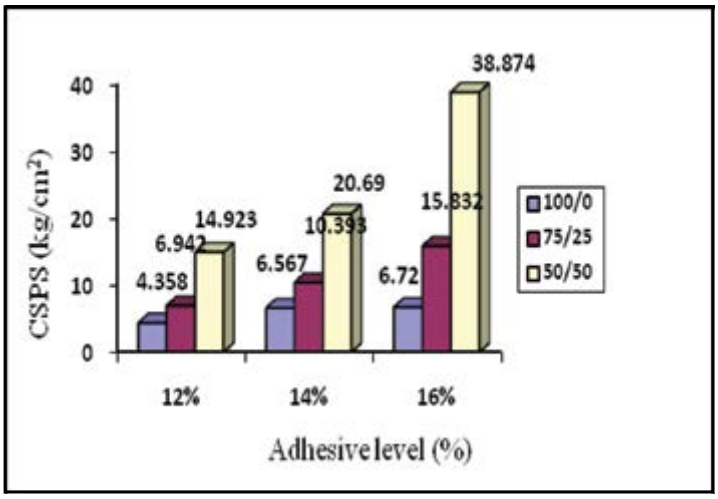

Figure 5. Effect of Cacao Peels, Bagasse, and AdhesiveCompositionon CSPS Value of Particle Board

Internal Bonding (IB)

Internal bonding is obtained by glueing the surface of the test board sample using epoxy adhesive on the iron block, then the iron block is drawn in the opposite way. In Figure 6 it can be seen that the more fiber and the increase of adhesive level, the higher of the IB value (Marpaung, 2015). IB values obtained ranged from 1.984 kg/ cm^2-10.096 kg/cm^2. The highest IB value is generated from particle board with 50:50% composition and 16% adhesive content. While the lowest IB value is generated by particle board with 100: 0% composition or without fiber with 12% adhesive level. In accordance with the research of Iskandar and Supriadi (2013) which yields IB value of the highest sugarcane particle board of 2.33 kg/cm^2 with 10% UF adhesive level. In addition Maloney (1993) stated that the value of IB is also influenced by the water content of particle board sheets. Test results of cacao peels and bagasse particlesboard showed that they were in accordance with JIS A 5908 (2003) and SNI 03-2105-2006 which required at least 1.5 kg/cm^2. While for the FAO standard (1996) does not requiretesting the value of IB

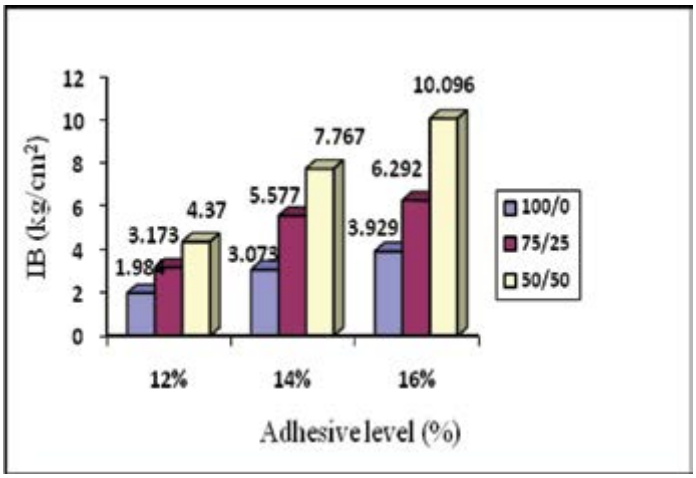

Figure 6. Effect of Cacao Peels, Bagasse, and Adhesive Composition on IB Value of Particle Board

Conclusion

Variations in the particle composition of the cacao peels, bagasse, and adhesive content affect the physical and mechanical properties of the particle board. The best particle board is obtained on the composition of the cacao peels : bagasse 50: 50% with adhesive content of 16%. The physical properties of the particle board were produced according to JIS A 5908 (2003), SNI 03-2105-2006, and FAO (1996) standards. Based on the percentage of particle board density obtained, the particle board produced includes the type of medium density particle board that can be used for the top of the table, cabinets, bedding, etc., and high density particle board which can be used for making separation wall, door and others.

ACKNOWLEDGMENT

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Improving The Four Stage Performance Savonius Wind Turbine With Additional Darrieus Blade

Ruzita Sumiati1, a, Hanif1,b and Adriansyah1,c

1Politeknik Negeri Padang, Padang, Indonesia

aRuzitasumiati@pnp.ac.id, b Hanif.hamzah71@gmail.com, c adriansyah64@ymail.com

Keywords: Renewable energy; Vertical axis wind turbine; Savonius rotor; Low wind speed, Hybrid

Abstract. The focus of this project is to enhance the performance, self-starting, of vertical axis wind turbin (VAWT) combining a four stage savonius with Darrieus Blade in low wind speed region. it is important that the blades of small wind turbines start rotating at the lowest wind speed. Wind turbine converts wind's kinetic energy into mechanical energy which is then converted into electrical energy. Indonesia is a country that has a low wind speed to maximize the use of wind energy that is a challenge to extract wind power optimally. In this paper, presented the experimental method to compare the effect of some of the additional Darrieus blade and non-the additional Darrieus blade from the construction. Achieved Self-Starting by using this combination is 0,955 m/s with additional two darrieus blade and 0,829 m/s with additional four darrieus blade.

Introduction

Research on the development of renewable energy is currently growing significantly due to the increasing demand for energy in the community and enhances air pollution and global warming caused by the use of fuel from fossil sources. The use of fossil-fueled electrical energy has an effect on increasing the level of emissions (CO2) in the air, resulting in the greenhouse effect. In addition, the fossil energy source is also non-renewable which will one day run out.

One of renewable energy sources that can develop is wind energy where this energy can be produced by using a tool called a wind turbine. The wind turbine converts the kinetic energy of the wind into mechanical energy. Shaft of the turbine has the same axis with generator that will generate electricity.

In the low wind speed area, it is a challenge to extract wind power optimally. Indonesia is one of the countries that have low wind speed. Map of the distribution of wind speed in indonesia fig.1 :

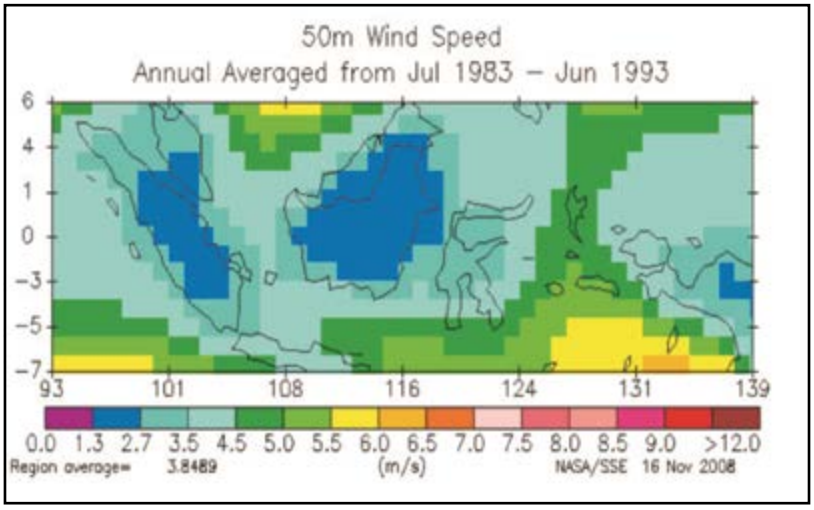

Fig .1 : Map of the distribution of wind speed in indonesia

To improve performance wind turbine in low wind speed region Chong et al [1] studied the design of improved wind turbine performance that can operate efficiently in urban environments that have very low wind speeds. This study presents a new design of turbines that have a cross axis of the wind that is vertical or horizontal. Korprasertsak, N et al (2) studied about improving VAWT performance by adding wind booster so that the wind turbine operates well for low wind speed, Aziz Pda at al. (3) examines the simulations on VAWT airfoils operated at low wind speeds.

VAWT work well in places with relatively low wind strength, and constant winds, that can accept wind from any direction. Savonius is one type of VAWT has a good self starting but low efficiency, darrieus has good efficiency at low wind speed and no self starting. Combining the two types of VAWT types is believed to be capable of producing better performance at low wind speed areas. Z. Anjum et al.[4] mesuared the hybrid configuration of Savonius-Darrieus VAWT has an efficiency of 37%. Ali [5] evaluated the performance of the combined Darrieus-Savonius turbine both theoretically and experimentally. the combined Darrieus and Bach type Savonius turbine would self-start at low wind speeds since the power and torque coefficients were higher than other type. Gupta et al. [6] experimentally evaluated the performance of a combined two-bucket Savonius and three-bladed Darrieus rotor within overlap range of 16.2%-25%. A maximum Cp of 0.25 was obtained at 20% overlap at a low tip speed ratio of 0.32. Gupta et al. [7] again made a comparative study between a three-bucket Savonius rotor & a combined configuration of a three-bucket Savonius and three-bladed Darrieus rotor within overlap range of 16.2%-35%. The maximum Cp of the combined rotor without blockage effect was higher than the Savonius rotor, and it was reported to be 0.51 at a low tip speed ratio of 0.61. Wakui et al.[8] studied the savonius mounted below the Darrieus system exhibited a better Cp, which was 0.18.

In this paper, it has been carried out a development of wind turbine design in accordance with the condition of the wind potential of Indonesia. In order to extract the maximum possible power, it is important that the blades of small wind turbines start rotating at the lowest wind speed that has optimal self-starting in low wind speed region.

Methodology

The methodology involved two stages namely:1) Design and manufacture 2). Experimental Set-Up

1. Design and manufacture

The design of VAWT combine savonius and darrieus . Savonius wind rotor is constructed simply of two vertical half cylinder. The model have four stage and between the stage with the other one twisted 90^0 fig 2 and the combined construction between the two blades is shown in fig. 3



Fig.2 Savonius Model



Fig. 3 Combining Savonius- two Darrius blade

Table1 Specification details of Savonius-Darrius VAWT mode

Shape of the savonius blade = ½ cylinder vertical
Number of savonius blade = 2
Number of stage = 4
Overlap ratio (β) = 0,2
Aspek ratio (α) = 1,7
Swep Area (A) savonius = 1,62 m^2
Swep Area (A) Darrieus = 1,8962 m^2
Number of Darrieus blade = 2, 4
Material of blade = alluminium sheet (0,8mm)
Material of frame blade = stainless steel hollow (3mm)
Number of open end plate = 8

1. Experimental Set-Up

Combination four stage savonius–darrieus blade is installed at the Laboratory in Mechanical Engineering Politeknik Negeri Padang. A number of preliminary tests have been carried out on the device, which has operate successfully. The following is an installation of an experiment (Fig 4)

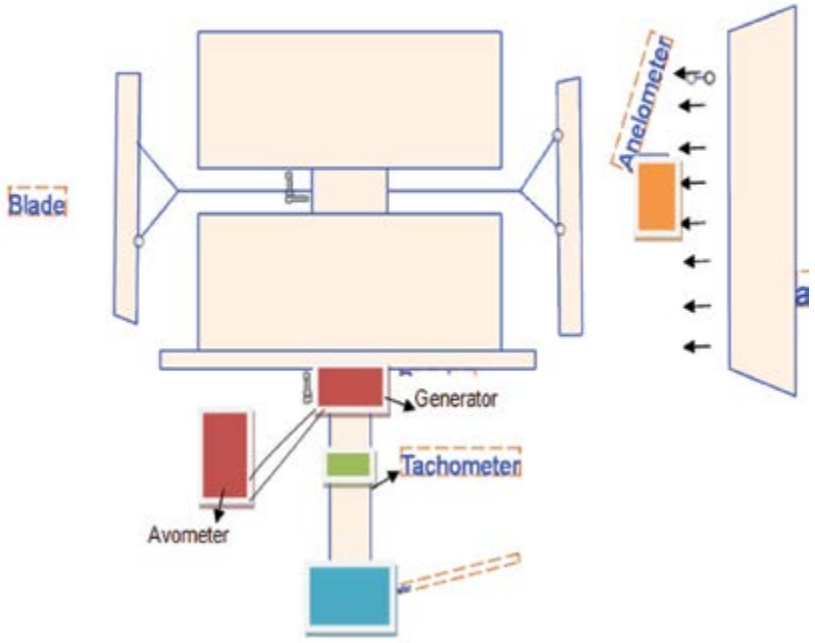

Fig 4. Experimental Set-Up

The measuring instruments used in testing wind turbines are as follows: Anemometer (LCA6000VT) is a device used for measuring wind speed; Tachometer (DT-2234C) is an instrument measuring the rotation speed of a shaft; Avometer is electrical measuring instruments (current, voltage and resistant). Generator Specification is Star Connection Permanent Magnet, output 300 watt

Experimental Results

The experimental result for self starting wind turbine is displayed by the table. Measured data is wind speed at the initial rotation of the wind turbine, data is taken 5 times for each turbine combination

- Four stage wind turbine (A)
- four stage savonius – 2 blade darrieus combination (B)
- four stage savonius- 4 blade darrieus combination (C)

Number	A m/s	B m/s	C m/s
1	1.227	0.911	0.820
2	1.172	0.987	0.784
3	1.189	1.030	0.893
4	1.208	0.952	0.855
5	1.161	0.896	0.791
average	1.191	0.955	0.829

Table 2 describes the self-starting value. Self-starting of each turbine combinations four stages savonius is 1,191 m/s, the combination of four stage savonius–2 blade darrieus is 0,955m/s, and four stage savonius-4 blade darrieus combination is 0,829m/s. From the three conditions, four stage savonius- 4 blade darrieus combination has the best self-starting.

The experimental result of turbine speed compare with wind velocity is displayed by the graph (fig.5).

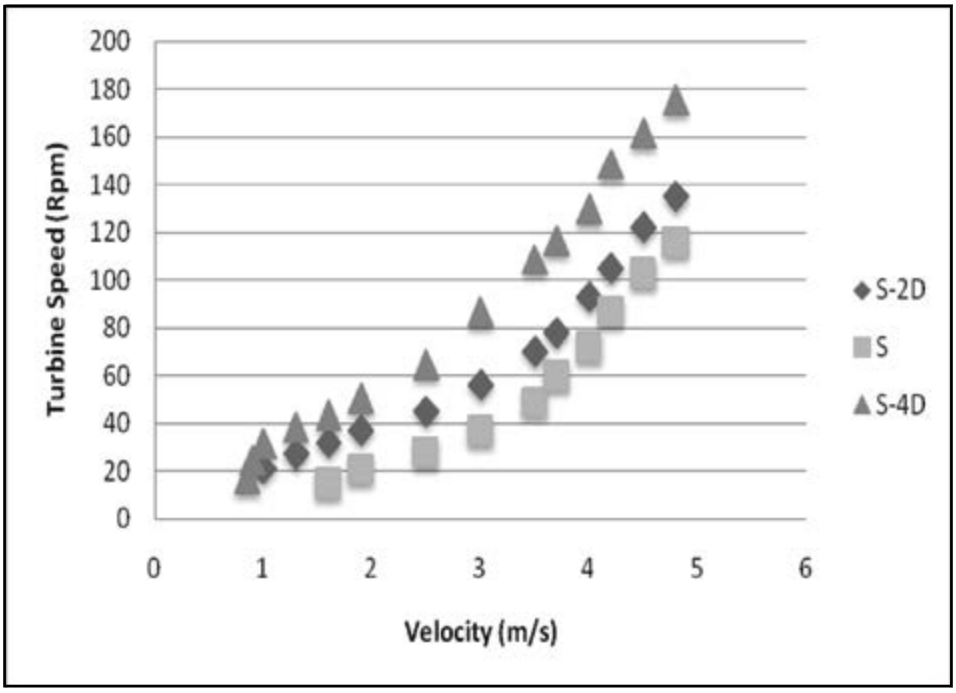

Fig 5. Wind turbine rotational speeds with wind velocity

The figures 5 describes the four-stage savonius rotor (square lines grey-S), savonius-2 blade darrieus (square line black S-2D) and savonius-4blade darrieus (triangle black S-4D). Rpm savonius-4blade darrieus is the highest from the others.

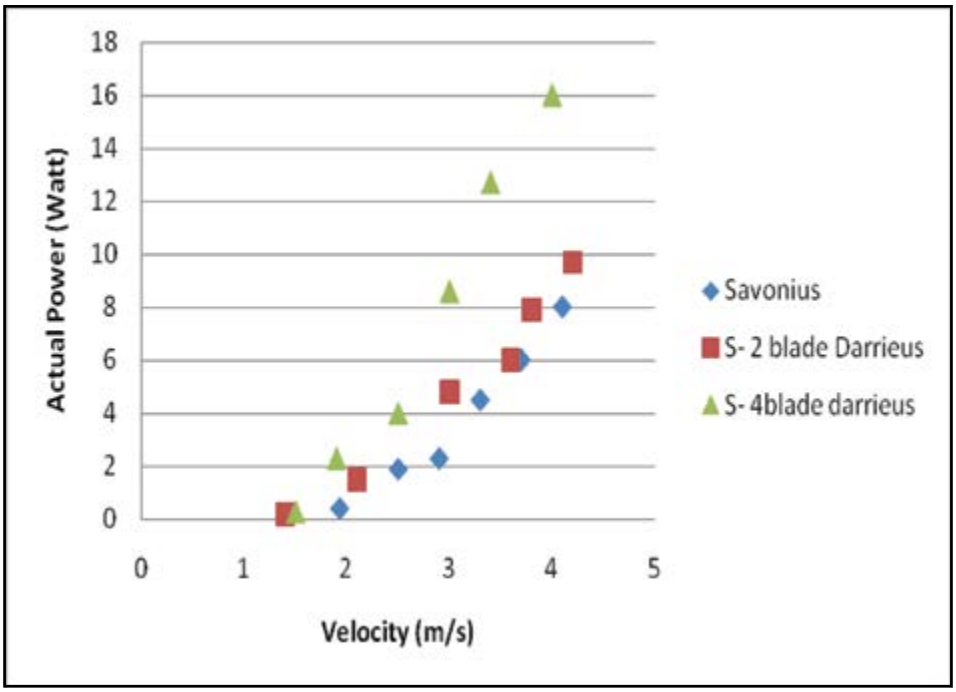

Fig 6. Actual power output of the turbine in low wind speed

The actual power output of the turbine has been compared with various wind speed in the Fig.6. With the increase in wind speed that makes actual power rise. The four stage savonius-4 blade darrieus turbine has better actual power compared to the other turbines which are proportional to the increase in rpm rotor.

Conclusion

From the above discussions, it is concluded that installing of Savonius- 4 blade Darrieus rotor result good performance compared with 4 stage savonius. Combined Savonius-Darrieus turbine may be used for small-scale applications and low wind speed applications

Acknowledgements

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Liquefaction Preventif by Cement Column Method:

A Case Study in Padang City

Liliwarti1,a, Satwarnirat2,b, Silvianengsih3,c

[1]Civil Engineering Department, Politeknik Negeri Padang, Padang, Indonesia

[2]Civil Engineering Department, Politeknik Negeri Padang, Padang, Indonesia

[3]Civil Engineering Department, Politeknik Negeri Padang, Padang, Indonesia

aliliwartie@gmail.com, bsatwarnirat@gmail.com. csilvianengsih@ocketmail.com

Keywords: **Liquefaction; Shear strength; Cement column.**

Abstract. Padang, a capital city of West Sumatera, is an earthquake-prone area, where the earthquake can cause liquefaction hazard which cause damage to the buildings and infrastructure facilities. On September 30, 2009, an earthquake struck Padang city with 7.6 in Richter scale cause heavy damage on building and infrastructure, which also rendered a lots of buildings collapsed. Many geotechnical experts argued that the buildings collapse was due to the liquefaction triggered by the earthquake. Therefore, the study for prevention of liquefaction is really important for mitigation and reducing the impact of the earthquake. This paper discusses about liquefaction prevention by cement column method, where soil of potentially liquefaction is place in the test box, then grouting by cement with spacing 2x diameter (2D), 3x diameter (3D), 4x diameter (4D), and 5x diameter (5D). The test box was vibrated for 5 second for each variations. The shear strenght of the soil was tested before and after grouting. The result of analysis showed the spacing of 2D and 3D increases the shear strength value significantly, while the spacing of 4D and 5D does not increase the shear strength value. Based on the test results, the cement column method could be used for reinforcing the soil in preventing liquefaction with spacing 2D to 3D. The results of this study can be utilized by consultants and the community for the consideration of buildings contruction, and the government can also use it as the guidelines for the development of Padang city especially in contruction engineering field.

Introduction

Padang in West Sumatra is an earthquakes-prone area, as it is located at the subduction of three active tectonic plates of the earth, which cause this area become more vulnerable to tectonic earthquakes [1,2]. Earthquake in Padang on September 30, 2009, with 7.6 in Richter scale cause heavy damage to buildings and infrastructures, which also rendered lots of buildings collapsed. Many geotechnical experts argued that the buildings collapsed was due to the liquefaction triggered

by the earthquake. Therefore, the study for prevention of liquefaction is really important for mitigation and reducing the impact of the earthquake [3]. This paper discusses about prevention of liquefaction by ce

ment column method.The cement material used for grouting the potentially liquefy soil, a soil–cement, is forming a strong bond, therefore it can fill the void of the soil which can raise the ability of the soil for vibration. It is hoped that results of this study can be utilized by consultants and the community for the consideration of buildings contruction, and the government can also use it as the guidelines for the development of Padang city especially in contruction engineering field.

Literature Review

Liquefaction. Liquefaction is the loss of the strength of soil because of ground shaking, such as earth quake, thereby the soil can not support the weight. Liquefaction usually occurs on the water-saturated soil in which water fills the pore of the soil. When the soil is shaken, water gives pressure to the soil particles which affects soil density. Pore water pressure increases and the soil loses its bearing capacity, consequently it can not support heavy structure which cause the building collapses [4,5]. Liquefaction generally occurs to the poor graded soil like SP (Sandy Poor) or usually called loose sand because this type of soil holds more water than the good graded soil. Hakam et all, studied that condition of the soil layer in Padang city, the result showed that the soil layer was dominated by fine sand and potentially liquefaction with a very high level [2]. Muntahar et all, investigated the application of cement columns for sandy soil, where the results showed that with the installation of cement columns could reduce the potentially liquefaction of sandy soils [3]. The assessment of potentially liquefaction by using Cone Penetration (CPT) Test . CPT measures cone head resistance (q_c) and sleeve friction (f_s) by using ASTM D 1586.

Soil Improvement by Grouting Method for Granular Soil. Grouting is a liquid mixture of cement and water which is injected with pressure into the soil, pores, fractures and rock cracks, subsequently the liquid in a specific time becomes physically and chemically solid. Cement and water are suitable for coarse-grained soil, whereas for fine and medium-grained soils, sodium silica, acrylates and polyurethanes may also be used [6,7]. Material grouting used consists of:

a. Cemen liquid

b. Additive materials such as aluminum, sodium carbonate, sodium silicate and phosphate.

c. Fly ash or bentonite

The grouting material is influenced by the permeability of the soil, and this material will fill the void of soil.

Table 2.1 Grouting material based on soil permeability.

Koeficien permeability (k)	Material grouting
5×10^{-4} m/sec	Cement Slurry
1×10^{-5} m/sec	Chemical + clay
1×10^{-6} m/sec	Chemical

The empirical formulas determine the diameter of the grouting hole, by using Karol formula as below.

$$R = 0.62 (qT / n) 1/2 \quad (1)$$

where,

R = the diameter of the grouting hole,
q = the capacity of the grouting material
T = hard time, n = porosity of soil

Cement is a industrial product of raw material alloys: limestone , clay or other substitute materials with the final result of bulk solids, regardless of the manufacturing process, which is hardened or fossilized in mixing with water. Type of cement consists of type I cement to type V cement.

Earthquake Intensity. Earthquakes are the vibrations which occur on the earth as a result of collisions between the plates, active fault activity, volcanic activity, and rock collapse. Parameter used to determine the level of damage is MMI (Modified Mercalli Intensity). The range starts from I to XII scale. Magnitude is an earthquake parameter measured based on the occurrence of a particular region due to shock at the source [8]. The unit used is the Richter Scale (SR).

Research Methods

West coast of Padang city generally consists of fine sand of soil layers, there for is a need to research on potential liquefaction to minimize the impact of liquefaction. In this study reviewed 20 locations in Padang city. The secondary data was collected is Cone Penetration Test (CPT) consist of 20 point which spread in Padang city.

The laboratory tests :

a. Specific Grafity, ASTM D 854

b. Grain size Analysis, ASTM D 422

c. Vane shear test, ASTM D 2573

Liquefaction analysis is used to categorize levels of potential liquefaction: hight liquefaction, liquefaction and no liquefaction. To minimize the impact of liquefaction, a small size modeling is

conducted by using cement column method by making the test box 50 cm x50 cm x 50 cm, the soil sample is compacted into the test box, and then the column of cement (grouting) with variation of 2D spacing , 3D, 4D and 5D. Each variation of soil samples in the test box is shaken for 10 seconds. Shear stress of each sample was tested before and after shaking with curing period 7 days. The diagram of outlining the proposed scheme (Fig 3.1).

No	Location	Safety Factor	Settlement (cm)	Overal Liquefaction Potential	Remaks
1	AP1	< 1	56.66	61.83	High liquefaction
2	AP 2	< 1	61.05	64.11	High liquefaction
3	A P 3	< 1	51.43	62.68	High liquefaction
4	AT 1	< 1	78.57	11.72	Liquefaction
5	A T 2	< 1	92.04	13.33	Liquefaction
6	A T 3	< 1	87.70	9.47	Liquefaction
7	A T 4	< 1	90.54	13.11	Liquefaction
8	And1	1	3.69	4.85	No Liquefaction
9	And 2	1	5.09	0.12	No Liquefaction
10	And3	1	3.25	0.8	No Liquefaction
11	Beo	< 1	0	5.01	Liquefaction
12	ByP 1	< 1	12.28	13.8	Liquefaction
13	GP	< 1	42.67	46.17	High liquefaction

Fig 3.1. Diagram outlining the proposed scheme.

Results And Analysis

The liquefaction potential with CPT test. CPT test data was obtained from 20 point locations which spread in Padang city, the result of analyzed is in Table 4.1.

Table 4.1 The potential of liquefaction in Padang city.

No	Location	Safety Factor	Settlement (cm)	Overal Liquefaction Potential	Remaks
1	AP1	< 1	56.66	61.83	High liquefaction
2	AP 2	< 1	61.05	64.11	High liquefaction
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11	Beo	< 1	0	5.01	Liquefaction
12	ByP 1	< 1	12.28	13.8	Liquefaction
13	GP	< 1	42.67	46.17	High liquefaction
14	And	> 1	0	0	No Liquefaction
15	ByP 2	< 1	37.04	36.56	High liquefaction
16	ByP3	> 1	0	0	No Liquefaction
17	ByP 4	> 1	0	3.03	No Liquefaction
18	ByP5	< 1	51.97	41.85	High liquefaction
19	ByP 6	< 1	42.75	56.38	High liquefaction
20	GM	< 1	4.18	10.09	Liquefaction

Table 4.1 shows that from 20 points location, it can be categorized as 7 points location is in high liquefaction, 7 point location in moderate liquefaction and 6 point location has no potential of liquefaction. Mainly the potential of liquefaction location is located along the west coast of Padang city.

Sieve Analysis. Figure 4.1, The soil sample is in a potentially liquefy range, so the soil is categorized as potentially liquefaction.

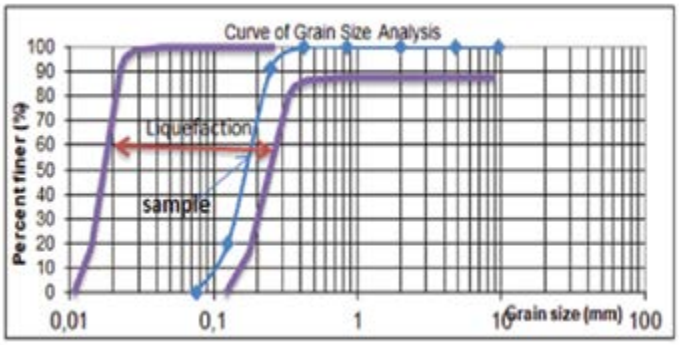

Fig 4.1 Sieve analysis.

Cement Column Method In Laboratory Test (Small Size Test). Soil was compacted in a test box, and then was grouting with cement column with 2D, 3D, 4D and 5D spacing. The test box was vibrated for 10 seconds, before and after vibrated the soil sample was tested of shear strength (Fig. 4.2 and 4.3).

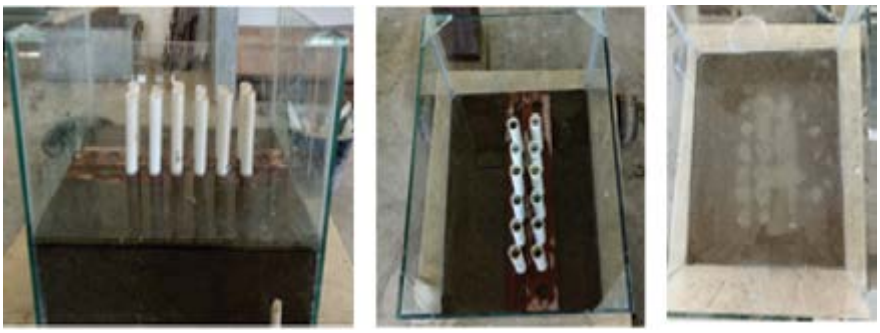

Fig.4.2 Cement column in test box.

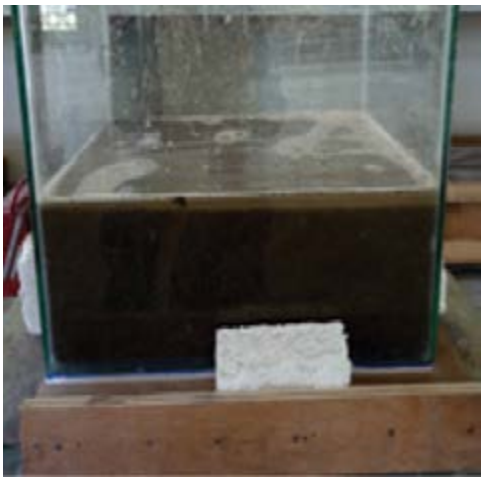

Fig.4.3 The sample after vibration.

Table 4.2 Shear Strength and Setlement after grouting.

Data	Shear Stress (kPa)	Settlement (cm)
Original Sample	3,14	15
Grouting with spacing 4 cm (2D)	16,8	1
Grouting with spacing 5 cm (3D)	30,12	5
Grouting with spacing 6 cm (4D)	10,45	10

Note :

Original Sample : without column cemen

D : Diameter

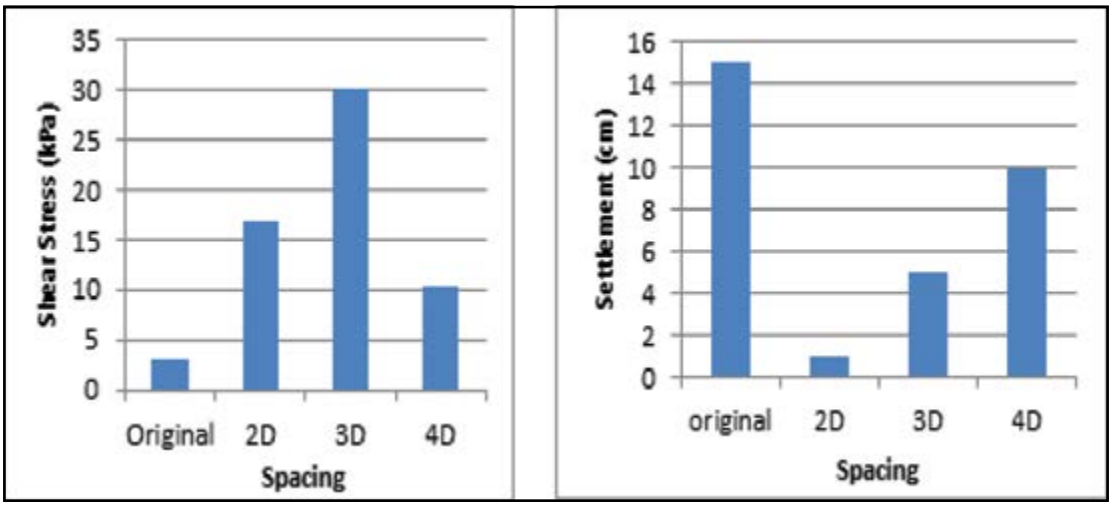

Fig.4.4 Shear stress with spacing and settlement with spacing.

Figure 4.4 shows that by using spacing 2D and 3D, the shear strength of the soil sample is increase, which is due to the distribution or radius of the grouting material that fill the void to form a strong bond. It causes the shear strength increase and the setlement decrease, while at spacing 3D and 4D dispersion of grouting material (radius) does not overlap each other. Therefore there is a void space that is not filled by grouting material, thus the strength becomes weak and the settlement becomes greater.

Conclusion

The results of this study shows that Padang city have a high potential of liquefaction along the west coast of Padang city. In order to minimize the effect, cement column method by spacing 2D to 3D are used in this research, with the results the soil shear stress increase significantly, and the settlement becomes smaller. The columns with spacing 4D and 5D do not exhibit a significant increase of soil shear stress, while the settlement becomes greater. Based on the test results, cement column method with spacing 2D to 3D could be used as a reinforcement of the soil for prevention of liquefaction.

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Comparative Study of Solar Thermal Application in Australia and Malaysia

Hooi Peng Lim1, a* and Muhammad bin Mustapha2, b

1Politeknik Kota Kinabalu, No 4 Jalan Politeknik, KKIP Barat, Kota Kinabalu Industrial Park 88460 Kota Kinabalu Sabah, Malaysia

2Politeknik Ibrahim Sultan, KM 10 Jalan Kong Kong 81700 Pasir Gudang Johor, Malaysia

alimhooipeng@polikk.edu.my, bmdm587@yahoo.com

Keywords: Solar thermal; Sustainability; Solar water heating system; Green technology.

Abstract. Sustainable development has become a primary policy paradigm among all the developed and developing countries for the past decades. It calls for attention and implementation regarding worldwide current life style with its high natural resources depletion. Hence, it leads to decay of environmental quality and increase the socio-economic disparities. At the same time, abundant researches have been carried out to interpret the green technology into solar thermal applications. There is a shift in this concept from global perspective to local perspective when the critical climate changed due to the pollution of CO_2 emissions in widely consumption of fossil fuels and petroleum. Hence, both developed and developing countries attempt to promote the solar technology as the catalyst of their socio environmental policy. Sustainability and renewable sources is beginning to make the hop from illusory, global scale thinking to concrete implementation. In the present study, Australia and Malaysia have been chosen in making comparison of solar thermal technology applications. As the developed and developing countries, both Australia and Malaysia have postulated the greatest potential in advocating the solar water heating (SWH) systems to the local publics. The focus of the case study is to critically evaluating the technology applications, economic impacts, regulatory systems, social acceptance and environmental impacts on solar water heating systems implementation within these two communities. The study will contribute to achieve the energy saving, renewable energy utilization, as well as carbon emission reduction in water heating system application in these countries.

Solar Thermal Energy Conversion Technology

To date, there is an urgent necessity to develop measures endeavouring at creating project harnessing renewable energy technology, promoting local and sector markets and cultivating business opportunities relevant to solar thermal. This is evident especially for all developed and developing countries. Comparative study on solar thermal energy conversion technology between Australia and Malaysia covers solar water heating system specifically. Recent technologies of thermal energy storage (TES) using phase change materials (PCM) for various applications is widely discussed particularly for concentrated solar thermal power (CSP) generation systems [1].

Local climatic conditions and the applications serve the requirements to design and develop the most feasible solar water heating systems. On average, Malaysia receives about 4.96 kWh/m^2 of daily solar radiation in a year [2]. The daily solar radiation received in Australia is approximately 5.89 kWh/m^2 [3]. Many enhancements have focused on the problems related with least or low ambient temperatures as well as the change in solar radiation ratios concerning the season, expensive components, overheating and corrosion. The following section will discuss on the major energy issues and key operational temperature of solar water heating system in Australia and Malaysia respectively. Figure 1 and 2 illustrate the mapping of the average daily solar radiation of Malaysia and Australia accordingly.

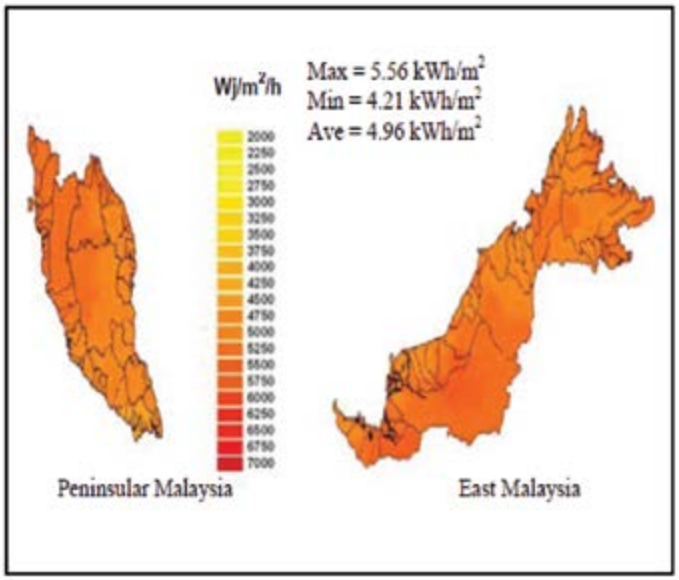

Fig. 1. Average daily solar radiation of Malaysia

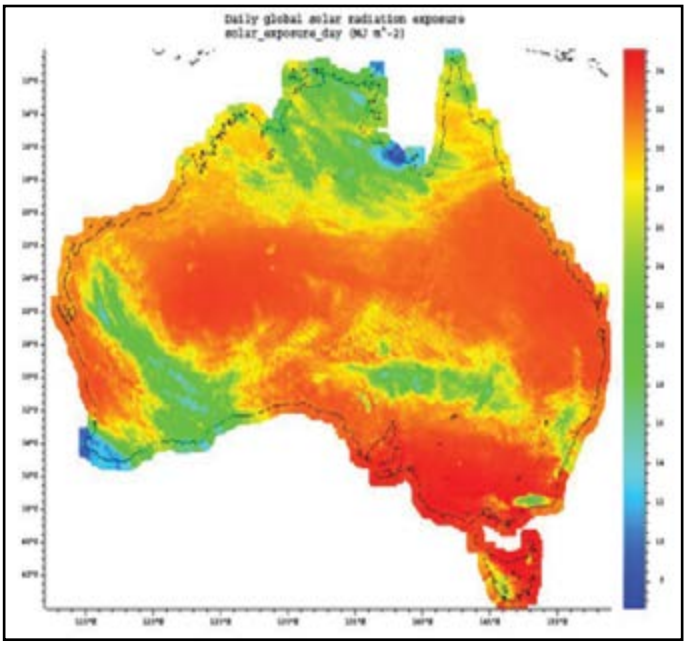

Fig. 2. Average daily solar radiation of Australia

Australia

Availability of the solar thermal technology and presence of sun energy resources provide a good opportunity for Australia to make solar thermal technology the major electricity generation technology. Lovegrove and Dennis suggested that Australian continent has the highest average amount of solar radiation per square metre in a year, ranging from 1500 to 1900 kWh/m^2 per year [4] through their study of solar thermal system in Australia. Australia has the exceptional insolation over most of its continent. It is usually well appreciated. Utilization of this solar input for electricity generation via thermal conversion has been largely developed and supported for remote areas. Although it has been a late starter in the quest for new energy sources however it has been advanced for the past few decades in great strides. It is even excelling expectations of those working in the field. Trends over the past few years are highlighted in Table 1 which lists several solar thermal power systems in selected regions for their noteworthy aspects.

State	Location	Capacity kW
New South Wales	Liddell Power Station	1,000
Victoria	Ballarat Solar Park	300
Queensland	Cloncurry Solar Farm	2,128
Queensland	Kogan Creek Solar Boost Project	44,000
South Australia	Whyalla	56
Northern Territory	Hermannsburg	192

Table 1. Solar thermal power systems in selected regions (Projects with a power rating less than 30 kW are not listed) [5]

The solar water heating system uses natural solar thermal technology which is where solar radiation is converted into heat and transmitted into a transfer medium such as water, water antifreeze or air [6]. On the other hand, the combustion of fossil fuels for energy in current water heating system, industrial processes and transportation has caused a significant increase in the emissions of greenhouse gases to the atmosphere [7]. Despite of the collaboration between governments sponsored research departments as well as private sector industrial in solar thermal power systems, several energy issues have been identified in the application of solar water heating system. The issues are including technological application, design and the functional failures [8]. Firstly, the technology issues, particularly the failure of the absorber. For example, when the absorber is exposed to a very cold condition during winter where the temperature would drop below zero or the radiation would cause the temperature to fall below freezing; the water in the panel would burst the pipe and seams. Besides, the unwanted disaster such as hail storm which is common in Australia would cause damage to the panels too. The early design of using a glass flat plate which was not reinforced by heat treated process was more susceptible to smashing from hail stones. Secondly, the proper design of the solar water heaters could reduce the price of production and be more cost competitive. In Australia, the integrated tank model of solar water heaters is offered to the public for

domestic application. One or two absorber panels would be connected directly to the storage tank to get the solar radiation and naturally rise into the tank setting up a circulation system. Nevertheless, the design of these systems was said to be woeful. No manufacturer made any effort to integrate the design into the house design.

Lastly, functional failure is more critical in its design for installation. In Australia, the potential of solar thermal industrial system which established the financial aggressiveness of large solar thermal system for industrial process is working at temperature below 80°C [9]. The third generation systems now use panels that are better suited for installation on Australian home roofs and are more resistant to hail damage. The location of the tank is now moved to the ground where it is more able to be maintained and where the gas, the preferred booster energy can be more easily installed. In this way, the optimum amount of solar contribution in used and the water that fails to meet the operating temperature of 80°C is being heated by the gas.

Malaysia

Malaysia's climate has comparatively high levels of temperature and humidity. Throughout the year, the temperature ranges between 22°C to 33°C and the monthly solar radiation is approximately around 400 – 600 M/m^2 [10]. In Malaysia, solar thermal energy is used in many remote and isolated industrial applications. It is renowned that solar thermal is the conversion of solar radiation into heat. Among renewable energy systems, solar thermal is considered as the most economical alternative to the household. Solar water heating systems are very favourable in Malaysian household. However, the high initial cost of this system lead to many is still opting for electric water heaters. The conventional water heaters are affordable and easy to install. Solar assisted heat pump (SAHP) is commonly used for hot water supply among local publics [11]. Figure 3 shows the diagram of solar assisted heat pump system.

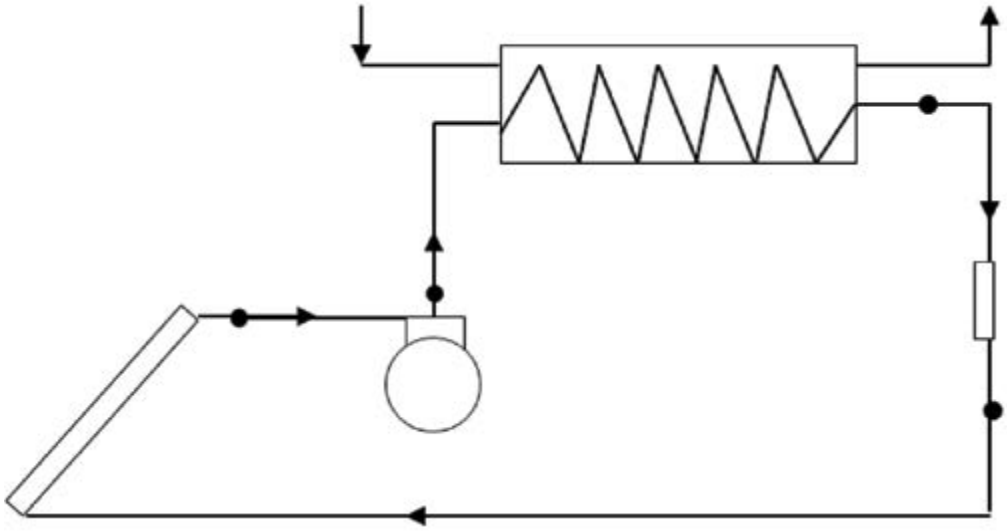

Figure 3. Diagram of solar assisted heat pump system [11]

The refrigerant passes through the compressor, capillary tube, evaporator and solar collector in

turn consistently to thermodynamic state points. The system is able to heat water to 55°C at night with the energy available from the ambient surrounding. The issues of sustainable development and renewable energy in Malaysia are frequently addressed yet only a minority of authorities are actually putting words into action. Like all the developing countries, solar thermal technology in Malaysia faces several issues such as expensive solar technology, lack of expertise, lack of public interest and insufficient funding. Solar thermal technology is still in its infancy in local publics. Installation of solar panels is very costly. Despite of the expensive charged of installation solar water heating system, there are only a few specialists or consultants who truly understand and know how to effectively save the energy in the long term. Private sector investors hardly consider solar technology in their projects due the high capital investment.

Environmental and energy issues are generally ignored by the local publics. With fossil fuels and petroleum still available to the public, alternative technology tends to be overlooked. Lastly, funding to support solar thermal technology is insufficient despite of local government incentives. To date, there are no specific loans from the financial sectors or private sectors to uplift the development of solar energy technology. Their concern is always profit purposive in short term rather than the long term. Therefore, the need of solar industry with its fundamental concepts, world energy scenario, highlights of researches done to upgrade solar industry, its potential applications and barriers for better solar industry in future in order to resolve energy crisis must be the priority in renewable and sustainability concern. Apparently, the improved thermal conductivity of solar water heating system in this country should be enhanced with a higher solid volume fraction to minimize the temperature difference between absorber and heat transfer fluid [12].

Conclusion

In summary, human stimulated climate changed is a crucial stress, pronominally on environmental, social and economic systems. These systems have affected by pollution, increasing renewable energy demands, and non-sustainable management practices. Both environmental and economic systems are delicate to the high rate of climate change. Hence, solar water heating technology plays an essential role to adapt the solar thermal technology to solve the climate changed issues. Better technology applications, availability of financing and information exchange, awareness of green technology implementations and institutional policies of local authorities are the driving forces to both developed and developing countries to tackle the global warming issues.

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Development of Gambir Adhesive Mixing Machine with TKKS Fiber Screw System

Junaidi[1], Maimuzar[2], Adriansyah[3], Ikhsan[4], Tuti Angraini[5]

Politeknik Negeri Padang, Kampus Limau Manis, Padang, 72590, Indonesia
E-mail: junaidisyampoltek@gmail.com

Abstract- Oil palm empty bunches (OPEB) are solid waste from oil palm plantation industry with fiber content of ± 70%, and can be used as a booster composite board. From the results of previous research, the physical and mechanical properties of composite board from OPEB fiber of mechanical defiberation that fulfill SNI standard are long fiber at 900 RPM and fiber spin at 600 RPM. However, from the test of physical and mechanical properties of the board, each board between the left, middle and right sections of the gap occurs very large properties, especially the flexural strength and compressive strength of the fiber. This is due to the uneven distribution of adhesives, so that some parts of the board are too much adhesive and the rest are few. This situation occurs because the process of mixing and stirring between OPEB fiber and gambir adhesive is still done manually by hand. With this process in addition to mixing very hard and long time also leads to quick fatigue workers To improve the efficiency of adhesive and fiber mixing process and uniform adhesive spread on all sides of the board it is necessary to use a mechanical adhesive mixer with fiber mechanically.

This research to design and model the OPEB fiber stirrer machine with a screw syringe adhesive to obtain the same mechanical properties of the board or close to all sides. Engine design results obtained engine capacity ± 5 kg / one stirring for 15 minutes, 2.5 HP power drive, 3.5 cm diameter shaft axle with 93 cm length. The machine consists of a mixing unit, a body unit and a drive unit. The agitator unit comprises an inner screw and an outer screw position of 60 cm opposite screw direction, screw stirrer and shaft handle. The body unit consists of a top cover and a stirrer house. The drive unit consists of a driving motor, a reduser, a belt and a pulley. On the stirring shaft installed 4 pieces of outer screw Ø 29 cm and 4 screw in Ø 22 cm and both with plate thickness 0.4 cm and 1.5 cm wide. From the results of testing the performance of the machine obtained the fiber material and adhesive mixed homogeneously and from the color looks very big difference is the color of the fiber before stirred yellowish color with the form of fibers that are not straight, while the results of bright brown colored mixture on all fiber and fiber form straight -right and easy to set up.

Keywords - *Composite boards; TKKS fiber; Adhesive mixer; System screw*

INTRODUCTION

Oil palm empty bunches (OPEB) are solid waste from oil palm plantation industries, estimated in Indonesia at ± 9,244,679.3 tons (Deptan, 2015). This OPEB fiber content ± 70%, can be used as fiber berkaret, matres, mattress, mat and raw materials fiber-based composite board.

The results of research on the manufacture of composite board in the form of particle board, such as making OPEB fiber into particle board (Anwar Kasim, 2007; Indra Mawardi, 2009), improvement of mechanical properties and physical properties of fiber (Abral 2012-2011). Fiber from sago plant can be increased its power as much as 254% and decrease the water absorption after soaked with NaOH (Abral, 2012b).

From the previous research, OPEB fibers have been produced by mechanical decomposition process with 4 kinds of fiber, ie dry fiber at 900 Rpm round, dry fiber at round 600 Rpm, mixed fiber (dry fiber 1-3 cm + petals) and wet fiber. Capacity of ± 250 kg / hour machine with decomposition of Mill hammer system (junaidi, 2016). The four types of fibers have been made of composite boards with some treatments. From the test results of the physical and mechanical properties of composite board that meets the SNI standard is a long fiber at 900 900 rounds and fiber at 600 rounds Rpm. Although each board between the left, middle and right there are differences in properties are very large, especially strength bending and compressive strength parallel to the fiber. This is due to the uneven distribution of adhesives, so that some parts of the board are too much adhesive and the rest are few.

This situation occurs because the process of mixing and stirring between OPEB fiber and gambir adhesive is still done manually by hand. With this process in addition to mixing very difficult and long time also resulted in workers fatigue quickly. To improve the efficiency of the adhesive and fiber mixing process and the uniform adhesion spread on all sides of the board it is necessary to use a mechanical adhesive stirring machine with the fiber mechanically.

The purpose of this research is to design / design and model the OPEB fiber stirrer machine with the screw syringe adhesive to obtain the mechanical properties of the board equal or close to all sides.

Research Methodology

A. Material and Device

Material consists of elbow iron size 6 cm x 6 cm x 0.4 cm, iron cylinder Ø 3 cm, strip plate size 2 cm x 3 cm, thick plate 0.2 cm x 120 cm x 240 cm. The driver uses 2.5 HP / 1500 Rpm electric motor, pulley, V type A belt, and reducer

Tools / machines for making components of stirring machines using lathes, milling machines, grinding machines, cutting machines, CNC, scrap machines, drilling machines, welding machines, and plate bending tools.

B. Method

The research was carried out in three stages, namely machine design, machine manufacturing and technical evaluation. Broadly speaking, the stages of this research are as in Figure 1 and the shape of the machine design as Figure 2

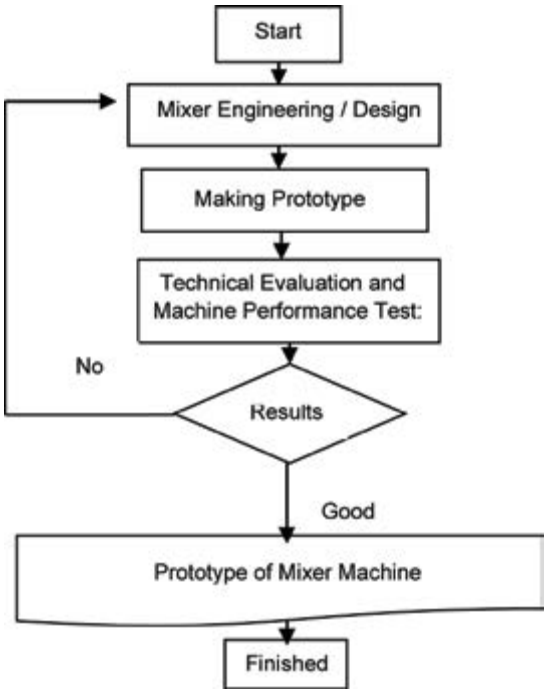
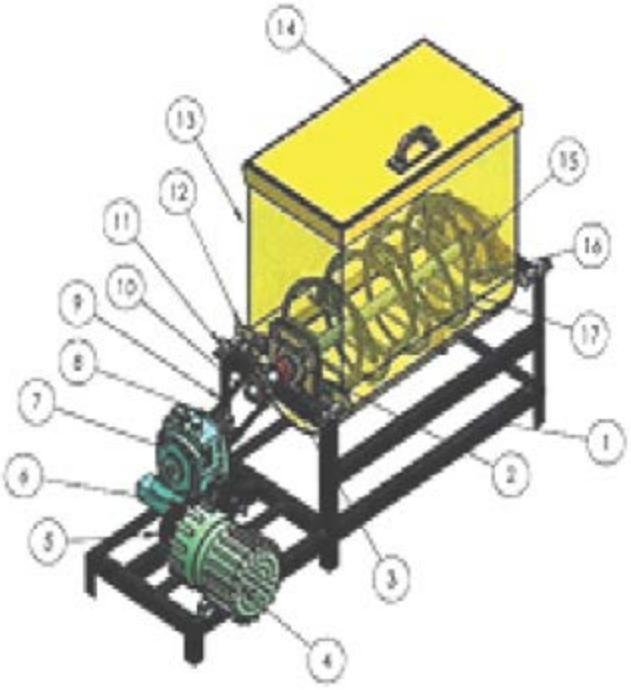


Figure 1. Research Flow Chart



Explanation:

1.	Frame
2.	Inner bearing
3.	Outer bearing
4.	Electric motor
5.	Pully
6.	V-Belt
7.	Speed Reducer
8.	Sproket
9.	Chain
10.	Stirrer Shaft
11.	Lock
12.	Locking Plate
13.	Stirrer house
14.	Close up
15.	Screw Stirrer
16.	Standard Bolt
17.	Stalk Screw

Figure 2. Mixer Machine Design Adhesive with OPEB Fiber

This machine consists of a stirring unit, a stirring house, a frame and a drive. The stirrer unit consists of screw stirrer, stirring shaft, bearing and pulley. In the stirrer shaft is installed 2 screw stirrers in the opposite position along 60 cm. Screw stirrer with an outer diameter of 29 cm and screw stirrer in an outer diameter of 22 cm. Form the stirring unit and its components as shown in Figure 3.

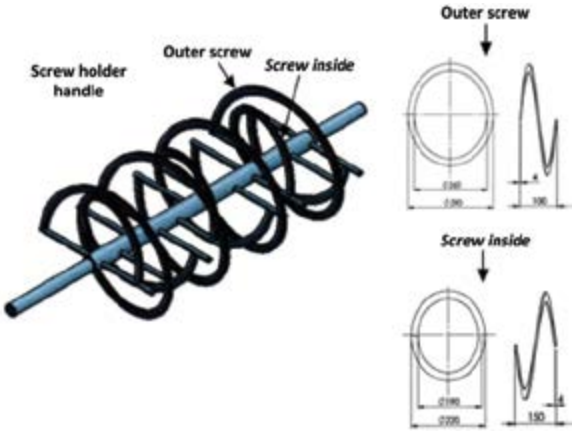


Figure 3. Mixer unit

Mixing unit The house of stirrer is made using stainless steel plate with 2.5 mm thick consisting of top cover with size 61 cm x 31 cm x 3 cm and stirring body with size 60 cm x 60 cm x 30 cm. In the stirrer housing is placed a rotating stirring unit can alternately move the fiber material mixed with adhesive.



Figure 4. Frame Unit

The frame unit is made from elbow plate 6 cm x 6 cm x 0.4 mm, with a length of 130 cm x width 40 cm x height 40 cm. In the frame unit there is a stirrer and drive unit holder.

After the engine design is ready then made component and assembling. Engine components are installed on the basis of the units adapted to be. The test was carried out without material with a stirring shaft rotation of around 150 rpm, then with 10 kg of OPEB fiber material with adhesive as much as 3 times. Observations were made on the conductor of the stirrer cylinder, repeated movement of left and right fibers and homogeneity of the adhesive with fiber.

RESULTS AND DISCUSSION

The result of the manufacture of the Fiber OPEB

Making the machine is done by making a stirring unit, frame unit, stirring housing unit and drive unit holder as in Figure 5.

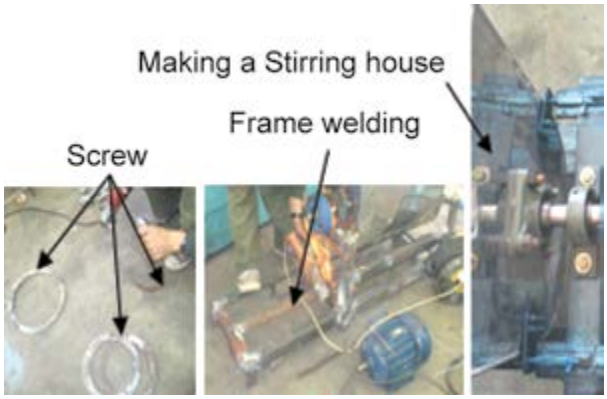


Figure 5. Preparation of the Machine Component

Some components of the agitating unit are, the outer screw 0.4 cm thick and 1.5 cm wide, the inner screw with the plate thick 0.4 cm and width of 1.5 cm. Both types of screw is made by cutting process using gas weld and then cut and bend to form thread as far as 10 cm with the amount of each 4 pieces. Long stirring aperture 93 cm, made with the process of lathe. The screw holder rod diameter 1.2 cm, the length of 12 cm as many as 6 pieces and 9 cm as many as 6 pieces made with the process of lathe. Then make a stirrer house with size 60 cm x 60 cm x 30 cm using stainless steel plate with 0.25 cm thick. Making a house mixer with cutting and bending process to form a semi-circle with a radius of 150 cm. Then the frame measuring 130 cm x 40 cm x 40 cm was made using a 4 cm x 4 cm x 0.4 cm elbow plate. Preparation of the frame by cutting and welding process, with length of 50 cm for reducer and electric motor stand, and 80 cm for stirring stand. After all the components of the finished machine unit is made then made a few holder units with drilling process before assembling on each unit and as a whole. The cradle is 2 seat bearing holder, 2 seat bearing seat, stand of reducer and motor drive holder. Some of the stands are as in Figure 6,

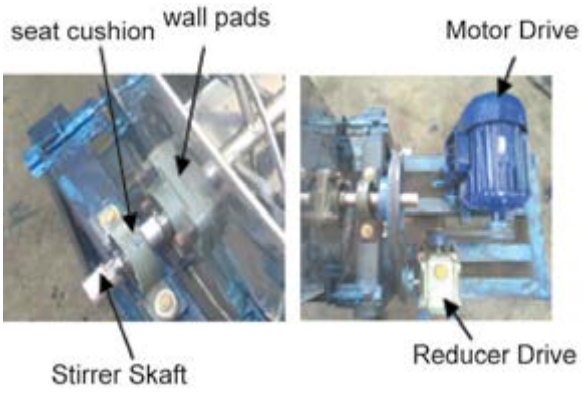


Figure 6. Stand of the Stirrer and Drive House

After all the stands are ready, then assembling at the stirrer house and frame. The assembling mixing chains are done inside the stirrer housing, by first installing the agitating shaft at the stirrer

housing hole (Figure 7). After that mounted wall pads and pads sit on both sides of the right and left rather than the shaft. Furthermore, the welding of the screw holder is applied to the stirrer shaft with the arrangement according to the position of the outer and inner screw, after which the outer and inner screw installation by welding process. Furthermore the installation of the driving unit of the electric motor and reducer,then mounting the belt on the pulley motor and reducer, and the sprocket chain is installed between the output shaft of the reducer and the shaft stirrer, next to the electrical control panel.



Figure 7. Assembling House Stirrer

Household stirrer mixer with a stirrer house using bolts and hinges, so that the stirrer lid can be opened and closed without being separated from the stirrer house. The stirring house in its use may be rotated left and right in the state of the still or moving stirrer unit, for it to be positioned from a sturdy stirrer housing to use a hinge lock which can be opened and locked. Lock hinges are installed four pieces in the left-right position of the house stirrer, mounted with bolts. After all the units finished diassembling then assembling the whole of all machine units, then the process of sanding, dusting and painting, and the machine is ready to be tested. Form of mixing machine that has been completed diassembling as in Figure 8.



Figure 8. Results of Assembling a Mixer Machine Adhesive with Fiber

1. Performance Test of Mixing MachineFrom the field testing,

The stirring capacity can only be used to stir the fiber with 800 g adhesive for a one-time stirring. The machine testing process is done without using materials and using fiber material with adhesive. Testing without using materials aims to see rounds of the agitating unit. From the test results obtained rounds of mixing unit 75 Rpm and there is no high vibration, because the rotating mixer unit occurs balance. As the stirrer unit rotates all the screw components on the left, center and right of the result there is no choke and then the locking of the stirrer house is done. Tests with fiber and adhesive materials are carried out by inserting the material at the time the engine is spinning. The loading process is gradually until the 800 g material is discharged and the machine is closed and left for 15 minutes. At the time the machine does the mixing work, the material is rotated by a screw and is reversed moving from left to right and vice versa continuously for 15 minutes. In FIG. 9a the process of inserting the material into the machine gradually, and Fig. 9b is the stirring process has been completed and the stirring results are removed by rotating the right stirrer and loading the material into the bucket.



Figure 9. Stirring Process

From the stirring results after observed the fiber material and adhesive mixed homogeneously and from the color looks very big difference that is the color of fiber before stirring as Figure 10a yellowish color with fiber form that is not straight, while like Figure 10b results in a bright brownish-brown mixture on all fibers and a straight and easily formed fiber shape.



Figure 10. Fiber before and after mixed with adhesive

CONCLUSION

The results of studies that have been carried out on the main parts of this machine are: stirrer unit, frame unit, stirrer housing unit and drive unit. The stirrer unit consists of an outer screw 4 mm thick plate and 15 mm wide, screw inside with 4 mm plate thickness and 15 mm wide, and a stirring shaft Ø 3 mm with a length of 930 mm. the frame unit measuring 1300 mm x 400 mm x 400 mm consists of a stirrer holder and drive holder, a stirrer housing unit measuring 600 mm x 600 mm x 300 mm uses a stainless steel plate with a thickness of 2.5 mm, and the drive unit consists of a reducer and motor electricity.

From the calculation of engine design, the engine capacity is ± 5 kg / one stirring for 15 minutes and the power needed is ± 2.5 hp. The length of the sprocket chain used is 69 cm, one belt used is a type A belt with a length of 75.2 cm, the diameter of the stirring shaft is 30 mm. From the results of testing the engine, the engine capacity of 800 g is obtained for one stirring, the stirring unit rotation is 75 Rpm and there is no high vibration, the material is rotated by screw and turned inverted moving from left to right and vice versa continuously for 15 minutes, stirring material the fibers and adhesives are mixed homogeneously and the color looks bright brown on all fibers and the shape of the fibers is straight and easy to form.

THANK-YOU NOTE

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A Capability Study Of Distance Towards Radio Frequency Identification Reading Range.

SOFIAN A.S.1, a, SAIFUNNIZAM A. K. 1,b NIK HAKIMI N.H. 1,c

1Department of Mechanical, Politeknik Ibrahim Sultan, Johor, Malaysia

asofian.samad@yahoo.com, b abotlagi@yahoo.com, c nikhakimi85@yahoo.com

Keywords: RFID; reading range; transponder

Abstract. Radio Frequency Identification (RFID) is the usage of radio waves to read and catch information stored on a tag. In Malaysia, RFID is a new electronic toll payment system that uses a sticker to undergo toll. In this study, Radio Frequency Identification reading range was analyzed. Based on the results, allocation of detection area which 1.7m x 1.7m square need to be assigned. The results also show that the minimum distance was 120 cm from RFID transponder. The results presented here may facilitate toll operator to ensure their system can detected every vehicle pass through.

Introduction

RFID technology can be substitute the used of barcode. RFID can reduce a cost and rise flexibility when it integrated with Automated Storage Retrieval System. It has been broadly received for applications like asset management, indoor localization, access control, and industrial automation[1] [2]. RFID involves technologies that use electromagnetic (radio) waves, part of electromagnetic spectrum, to recognize individual items, places, animals or people. RFID can be properlyapplied for many uses. The most collective is to use arecognizing number that uniquely identify an object, place, animal or person. The number is stored on an integrated circuit (IC) that is attached to an antenna. Together, the IC and the antenna are called as RFID transponder or tag. The tag is attached to the object, place, animal or person to be recognized. A device called interrogator or reader communicates with the tag and is use to read the identifying number from the tag. RFID system performance is highly sensitive to the interference and channel fading and thus for a maximum reliable reading range[3]. The reader feeds the number it reads into an information system, which store the number in its database or search it database for the number and returns information stored within about the object, place, animal or person. According to Satya et. Al ,reflection, refraction and absorption (loss) effects the performance of Read Range of UHF RFID system[4]. The main aim of the present study is to investigate the distance read range of RFID. The findings of this study will help RFID Tag gateless gantry toll system for electronic toll collection to consider the range of reading.

Methodologies

To validate the feasibility of proposed expectation, an experimental study has been designed. In the experimental study, the effective reading distance of a tag will be setup by a small scale of toll gate. Distance analysis is measured reading range of RFID between the centres of door till the outdoor and also centre door to storage indoor. This analysis is important because it can determine a default area which mean no rack or partition use to stored product in this area. If there have a product with RFID tagging stored in this area, it will affect the recording calculation in database system. Figure 1 segregates the position for entrance, exit and centre gate during the analysis. Actual toll gate condition are shown in figure 2.



Figure 1: The RFID system complete setup.



Figure 2: Actual toll gate in Malaysia highway [5].

This analysis has done with three cycle test to achieve a finest data and the result was recorded in table 1. Started from distance 180 cm entrance area, the trolley move every 20 cm and interface display was observe to record if the antenna can read the tag id. Then the trolley move centre of gate frame. The analysis was stopped at 180 cm in exit area.

Table 1: Data record for distance analysis

	Entrance									Centre	Exit								
Distance (cm)/ Test	-180	-160	-140	-120	-100	-80	-60	-40	-20	0	20	40	60	80	100	120	140	160	180
Test 1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Test 2	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
Test 3	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0

Results and Discussion

From the analysis, data was recorded into table 1 and graph Reading versus Distance as figure 2 was plotted by using Microsoft Excel program. As mention in graph the reading 0 represent unread condition while 1 signifies read condition. Maximum distance of antenna can read the tag by this setup is 160 cm whereas minimum distance of antenna start read the tag is 120 cm from centre.

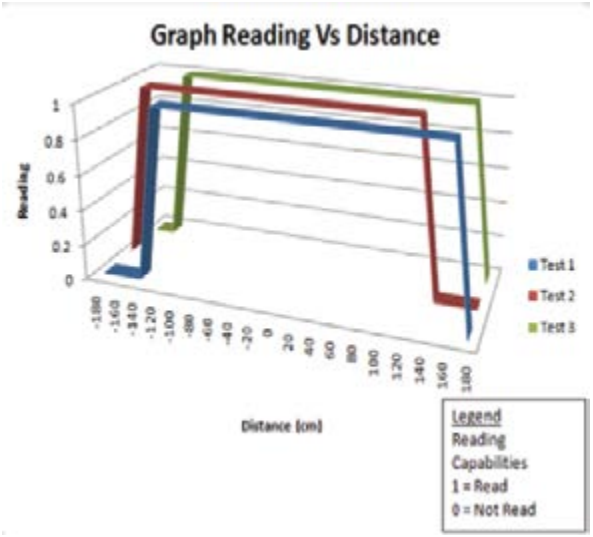

Figure 2: Graph Reading versus Distance (cm).

From the data above, the default area has been found. To indicate border between detection area and concealment area, tape or cone are suggested. After consider the tolerance, 2.89 meter square (1.7m x 1.7m) area must be reserved to allocate this RFID system. As for further study, multiple rate

reading can be explore to execute the best result as our toll is moving to gateless.

Conclusion

This paper presented results of RFID read range. The main finding can be summarized as the system need designed area of detection that is 2.89 meter square. This result has been along with previous work by Yuri A.L. et al. that 26% error on reading up to 4 meter [6]. The findings provide insights that can be useful for toll operator to ensure no problems will occur when plans to fully use RFID are done

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Mapping Vulnerability Status of an Urban Catchment Using DEM and Vegetation Index

Syofyan, E.R.1,a, Herdianto, R.1.b, Saidi, A.2,c, Istijono, B.2,d,Khairat, N.1,e Nulrajabmil1,f

[1]Politeknik Negeri Padang, Padang, Indonesia

[2]University of Andalas, Padang, Indonesia

[a]syofyan_er@yahoo.co.id, [b]revalin@pnp.ac.id (*corresponding author*),

[c]amrizal.saidi@gmail.com, [d]bistijono1452@yahoo.co.id,

[e]isakhairat06@gmail.com, [f]nulrajabmil.uul05@gmail.com

Keywords: Land use; Streams, DEM,

Abstract: Indonesia is experiencing a rapid land use conversion to provide settlement for its growing population. Air Dingin catchment in the City of Padang, West Sumatera is no exception in which the conversion has begun from 1990's. However, this catchment is in vulnerable condition due to its topographic coupled with high rainfall. Hence, mapping vulnerability of the catchment for land use recommendation is highly needed for mitigation purposes as well as city planning.

The study was conducted using both primary and secondary data. Primary data was collected by field work, such as measuring river junctions and identifying land use classes. Secondary data such as DEM, EVI (Enhanced Vegetation Index) were collected from USGS (United States Geological Survey) websites and analysed using QGIS. Daily precipitation was collected from Regional Office of River Management V in Padang. Discharge was simulated using HEC-HMS with SCS unit hydrograph. Runoff generation was simulated using three scenarios of land use changes that directly affect runoff coefficients, and the catchments were divided into 5 sub-catchments based on river junctions.

Discharge analysis based on the three scenarios shows that a 50% conversion from forest and farms into bare land increased discharge by 35%. This was based on a tendency that settlement would first seek for area close to main road. Sub-5 is situated between the main road and the Air Dingin River. Therefore this sub catchment is likely to be converted into housing due to easy access. Yet, this area is steep in the upper catchment and surrounded by hills. Apart from flood threat, land slide is another problem that needs a mitigation plan.

Introduction

Land use conversion for settlement and housing is a common issue in an urban catchment. The need for office space, housing, industry, and supporting facilities pushes city boundaries outwards. Sometimes, conflict arises when city expansion breaks natural reserves and forest for conservation areas. In one hand, government must provide adequate facilities for city inhabitants. On the other hand, government need to protect conservation areas to ensure ecosystem balance. Therefore a plan is needed to ensure environmental sustainability and fulfilling people's need for land.

Air Dingin catchment in the City of Padang, West Sumatera, has experienced a shift in its land use from year 1990's, from rainforest to human inhabitants and farms. Its rugged topographic conditions in the upstream coupled with high rainfall exposed the catchment to natural disasters such as flash flood and landslide. However, the government cannot stop land conversion due to land rights to the owner and the need for housing for expanding city. Thus, mapping vulnerability of the catchment for recommendation of use is an alternative.

In Indonesia, rapid land conversion in urban city, particularly in Jakarta, was induced by simplifying regulations that granted quick permits to developers and investors since year 1990's (Firman, 2000) [1]. This situation was even earlier in China in early 1980's, accommodating an increase in urban population from 22% to 47% in 17 years (NBSC)[2]. There are some direct and indirect effect on these changes in terms of hydrologic conditions of the catchment. Kavian et al (2018) [3] simulated that a decrease in forested area of almost 40% in 60 years and corresponding increase in farms, rangeland, and residential areas in Iran has increased runoff by more than 40%. Likewise, in Olifants Basin, South Africa, a decrease in rangeland followed by an increase in agricultural land by 20% and urban areas by more than 10% in 13 years has increased runoff by almost 47% (Gyamfi et al., 2016) [4]. For existing cities, an increase in runoff can be problematic. First, flood way capacity will be exceeded and fluvial flood is imminent. Secondly, local drainage from storm water could not be flushed since water level increases during the rain. Both conditions would cause tangible and intangible loss to the city.

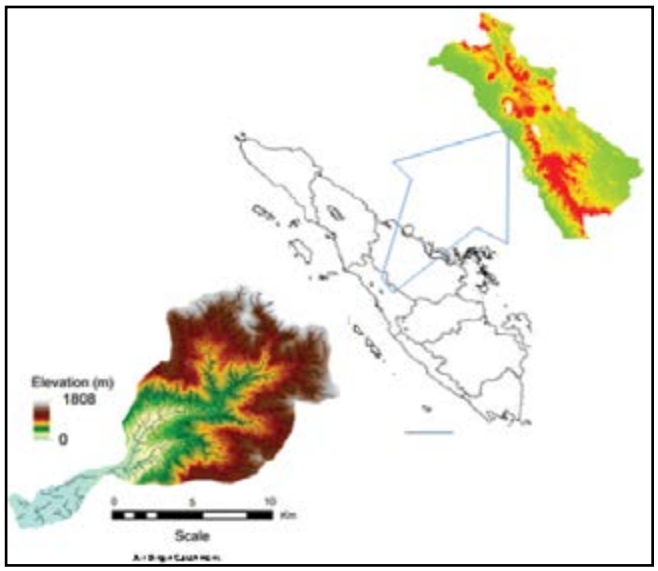

Figure 1. Study location. Lower left: Air Dingin catchment. Upper right: Province of West Sumatera.

Apart from flood and drainage problems, land conversion may cause land slide and flash flood in steep terrain. Two neighboring catchments in City of Padang, Arau and Kuranji catchments, were hit by flashflood in 2012. The catastrophe were suspected due to illegal logging in the upstream catchments since a lot of logs were found after the floods. Yet, land slide and flashflood are affected by many factors such as initial soil moisture, terrain, soil type, geology, and hydrology. Thus, land use conversion is only one of many parameters to study.

Methods

Study was conducted at Air Dingin catchment in the City of Padang, west Sumatera (Fig. 1). The catchment comprises an area of approximately 120 sq. km. The catchment is stretched from south-west in The Indian Ocean to north-east with the main river being Air Dingin River. The top of the catchment is at 1808 m above sea level. Mean annual precipitation is above 3000 mm, although in several years, the El Nino significantly reduced annual precipitation (Herdianto et al., 2017)[5] . The study was conducted using both primary and secondary data. Primary data was collected by field work, such as measuring river junctions and identifying land use classes. Secondary data such as DEM, EVI (Enhanced Vegetation Index) were collected from USGS (United States Geological Survey) websites and analysed using QGIS. The EVI values is from 0 for completely no vegetation or water body to a maximum of 1 for closed canopy and healthy vegetation. The EVI has been used to monitor vegetation response to annual precipitation in Korea (Herdianto et al., 2013) [6]. Daily precipitation was collected from Regional Office of River Management V in Padang. Discharge was computed using HEC-HMS with SCS unit hydrograph. For this study, only a sub-catchment was simulated, namely sub-5 with an area of 21.8 sq.km.

Results and Discussion

Table 1. Hourly precipitation analysis using Mononobe method.

Hour	RT	Rt	Ratio	Cumulative	R50	R100
					391.78	**433.13**
1	0.55	0.55	55	55	215.48	238.22
2	0.34	0.14	14	69	54.85	60.64
3	0.26	0.1	10	79	39.18	43.31
4	0.22	0.08	8	87	31.34	34.65
5	0.19	0.07	7	94	27.42	30.32
6	0.17	0.06	6	100	23.51	25.99
Sum					**391.78**	**433.13**

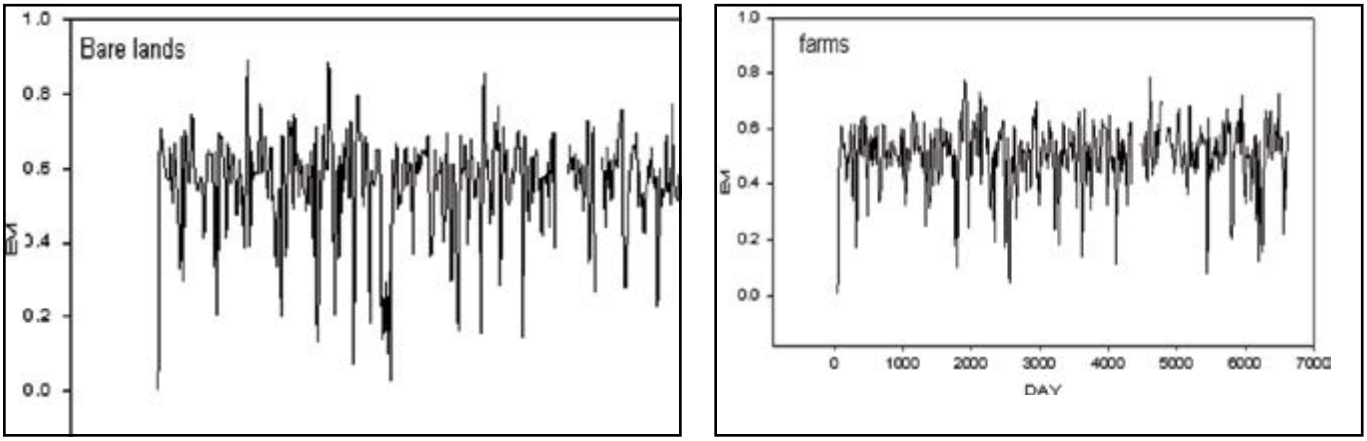

Figure 2. EVI of sub-5 with two land cover types: (left) bare lands; (right) farms.

Precipitation analysis for frequency and probability was conducted using Gumbel Method for 50 and 100 year return period, resulting in 391.78 mm and 433.13 mm, respectively. Rainfall intensity was calculated using Mononobe method. Hourly precipitation is presented in Table 1.

Analysis of EVI from year 2000 to 2017 revealed two conditions. First, some forest were converted into intensive farms and bare lands, mostly since 2011 (Fig. 2). For bare lands, EVI fluctuates with an average of 0.46. Secondly, forest was slashed that EVI dropped to 0.25. These findings confirm land use changes obtained in Landsat data (Fig. 3) that some forest and farms turned into bare lands. Since Landsat does not segregate between forest and farms, EVI analysis was then very useful to complement the data.

Design discharge was simulated in sub-5 using HEC-HMS 4.0 for three scenarios (Table 2). The first scenario was simulated based on land use in 1999 (Fig. 3-left). This was the year with clear image from Landsat TM. The second scenario was simulated using 2017 land use (Fig.2-right). The third scenario was applied assuming a conversion of 50% forest into housing. For the first scenario, maximum discharge for 1999 land use scheme resulted in 167.9 m^3/s and land use data in 2017 resulted in 171.79 m^3/s. The third scenario resulted in a maximum discharge of 231.3 m^3/s.

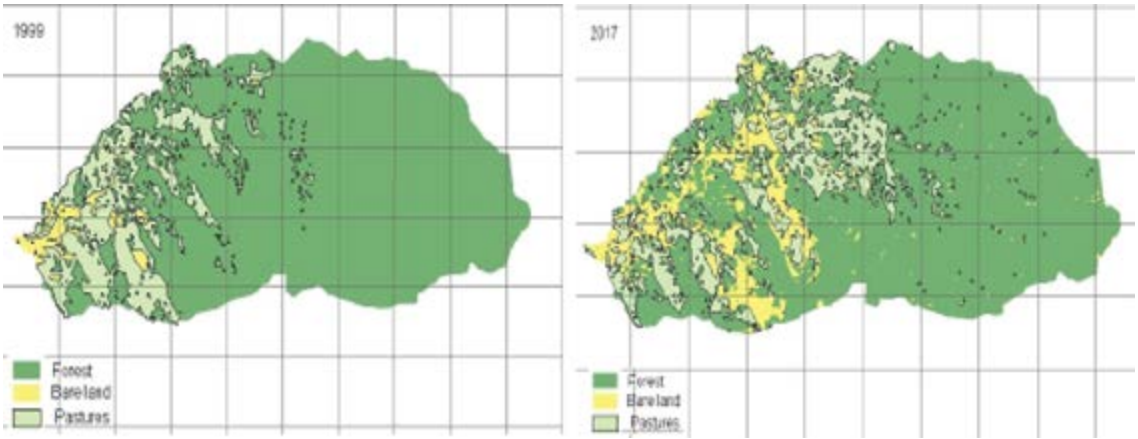

Figure 3. (left) Land use in 1999; (right) Land use in 2017.

Discharge analysis based on the three scenarios shows that a 50% conversion from forest and farms into bare land increased discharge by 35%. This was based on a tendency that settlement would first seek for area close to main road. Sub-5 is situated between the main road and the Air Dingin River. Therefore this sub catchment is likely to be converted into housing due to easy access. Yet, this area is steep in the upper catchment and surrounded by hills. Apart from flood threat, land slide is another problem.

Table 2. Land cover scenarios.

Land Cover Type	Area (sq. km)		
	1st scenario	2nd scenario	3rd scenario
Forest & Farms	15.54	17.67	8.84
Bare land	2.57	0.61	9.45
Pastures	3.70	3.53	3.53
Total	21.81	21.81	21.81

Areas close to stream junctions is less vulnerable to landslides than pixels located upstream further. The main reason was that areas near the streams have gentle slope, although its land cover tend to shift from rainforest to farms. On the other hand, areas near the beginning of the streams is likely to be more prone to landslide, although its flow accumulation is fewer than the downstream areas. The main reason was slope. This finding may be used to recommend that lands upstream the catchment is better to leave for rainforest and shifting the development to areas near stream junctions. However, other external factors such as hydrologic conditions and earthquake must also be taken into account.

Conclusions

A sub-catchment in Air Dingin catchment with an area of 21.8 sq.km was analyzed for its hydrologic response to land use changes and its vulnerability to flood and land slide. Landsat data revealed that some forest has been shifted into bare land from year 1999 to 2017. This was confirmed by EVI time series from 2000 to 2017. Using three land use scenarios, it was shown that a 50% conversion from forest and farms to bare land resulted an increase of 35% maximum discharge in the main stream. With high precipitation in the catchment, this area is also vulnerable to land slide. Therefore, a comprehensive study is needed immediately to inform decision makers about the status of the area now and in the future.

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THE MULTICULTURAL OF MINANGKABAU IN PADANG, INDONESIA: SEMIOTIC ANALYSIS ON PADANG CITY BRANDING

Fitri Adona[1, a], Sri Nita [2,b] and Yusnani[,c] Luth Mafrudoh[4, d]

[1] Politeknik Negeri Padang, Padang, Indonesia

[2] Politeknik Negeri Padang, Padang, Indonesia

[3] Politeknik Negeri Padang, Padang, Indonesia

[a]fitriadonapnp@gmail.com, [b]srinita0610@gmail.com, [c]Yusnani57@gmail.com

[4] Universitas Trisakti, Jakarta, Indonesia

[d] luthe.mafrudoh.@gmail.com

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This paper aims to look at Minangkabau cultural content in several city branding ideas for Padang City. It is also to find out cultural element within the content besides other elements of Non Minangkabau. Starting from that point, it can be estimated cultural influence from outside related with multicultural into several ideas for city branding on Padang City proposed by the society. It is semiotic analysis, by applying *Focus Group Discussion* (FGD) to expose group perception on problem associated with *city branding*. The FGD was consisted of seven people and chosen based on the criteria: community leaders (clanchief/ traditional leader, *ulama* (religious scholar)/ religious leader, intellectual, *bundo kanduang*(respective women leader), bureaucrat, and practitioner. The research was conducted in Padang City and out side of the city named by Minangkabau society as *rantau* which populated by many of Minangkabau people such as Jakarta, Bandung, Medan Pekanbaru, and Aceh. The result showed that the cultural content in several ideas of the city branding was not only Minangkabau culture, but also Arabic, Indian, Chinese, Portuguese, French, British, even Dutch and Japanese. Nevertheless, the multicultural content within the ideas covered interaction in social life, business and economics, politics, and several others activities in the society.Besides that the result also presented the multicultural ideology affecting Minangkabau culture that strengthened the tendencies of their egalitarian way of thinking, treating someone equal which was included into cultural dimension.

Introduction

"*Rendang Padang*", "*Gunuang Padang*", "Padang Your Motherland", "*RancakBana*", "*MalinKundang*", "*Padang Kota IndustriOtak*", are six out of 27 city branding proposed by Padang society. These 27 proposed brandings are talking about Padang City culture which are dominantly

Minangkabau culture including culinary, geography, ethnic tradition and cultural value, proverb, legends, and life style (Proceeding of National Seminar in Multidisicpline Knowledge & Call For Papers Unisbank Ke-3 (SENDI-U3) 2017 ISBN 9-789-7936-499-93). Some have been existing before the local government of Padang City implements the slogan "*Padang Kota Tercinta, Kujaga dan Kubela*", and some others after.

Particularly for "Padang Your Motherland", was established by the local government in 2008. However, it is assumed inappropriate with the process of establishing the branding as it is more spontaneous, and unplanned. Thus, vission, mission and the purpose of the government become inconsistent with the designed brand. Most of West Sumatera bureaucrats are incapable in explaining the consequences and their understanding on city branding. On the other side, the involvement of the community in promoting their branding yet can be seen.

Taken as the example, *Rendang Padang*" idea symbolizes the influence of countries which have ever visited Padang. Spices contained in the meal illustrate the glory of this city as the center of worlds spice trading and Indonesia as the world largest country in producing spices during Dutch colonial era. Looking at the meal side, the characteristic of making this rendang is similar to the Indian cuisine.

"*Gunuang Padang*", the proposed branding on geography symbolizes the place of *Siti Nurbaya* myth, the central character in "*Kasih Tak Sampai*" novel written by Marah Rusli, with forced marriage as the theme. It was published by Balai Pustaka, national publisher of Dutch Indies in 1922. The writer was affected by the dispute between Minangkabau culture from western part of Sumatera and Dutch colonialism, which had been conquered Indonesia since 17th century. Here, it also can be found fort, bunker, and canon as the symbol of Japanese defense in Padang coast. Japanese troops conquered Padang City on March 17, 1942, and within days they could take over whole West Sumatera areas and forced Dutch military commander to surrender unconditionally. The place which also becomes the center of Chinese graveyard is provided with mini great wall like in China.

The intended Minangkabau culture concerns onview of life, philosophy value, and ethichs and rules of conduct in society. The lesson on moral and principles in life are taken and expressed by taking them wisely from natural phenomena and life itself. Whereas, the understanding of life and its lessons are taken from natural phenomena and human being known as "*alam takambang jadi guru*". These natural phenomena are comprehended through five senses, logic, taste and conscience.

Minangkabau society which its ethnic tradition was established by Dt. Ketumanggungan and Dt. Perpatih Nan Sabatang did not refuse on any arrivals of the largest religions in the world. Before the arrival of Islam, Hindu-Buddhist beliefs had ever been widespreaded and become society's way of life and culture. Both were accepted as their source principles were not contradicted with Minangkabau tradition. Similarly, the arrival of Islam was accepted as well, eventhough some of the traditions and beliefs along with its ethnic tradition were not in line with Islamic teachings (Agus, 2004).

Minangkabau is part of ethnic traditiondiversity and culture plurality in Indonesia. Minangkabau multicultural values comprise democracy, human right, tolerance, social justice, gender, and equality values. Minangkabau traditions are based upon Holy Quran, universe and human thought. Three of them produce indigenous philosophy "*adat basandi syarak, syarak basandi kitabullah*" [tradition founded upon Islamic law, Islamic law founded upon the Qur'an] (Barry, 2014).

Nevertheless, for Indonesian at present time, multiculturalism is like an uncommon concept. Some of the social strengths can support and initiate the implementation of democracy goals, if only they can understand the meaning of respective multiculturalism and respective concepts structures. On the contrary, they can also against if they cannot apprehend the meaning, or have no interest to participate in executing this reformation (Suparlan, 2014).

On another side, general text concept used by semiotics is appropriate to be utilized by communication study discipline which is involved in cultural phenomena study and media in the form of city branding. Its contribution bridges structure research and marking complex function in city branding. The commercial messages in city branding are considered intertextuality or text idea referring to other texts.

City Branding, Multiculturalism, and Culture Identity

Communicationis not just about explicit symbols but also embedded aspects, such as behavior, signs or symbols that carry meanings and these meanings have to be thoroughly interpreted. Thus, communication is categorized into two which are verbal communication and non-verbal communication. Verbal communication refers to symbols which have universal meanings to the people involved in the communication and it exists in the form of speech and writing that are known as language (Baker, 1984).

Seiler and Beall defined verbal communication as "…all behaviors, attributes, or objects (except words) that communicate messages that have social meaning" (2005:110). This means that non-verbal communication involves anyforms of behaviors, objects, attributes, messages or symbols, apart from words or the use of language, be it speech and writing. Non-verbal communication can be divided into few categories; communication involving facial expression, signs, kinesics, oculesics, physical attributes, haptics, olfactics, proxemics and territoriality, chronemics, paralanguage/vocalics, silence, physical and psychological environment, and also artifacts (Seiler &Beall, 2005). Semiotic analysis focuses on the cultural and psychological patterns that underlie language, art and other cultural expressions that is used as a tool for representing and interpreting phenomena. Among famous semioticians are Ferdinand de Saussure, 1857–1913 (the father of modern linguistics), Charles Sanders Peirce, 1839 – 1914 (the founder of the pragmatism doctrine) and Roland Barthes, 1915 – 1980 (cited in Yakin, et al).

Saussure believed that semiotics could be used to analyze a large number of „sign systems", and for this reason, there is no reason why it could not be applied to any media or cultural form (Stokes, 2003). Semiotics breaks down the content of texts into their component parts and relates them to broader discourses (Stokes, 2003). According to Berger (1987), the method involves putting into words how images work by relating them to the ideological structure which organizes meaning. Almost every image in a technologically advanced society is created for a reason, with some other or larger purpose in mind. There is, then, the surface appearance or denotative meaning of the image, but there is also a deeper, myth-like connotation as Well (cited in Huat, 2008).

Culture is made of a web of semiotics, a thick tapestry of interwoven sign systems. This web is not perfectly smooth and continuous, however, and cultural semiotics finds its way into

the sign system of a culture through the discontinuous, the breaks and gaps, the unexpected, the ambivalent" (Orr, 1986: 813). Every culture selects from the set of these texts a small subset which its members consider important for their cultural identity" (Posner 2004: 118). Lotman's emphasis on the criteria for textual selection (and, furthermore, of particular signs from distinctive texts) is most pertinent for a cultural branding model that is intent on managing dynamically sources of a brand's textual formation. Cultural semiotics has broadened the meanings of the terms 'text', 'language' and 'reading' to include almost everything perceived as partaking of a sign-relationship understood in terms of inter-subjective communication" (Orr 1986: 812). "If one designates the totality of all sign systems in the world as the 'semiosphere' (Lotman, 1990 and Posner, 2001, 2003: 80), one can say that cultural semiotics studies cultures as parts of the semiosphere" (Posner, 2004: 2). The cultural branding approach "emphasizes the cultural forces in society and how these can be used to build iconic brands as well as the impact of branding practices on the globalized culture and marketplace" (Heding, et al. 2009: 208). "Brand meaning is not wholly derived from the market. Culture, aesthetics, and history interact to inject brands into the global flow of images" (Schroeder and Saizer-Morling, 2006: 4). "The cultural approach focuses on culture in a macro perspective, applying findings from the culture surrounding us all branding practices. In this approach, macro-level culture is defined as the social definition of culture. In this definition, culture is closely intertwined with meaning and communication (Du Gay et al, 1997)' (Heding et al, 2009: 209). "In the cultural approach, the brand is analysed as a 'cultural artifact moving through history' (Holt, 2004: 215)" (Hedinget al, 2009: 210). Holt's (2004) cultural branding model currently monopolizes marketing theory (cf. Chapter on cultural branding in Heding et al, 2009). (cited in Rossalatos, 2014).

The main reference in order to make the realization of multicultural Indonesian society is through multiculturalism. It is an ideology that acknowledge and glorify differences in equality either individually or culturally (Fay, 1996; Jary & Jary, 1991; Watson, 2000). Within this multicuturalism model, a community (including Indonesian) seen as one that has an accepted culture with its mozaic pattern. This mozaic includes all cultures of smaller communities constructing a larger one, and owns a culture which looks like afore mentioned mozaic (Reed, ed, 1997). (cited in Suparlan, P. (2002).

This city branding is defined by Anholt cited in Moilanen and Rainisto as image management of a destination through strategic innovation and economics coordination, social, commercial, cultural, and local government regulation (2009:7). Hence, city branding can be said as a strategy of a country or an area in order to set down strong position within their target market like other positioning strategies of a product or a service, therefore this country or area can be recognized worldwide (Harahap, 1992).

Based on that definition, city branding can be said as a constructing process of creating an image for a city or an area to be known by the target market (investor, tourist, talent, event with icon, slogan, exhibition, and a good positioning in many types of promotion media). A city branding is not only about slogan or campaign promotion, instead it is a description of someone thought, feeling, association, and expectation coming from someone after seeing the name, logo, service product, event, or other conveyed images of symbols and designs.

Thus, researchers consider that a study on a connection between city branding and multiculturalism, mainly those involving developing countries such as Indonesia, particularly Padang City should be conducted. So that the impact of modernisation and globalization on multicultural

construction can be comprehended deeply. The first step taken in acknowledging it is through semiotics study containing in proposed city branding by society and government of Padang City.

In line with that matter, this study aims to see the contents of multiculturalism within the first six ideas on city branding of Padang City. The researchers concern on finding out cultural elements applied in respective city branding ideas besides other Non Minangkabau cultural elements. Starting from that point, then they can make intellectual implication on outside cultural influence related with multiculturalism covering: interaction in social life, business and economics life, politics life, and other activitis within the society.

Research Methods

This paper is a qualitative study by applying semiotic analysis as highlighted by Holt (2004), that in cultural approach, the image is analyzed as cultural artifact which is developed through history. Within this context, the image is described as city branding ideas. Here, the researchers have been clearly seen the intended aspect containing in the city branding ideas which is multiculturalism ideology. Specifically, they view the interaction symbol in social life, business and economics life, politics life, and other activities among the respective society.

The chosen ideas for city branding of Padang was the ones proposed by the local government, Padang community who is in the city or in *rantau* (diaspora). It includes the ideas brought and discussed by Padang community among social media such as facebook and twitter starting from 2012 to 2017.

Justifications of the chosen ideas for this branding are: that some of the ideas have possibility to be the branding of Padang as they contain of multiculturalism thought; it is assumed that the present authorized city branding ("Padang Your Motherland") is not specific and planned to be replaced; that branding is not acknowledged by visitors and investors to be; that Padang society has little sense of belonging onto the branding.

This study was taken place in Padang City and through out the country which Minangkabau society named it as *rantau*; Jakarta, Bandung, Medan, Pekanbaru, and Aceh. Here, Focus Group Discussion (FGD) was utilized in order to concede group perception on city branding matter. The FGD's participant was chosen based on agreed criteria, and they were seven people in total coming from community leaders (clanchief/ traditional leader, ulama (religious scholar)/ religious leader, intellectual, bundo kanduang (respective women leader), bureaucrat, and practitioner. The FGD discussion was conducted for two hours and spent to collect, reduce, present the data, and conclude the whole discussion.

Analysis of The Study

"Padang as Brain Industry": Interaction Symbol in Social Life

West Sumatera has once become the center of education in Sumatera Island, particularly referring to Islamic education and *surau* as its major basis. During the Dutch Indies collonial era, besides Islamic education, western education was widespreaded as well. In 1856, Dutch Indies government established King School in Bukittinggi. Besides shools managed by government, there were some managed by private organizationssuch as Adabiah School in Padang, Institut Nasional Syafei, in Kayutanam, Sumatera Thawalib and Diniyyah Puteri in Padang Panjang. So at that time, West Sumaterabecame one of Dutch Indies area having a big number of schools and students.

After the independence time, there have been many universities, high institutions established in West Sumatera. Inititated from the establishment of Andalas University in 1955, proceeded by IAIN Imam Bonjol, State University of Padang, and IPDN Bukittinggi. Some of the well-known private universites in this province are Bung Hatta University, and West Sumatera Muhammadiyah University. At present, almost each regency and municipality have higher institution, with the biggest number in Padang City. This city has been prominently becoming the center of higher instituiton out of Java Island, and is supported by tens of universities including three state universities.

The term "brain industry" was initiated by Emil Salim around a quarter century ago. Once upon a time, West Sumatera was known as producer for intellectual in national and international level. The occurence of this country's intellectual such as Buya Hamka, Tan Malaka, Syahrir, Agus Salim, and M. Yamin has become a historical fact proving Minang people are educated and intelligent.

Historically, local education system implements *surau*(a prayer house and community center) education and *merantau*(traveling out of the country for unspecified time) tradition. For men, these *surau* and *merantau* traditionshave shaped them into intellectual people (Piliang, 2012). Before knowing modern education, little boys in Minangkabau go through *surau* education and help them building their intellectual character. They receive religious education from *ulama*, where at the same time socializing, and adapting with grown men who sleep in surau. Minangkabau men in old time slept in *surau* and not in their wife's house.

On contrary, *merantau* is a Minang tradition to make someone becoming psychologically, economically, politically and educatively mature. *Merantau* can be said as one of migrations with the criteria; living their hometown; on their own iniative; for short or long term; seeking fortune; furthering their study or looking for experience; planning to come back home; and social institution which is part of society (Naim, 2003: 3). In other words, merantau is a strategy in empowering own self to broad their vision so that they won't become "*katak dalam tempurung*" (shallow minded person). Most of Minang intellectual figures have become important people after *merantau*.

For city branding, the "Brain Industry" term has a bad meaning or inappropriate diction, and it was argued by community leaders as well. That term seems legalizing educational institution which does not educate and build students's awareness on present situation. Instead, it is only to meet up the quota made for work force in government and industry.

On another side, to actualize "Padang as Brain Industry", this city needs educational institution, higher institution and educator with appropriate quantity and quality. Nonetheless, a few local expert concerns and refuses this "Brain Industry" term for education system in this area. It is because this term constituting that educational institution is presumed as factory or "Brain Industry" like what it used to be called in collonial era. In practice, the respective education metaphor can be seen in control system of school administration; education administrator in any level and agency, which is

similar to factory managers. These manager should supervise their employees, students behaviour, and school working performance in order to make the production quality to be up-to-date, in line with market needs. Whereas, curriculum becomes one of the instruments in production process; commonly the school subjects which are not in humanity field and disadvantageous are taken out and changed based on the market needs.

Sincethe mid 19th century, when the western style education was introduced by the Dutch imperialist,colonial authority often analogized schools as factories. This metaphor became strong as the collonial capitalism came to Indonesia in the early 20th century, and continued by education system in new regime. At that time schools were not meant to make the students becoming smart and conscious on their present situation. Instead, the education was aimed just to fulfill the quota for work force in the government and industry world (Ilham, 2009).

"Padang Rendang City": Interaction Symbol in Buisness and Economics Life

Rendang is one of the dish which is recognized as Minangkabau traditional cuisine. This dish uses beef and coconut milk as its major ingredients. It can be tasted in any Padang restaurants in all over the world, and has been well-known in home country and other South East Asia countries like Malaysia, Singapore, Brunai, Philippines, and Thailand. In its origin area; Minangkabau, rendang isserved in many traditional ceremonies and special events. Eventhough it is considered as Minangkabau traditional dish, each of area in Minang has their own technique in cooking it and in using the ingredients. In Minang tradition, *rendang* is a compulsory served dish in every tradition ceremony like in wedding reception and in welcoming honorable guess.

A historian from Andalas Univesity; Gusti Anan states that Col. Hubert Joseph Jean Lambert de Stuers, military commander and resident in Padang (1824-1829), in 1827 statedin his note that Minang merchants who traded to Singapore and Malaysia through Sungai Kuantan and Indragiri equipped themselves with cooked meat which was dried and black in color. Even Book on Minang Cuisine and Games written by M. Yostra and was published in 1923 has yet mentioned about the name of *rendang* as one of Minangcuisine. In the year of 1930 that the term of rendang occured in magazines of Minang people association.

Despite its name showed up in the 20th century, *rendang* was assumed occured when Sumatera was involved in world spices trading. On the 13th century, Tamil Indian merchants who looked for spices commencedtheir settling in western coast of Sumatera. On the 14th and 15th century, they started to purchase spices from the area of Tiku, Pariaman which was still under Aceh Empire authority. Eventhough the spices trading was within the power of Aceh Empire, most of those spices were planted by Minangkabau people on the highland of central Sumatera (Reid, 2011).

Through the interaction with the Indian merchants, Sumateranese, particularly the ones from Aceh and Minangkabau becoming acquainted with the use of spices and seasoning. Aceh dish like curry shows the strong influence of Indian in its cuisine. Colleen Taylor Sen in the book *Curry, A Global History*highlights that the use of curry seasoning in South East Asia, including Indonesia was started from the 3rd century BC. At that time, Indian merchants and Budhhist missionaries brought tamarind, garlic, red onion, ginger, tumeric, and pepper to that area. Those are the seasoning that is becoming mostly used for cooking in South East Asia at recent times. Even Taylor strongly states that seasoning dish made with coconut milk which is popular in Indonesia as gule or gulai actually

can be considered as curry.However, rendang contains more coconut milk than curry. The hot spicy taste on it comes from the taste of chilli and not from pepper. Penny van Esterik in the book *Food Culture in South East Asia* records that since the 19th century, South East Asian has recognized chilli brought by Portuguese from Central America.

Rendang seasoning is also varied in every area. The seasoning from *Nagari* Kapau Agam for instance, it contains coconut milk, red onion, chili, lemongrass, lemon leave, tumeric leave, powder spicy like coriander, pepper, nutmeg, and candle nut. Whereas, *rendang* from *Nagari* Sumpur, Tanah Datar Regency only uses chili, garlic, tumeric leave, lemon leave, and coconut milk as their seasoning. Despite the difference in its seasoning, the way of cooking is still similar which is stirring the beef and the coconut milk softly, and pouring the chili seasoning when the sauce is not watery anymore.

Lately rendang has its economics function. Particularly when it is sold and becomes the icon of Padang restaurant in every place. Indonesian chef like William Songo often cooks *rendang* in international culinary festival and feast for foreigners. Since a few year ago, Garuda Indonesia airline takes role as the agent in widespreading *rendang* worldwide by putting *rendang* inside rijsttafel dish in its business class at the international flight. Several of urban youngsters sell rendang through their social media and internet. They wrap it in a thick airtight plastic so that it can last longer and easily be sent anywhere.

Rendang has an honored position in Minangkabau community culture, as it has its own characteristic philosophy for Minang people in West Sumatera. It illustrates deliberation and consensus, which derives from four staple describing the wholeness of Minang people, they are: Beef representing "*Niniak Mamak*" (clan chief); Coconut representing "*Cadiak Pandai*" (intellectual); Chili pepper representing "*Alim Ulama*" who are strict on teaching religious sharia; and Spicesrepresenting all Minangkabau community.

In Malay tradition, such as in Riau, Jambi, Medan or Malay Peninsula, rendang is a peculiar dish served only in circumcision ceremony, birthday party, wedding reception, barzanji (a colourful celebration and spiritual display of deep love of the Prophet Muḥammad), or other religious events like Eid El Fitr and Weid El Adha. Usually parents in Minangkabau society make *rendang* for taking away whenever their children go *merantau* as it can last for months. They take *rendang* as the significant element to be taken for *merantau* besides religious knowledge and martial art skill. Eventhough they are not financially can afford it, they put much effort to make one for their children. This tradition has been known since the earliest time Minang people went*merantau*, said Muhammad Nur. Looking from this side, totally *rendang* has social function to bind family ties.

"Padang The Legend City of Malin Kundang": Interaction Symbol in Politics Life

"*Malin Kundang*" is a legend which is stated in *kaba*(folktale) 'genre of Minangkabau traditional literature'. This legend tells a story of a disobedient son to his mother and thus he was cursed by his mom to stone. An array of stone in this tourism site becomes the evident of the story which is being told by the parents to their children, to make them to be obedient. To make it more dramatic, one can find other stones looked like human and ship made from concrete as the symbol of *Malin Kundang* and his ship.

The similar folktale is found in other countries in South East Asia like in Malaysia where the folktale is a story about *Si Tenggang*. This folktale is derived from story existed in 1900 in *Malay Magic* book, written by Walter Willian Skeat as one of folktales entitled *CharitraMegatSajobang.* This *Si Tenggang* has ever published by Balai Pustaka, Jakarta in 1975 with different title; *NakodaTenggang: sebuahlegendadari Malaysia.*

The emergence of "*Malin*" name as a character of disobedient son indicates that this story was created by looking through Islamic perspective, instead of Hindu and Buddhist beliefs which were earlier existed in Padang or West Sumatera, or in Indonesia. It is estimated that Islam came to Padang while Aceh set its authority in this city. In historian note, it was mentioned that many merchants from all over the world had been stopped over in Muaro Harbor, in Padang City, starting from Aceh merchants, Gujarat (Indian), Chinese, Portuguese, Spanish, French, British, till Dutch. It became more crowded when the trading venue was moved to the western coast of Sumatera and the conflict occured in Malaka Traits.

Since the 15th century to the beginning of the 16th century, Padang was under the authority of Aceh Empire, and it only became the settlement for fishermen. Aceh Empire posted a commander-in-chief in Padang, however his function was more becoming trading representative than politics one. When Vereenigde Oostindische Compagnie (VOC) arrived in 1663, slowly Aceh Empire was being diminished. In 1660, VOC was succeeded to force young kings to adhere its will to expel Aceh from Muaro Padang which had been weakening after the death of Sultan Iskandar Muda. In 1666, VOC made Padang City as their head quarter for western Sumatera coast (Sumatra's Westkust).

VOC was interested to build a harbor in the creek of Batang ArauRiver area, Padang City, as this this creek was a vast and wonderful place for trading ships to dock. Even, this city became the center of military force of Dutch Indies when Aceh war took place, and functioned as resort or nursing place for sick and injured army. Recently, around Muaro harbor, people can see the relic of Dutch government building, military building, hospital, trading office and many others (Haryanto, 2016).

The word *kaba* is derived from Arabic "*khabar*", where it has similar meaning to the word "*berita*" (news). However, in its development, the meaning of *kaba* and *khabar* is being differentiated. *Kaba* means as saga or a story in Malay literature. *Malin* or "*Mualim*" is an Arabic word means as"ship's captain" or "religious person". The word "*Malin*" is believed as the word influenced by Islam in West Sumatera, particularly in Padang City brought by Aceh merchants. The word "*Kundang*" in Minang language is believed as "*dikundang-kundang*" or "being hold in the arms" or taking something or a child wherever you go.

For city branding, "*Malin Kundang*" word contains of bad meaning or inappropriate language eventhough it is used as a warning for the children to not becoming disobedient to their parents.

"Romantism of Gunuang Padang": City Branding Idea Based on Geography

Eventhough the hill is only 400 meters above the sea level, Padang people named it "Gunuang Padang", as it is located in higher place in the city center. People around this Gunuang Padang considers this hill has its good fortune as there is no destruction on it when the natural disaster happened in Padang like earth quake and tsunami in 1969, and the last one was the grand earth quake in 2009.

Before seeing the top, people will meet several relics from Japanese collonial such as forts, defense bunker and canon. The first bunker is so close to resident's house. The second one is used by the residents as warehouse and its position is right in front of someone's stall. The first fort found in this area is called Pilboks, in polygon shaped, half circle and was built around 1942-1945, and has a quite wide room. There is also found a big canon. Meanwhile the second fort is shaped like a house with two roofless rooms, and has BOW letters written on it. When arriving at the top, it can be seen two more bunkers there. In old times, Gunuang Padang was constructed as one of defence basis by Japanese collonialism. Forts, bunkers and canons were utilized as the defense basis by Japanese in Padang Coast. Japanese troop entered this city on March 17, 1942, and within days they could conquer all areas in West Sumatera, and made the military commander of Dutch in Sumatera unconditionally surrendered.

On the right side, there is loophole on the rock or hall with dropping stairs, and people around belive that it is the location of Siti Nurbaya graveyard, the main character of Minangkabau legendary folktale. "*Kasih Tak Sampai*" novel was published by Balai Pustaka, a national publisher in Dutch Indies in 1922. The author was influenced by the dispute between Minangkabau culture from the western part of Sumatera with Dutch collonial, which has conquered Indonesia since the 17th century.

On the eastern and northern side of Siti Nurbaya graveyard outspreads the view of Padang City and Siti Nurbaya bridge from a distance. On the southern part, it can be seen Air Manis coast and Pisang Kecil and Pisang Besar Islands. Furthermore, from the top, there is a view on half part of coast in Padang, sea shore and Talang Mountain. Whereas, on the western side outspreads the vast Indian Ocean. This location which also becomes the center of Chinese cemetery has mini great wall like found in China.

"Gunuang Padang" is a symbol of multiethnic harmony on cemetery, starting from Siti Nurbaya's grave, the character in "*Kasih Tak Sampai*" novel, written by Marah Rusli with forced married as the theme, then Chinese cemetery, and last the sacred graves of three Syekh. Siti Nurbaya grave is covered by huge rock functioning as roof and wall of the grave. Only a white tombstone is seen and covered by material in white and blue color. The grave's condition is shady and less of sunlight made it mystical. Visitors are forbid to take photgraphs of these graves as they are believed to have spirits guarding them. Thus, visitors are also encouraged to not do something negative or use vulgar language. Some of the community believe that the graveyard on the top of *Gunuang Padang* is truely the graveyard of Siti Nurbaya, some others believe that it is only a fiction, a myth taken from true story of Siti Nurbaya. Despite, many people visit this grave in order to get some lucks and inspirations.

There is also a grave of Syekh Zainuddin called flying grave (*Makam Terbang*) here. Based on the widespread myth, this Syekh was buried in Seberang Padang area, nonetheless it flew right after this late Syekh came to visit his good friend through dream asking his friend to move his grave yard into Gunuang Padang. Presumably, his graveyard was located in the entrance of the cave facing the ocean, and was on the right side of Siti Nurbaya park. Besides Syekh Zainuddin grave yard, Syekh Basyir and Syekh Alamsyah titled Raja Pesisir graves are found as well in this place. Both of them are believed as white blood people. It is because when the funeral of Syekh Basyir happened, when the coprse was carried to Gunuang Padang passing Batang Arau river, suddenly the river's water splitted so the procession could move without crossing the river by using the boat.

This sacred grave was located on the southern part, on the sloppy road to Gunuang Padang top or Siti Nurbaya park. It was estimated 200 meters after passing by Muslim and Chinese Muslim cemeteries. Both of these Syekh graves are on the upper area inside the complex.

Meanwhile, in the sloppy road people can find many Chinese graves with gravity on them. Reportedly, Gunuang Padang legend has dragon (Ba Ula Nago) nesting in a long cave inside the mountain, where the entrance of the cave facing the ocean. It is estimated that Chinese has been settling in Padang since Padang was founded in the 17th century. The biggest Chinese settelement or known as *pecinan* is located in Pondok and Tanah Kongsi. No matter where Chinese go and settle, they always take their ethnic tradition with them. Therefore, here in Padang, people can find particular place for their cemetery which is located in Gado-Gado Hill in the slopes of Monyet Mountain (Gunuang Padang).

In old times, when a chinese died, part of their wealth which they love was also buried together, thus they coul feel happy in the here after, There were so many graveyard diggings and destructions by thief who wanted to take out this wealth from the grave. This vandalism was also conducted by Le Meme sub-ordinats, a French pirate who came to Padang and plundered the grave in December 7th 1793. "*Mereka cukup jahat untuk membongkar kuburan dan memgeluarkan mayat seorang Cina yang menurut mereka dikebumikan dengan sejumlah emas",* as written by Le Meme in an open letter to France society counterclaiming negative statement accusing him embezzled the spoil of dead Chinese in Padang (see: EE. Netscher 1881:119-22; translated by Suryadi).

For city branding, the word "Gunuang Padang" is often associated with cemetery or graveyard. Its name is presumed less specific as Gunuang Padang is also found in other areas in Indonesia. From publicity side, there has been a well-known Gunuang Padang which is located in Cianjur, West Java. This tourism site has become such a controversy as its age declared is older than pyramid in Egypt, its immensity is wider than Borobudur temple, and its prediction becoming the greatest tourism site over Borobudur temple. It is also suspected containing of bunch of gold, due to the involvement of many troops digging in this site.

"Padang Rancak Bana": City Branding Idea Based on Proverb

Co-creation of meaning has also been defined as 'the process in which consumers actively appropriate, extend, and/or modify product in ways that differ from the predefined or prescribed form and/ or use in order to create new symbolic structures and meanings that have both personal and communal significance" (Lanier &Schau, 2007: 327). The designing of "*rancak*" can be defined as customer process in customizing the idea of city branding in different way. It has been set up to create new structure and symbolic meaning with privacy mark and communal.

According to *Kamus Besar Bahasa Indonesia* (KBBI), the word "*rancak*" means nice; elegant; beautiful; fast; dynamic; or happy defining a song, music, dance and others, and including Padang City through its branding. The use of the word "*rancak*" has often applied by poet and author in Indonesian literature world, either new or old literature. One of literary works inserting the word "*rancak*" is a poem written by Sanusi Pane entitled "*Sajak*" (poem).

Sajak

Di mana harga karangan sajak,
Bukan dalam maksud isinya,
Dalam bentuk, kata nan ***rancak***
Dicari timbang dengan pilihnya.

Tanya pertama keluar di hati,
Setelah sajak dibaca tamat,
Sehingga makna tersebut sakti,
Mengikat diri di dalam hikmat.

Rasa bujangga waktu menyusun
Kata yang datang berduyun-duyun
Dari dalambukan nan dicari

Harus kembali dalam pembaca,
Sebagai bayang di muka kaca.
Harusbergoncang hati nurani.

Padang, West Sumatera is famous with its beautiful scenery, and green hills surrounding it. The proper word in describing this beauty is "*rancak bana*" which means nice/ gorgeous/ beautiful. The word "*bana*" means "*sangat*" (very). So when they are combined becoming "*Kota Padang Rancak Bana*" means "Padang City is Gorgeous".

"Padang Your Motherland": City Branding Idea Based on Ethnic Tradition and Cultural Value

Tourism brand of Padang City is cystalized through its character and distinctiveness of its society. By taking this brand, Padang positions itself as one of tourism destinations offering its unique culture in managing its community among the diversity of its ethnic traditions. As a Minangese, Padang society embraces matrilineal system or kinship system inherited through female lineage. It is a very unique system as it is only implemented by five clans in the whole world, they are Chinese, Indian American, Indian, Ghana, and United States. This fact encourages Padang government to design its city branding becoming "Your Motherland" in 2008.

Besides that, it is known that Minangkabau society in Padang City is originated from several *luhak* (local village) and mingled. It becomes its special attractiveness as it creates diversity in etnic traditions/ customs, cuisine, games of villagers, and other distinctive handy crafts of Minangkabau. In order to capture this diversity within the city branding, thus the design of several spired roofswith different color drawed in the logo.

The beauty of its nature and its unique culture are potential and chance for Padang City to develop. Historically or governmentally, this city also has strong emotional connection with neighboring countries and Arabic countries. Historically, Padang and Minangkabau societies have a deep emotional connection with their neighboring country, like Malaysia due to the migration occured, and other Arabic countries due to many of Minangkabau figures who had ever studied

and taught Islam there. Regarding to program issue, Padang government has made sister city cooperation with the city of Perth in Australia, the city of Ba Ria Vung Tau in Vietnam, and the city of Hildesheim in German.

However, local government commitment to use the city branding “Padang Your Motherland” starts changing after a recommendation came that this branding is similar to what Russia has; “The Motherland Calls” a namefor a sculpture in Mamayec Kurgan in Volgograd, Russia. It is the highest woman sculpture which was made in commemoration on Stalingard Battle. Its designer are Yevgeny Vuchetich and a structure engineer named Nikolai Nikitin. It was declared as the biggest sculpture in the world in 1967. At recent times, it becomes the highest sculpture in Europe and the highest woman sculpture in the world. It portrays a woman lifting up high a sword on her right hand where her left hand indicating a call.

Conclusion

This paper focuses on the research between city branding and multicultural. It offers cultural asset reading extremely nuancing of what it contains in Padang city branding.

The result shows that eventhough this city branding was set for Padang City, the culture containing inside absorbs other culture besides Minangkabau culture which is applied dominantly by Padang society. Generally, the identity formation of Padang and Minangkabau society was caused by their interaction result within social group, historical factor, and dispora process which they have been through. Therefore, through this city branding, it could be analyzed that multicultural challenges influence Minangkabau cultural practice, even it strengthened its egalitarian attribute.

Hence, not all city branding ideas could represent city branding of Padang City based on several reasons like unappropriate or unspecific nomination for the name, and also philosophically these ideas were againsts its essence and view or conception of community leaders. City branding idea of “*Padang Kota Rendang*” was considered meaningfull and representative in representing Minangkabau multiculture and Padang society. The branding idea for “*Padang Rancak Bana*” had political nuance in it despite its meaning did not illustrate the multiculture in Minangkabau or Padang society.

This study proposes the needs to conduct other researches by utilizing audience analysis in order to see how they guard the meaning of respective city branding ideas, and how tourists, investors, and community provide deeper impression on their understanding and perception sides of Minangkabau multiculture.

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Power Supply of Landslide Early Warning System with Solar Tracker using Fuzzy Logic Algorithm

Suryadi,[1],Adi Chandranata[2],Yultrisna[3]Pevi Ramadhani[4]

[1,2,3,4]Electrical Engineering, Politeknik Negeri Padang

Kampus Limau Manis Padang Sumatera Barat

1suryadi2708@yahoo.com, 2adichandra355@gmail.com,3 rina@yahoo.com 4pevi_r@yahoo.com

Keywords: Solar Panel, LDR Sensor, Fuzzy Logic, Microcontroller, Power Supply.

Abstract. Landslide is one of the natural disasters which often encountered in Indonesia, especially in mountainous and hill region as like in most region of West Sumatera. To overcome this case, it can be done by creating Landslide Early Warning System (EWS) prototype. This prototype was placed in the area where near to mountain or hill and far from the settlement. This research was tried to create landslide EWS Prototype system by using sunlight from solar panel as the power supply. It used three parameters, those were solar panel, LDR (Light Dependence Resistor) sensor, and limit switch sensor. The function of these parameters was to convert solar energy into electrical energy which would utilize as battery charger of landslide EWS prototype power supply. The charging of power supply battery was using microcontroller and was following the sunlight track with fuzzy logic method. This research used motor as the output to drive solar panel, and LCD to read sensor value. The research result showed that the device to utilize sunlight for charging landslide EWS prototype battery was highly efficient and working properly.

Introduction

Solar panel (photovoltaic arrays) is a device which consists of solar cell that converts sunlight into electricity. The utilization of solar panel as an alternative of electricity energy source which needed by the citizens, it provides many advantages for the citizens, both for daily needs and as a supporter of innovation that is being developed.

Technological development had been generated the using of solar panel in order to deal with the issue which is faced by the citizens. Previously, this research had been conducted by Ulfa Ni'mal Aulia (2011) from Bogor Agricultural Institute with title The Implementation of Solar Cell (Solar Power) in Remote Area, and Wahyu Hidaya (2017) UNISMA with title Solar Cell Power Supply for Mobile Phone.

Therefore, the writer created the device "Power Supply of Landslide Early Warning System with Solar Tracker using fuzzy logic algorithm". This device is able to set motor rotation by using fuzzy logic method to follow sunlight track and also it is able to avoid battery from over charge. By using

three parameters, those are solar panel, LDR sensor, and limit switch sensor.

Methodology

There were some steps that should be done in designing and creating battery charging device with sunlight track by using *fuzzy* method microcontroller-based, those were :

1. Creating mechanic design of automatic battery charging prototype with sunlight track.
2. Creating hardware system in form of LDR sensor, driver series, limit switch sensor, LCD
3. Creating software with flowchart system of automatic battery charging prototype setting with sunlight track.
4. Combining hardware and software by using *fuzzy* method.

1.1 Creating mechanic design of automatic battery charging prototype with sunlight track.

Mechanic Design:



Fig. 1. Prototype Design (side view)



Fig. 2. Prototype Design (front view)

2.1 Creating hardware system in form of LDR sensor, driver series, limit switch sensor, LCD Main component:

1. Input
    - LDR Sensor

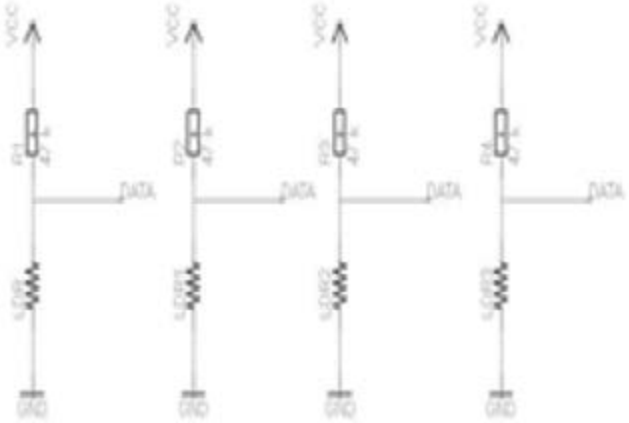

Fig. 3. LDR Sensor

- *Limit Switch* Senso

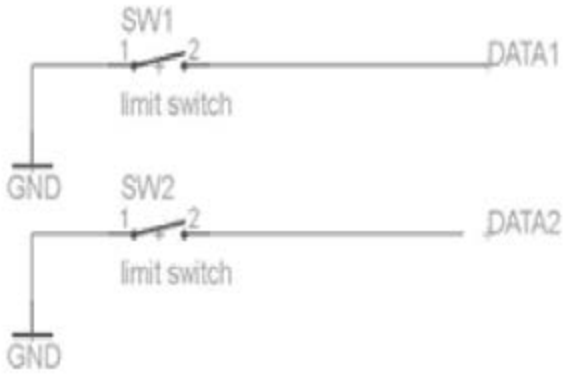

Fig. 4. *Limit Switch* Sensor

- Microcontroller



Fig. 5. Arduino Microcontroller

2. Output

- Relay Series

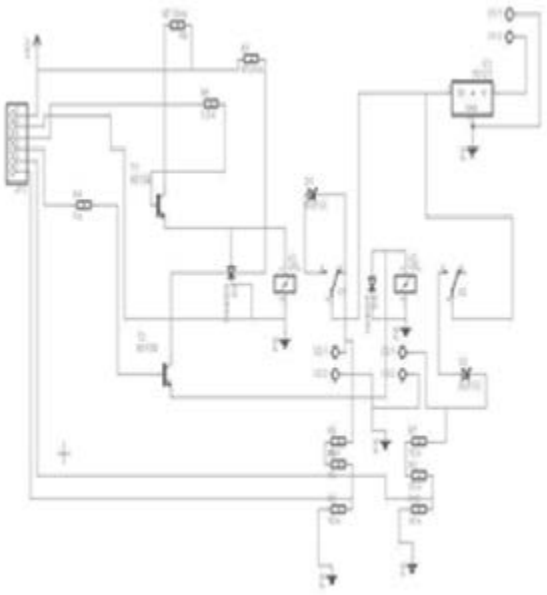

Fig. 6. Relay Series

- Driver Series

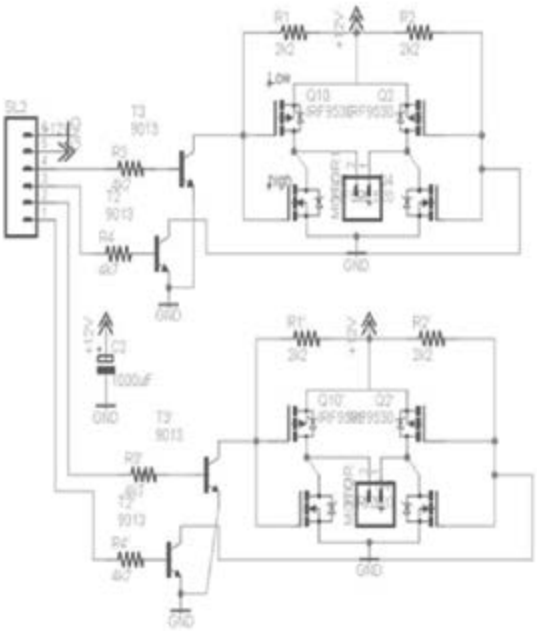

Fig. 7. Motor Driver Series

- LCD

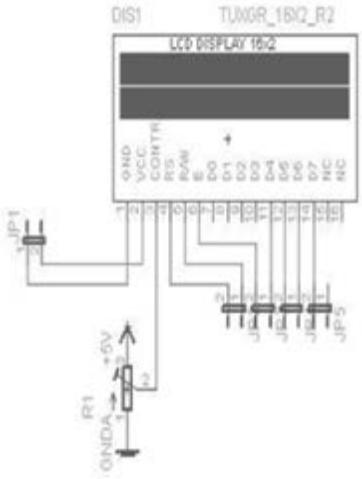

Fig. 8. LCD Series

3.1 Creating software with flowchart system of automatic battery charging prototype setting with sunlight track.

The program was created according to hardware. It was arranged from initialization, sub routine and main program. Meanwhile, for the flowchart in this system is divided into two, those are:

1. Sun tracking flowchart
2. Battery charging flowchart

Moreover, the processes can be seen in the picture below:

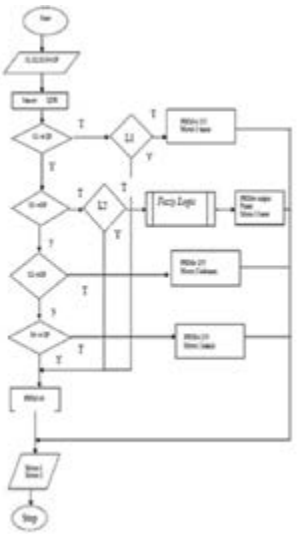

Figure 9. Sun Tracking Flowchart

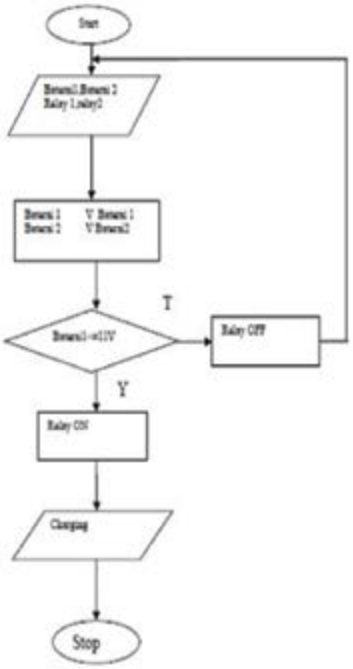

Fig. 10. Battery Charging Flowchart

4.1 Combining hardware and software by using *fuzzy* method.

This method has three steps, those are:

1. Making fuzzification of membership function (MF)
2. Making membership Function (MF) for motor output
3. Making rule

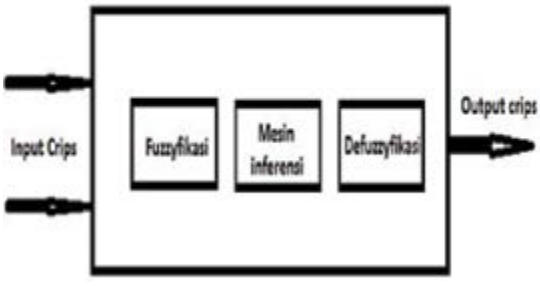

Fig. 11. *Fuzzy Logic Controller*

Research Result and Discussion

Generally, it needed to oversee the performance of LDR sensor, *fuzzy* logic algorithm, measuring *solar cell* output voltage in order to examine the system which had been created.

1.1 LDR sensor testing

There are five LDR sensors which were used in this device, four of them were for determining sun position and one was for the *seeting point.*

Table 1. LDR Sensor Testing Result

Hour	Voltage		Current		Power	
	Tracking	No Tracking	Tracking	No Tracking	Tracking	NoTracking
10 - 11	17 V	16 V	160 mA	150 mA	2720mV	2560mV
11 - 12	19 V	19 V	300 mA	200 mA	5700 mV	3800 mV
12 - 13	19 V	19 V	350 mV	350 mV	6650 mV	6650 mV
13 - 14	19 V	18 V	350 mV	320 mV	6650 mV	5760 mV
Power Total 1 Hour					21,720 W	18,770 W

LDR Sensor Testing Result showed that whether the sensor resistor was small, then it obtained enough sunlight, and vice versa.

1.2 Fuzzy logic algorithm

Algorithm was used to search the light range in S1 and S3 sensor which would control motor speed.

Table 2. *Fuzzy* Rule

s1 Light / s3 Light	Bright	Dark
Bright	Motor Off	Motor Off
Dark	Motor On	Motor Off

From the *fuzzy* rule, it can be seen that:

- *If* S1 light was bright and S3 light was bright, then motor was *off*
- *If* S1 light bright and S3 light was dark, then motor was *off*

- *If* S1 light was dark and S3 light was bright, then motor was *on*
- *If* S1 light was dark and S3 light was dark, then motor was *off*

To know S1 and S3 light, it can be searched by using this equation:
S1 light = Sp – Sensor Data 1

1.3 Solar cell output voltage testing

This testing was conducted in sunny day.

Table 3. Result of Solar Cell during Sunny day

	Time	Voltage (Volt)	Direction
1	12.00 PM	19,7	Center

Table 4. Solar Cell Output Voltage

No	LDR Sensor	LDR Resistor (Ω)	LDR Voltage (Volt)	Source Voltage (Volt)
1	Set point (SP)	270	0,14	4,95
2	Sensor 1 (S1)	470	0,22	4,95
3	Sensor 2 (S2)	820	0,42	4,95
4	Sensor 3 (S3)	960	0,50	4,95
5	Sensor 4 (S4)	490	0,25	4,95

In table 4 above, it showed that solar cell output voltage depends on sunlight which was obtain by solar cell, if solar cell obtains sunlight at the right position in sunny day then solar cell output voltage will reach to ± 20 Vdc.

.

Conclusions

After doing observation, collecting data and analyzing then it can be concluded:

1. The maximum power that was generated by solar cell in a day was 18,770 Watt.
2. The maximum power that was generated by solar cell in quiescent condition in a day was 21,720 Watt.
3. In a day, motor moved in about 15 minutes while maximum power that was spent by motor

power window was 0,067 KWh.

Sugestions

For the perfection of this system, the author gives several suggestions in improving this system.

1. The use of solar cells in greater power capacity for effectiveness in battery charging.
2. Addition of sensors to trigger the motor.
3. Add a tilt sensor to adjust the tilt of the solar cell with the tilt of the sun‘s motion.

Acknowledgment

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Materials Handling Systems at Manufacturing Industry

N.M. Nurul[1, a], R.S. Liza[2,b] and A.S. Aida[3,c]

Department of Mechanical, Politeknik Ibrahim Sultan, Johor, Malaysia

nurul.maizai@gmail.com, adamraje_8482@yahoo.com, aidasalihin@yahoo.com

Keywords: MHS; MHE; Tecnomatix Plant Simulation 14

Abstract: The development of automation system in manufacturing especially in material handling system is growing rapidly due to high demand. Demands for material handling systems likely to be increased due to large number of production operation in Malaysia. The analysis intends to study current efficiency in parts delivery using Tecnomatix Plant Simulation 14 software that would then be used to propose additional improvement for greater efficiency. The results of the simulations performed shows efficiency improvement of the proposed MHS (Material Handling System). This study concludes that the proposed changes to the current MHS has resulted in improved efficiency in the production line.

Introduction

Material handling involves short distance movement within the building itself or between a building and transportation vehicles. It utilizes wide range of manual; semi- automated, and automated equipment including consideration of the protection, storage and control materials throughout their manufacturing, warehousing, distribution, consumption and disposal processes.

The computer simulation will help to visualize the changes in layout and process as well to utilize the layout of material handling before implementing an automation technology, information management system, and procedural changes. Computer simulation model can be used to help the technicians or engineers to evaluate potential new automation investment or even changes to current operations.

Methodology

The main goal of this study is to improve MHS in production via simulation modelling of the production process. In order to achieve the goals and objectives, several steps and principles

should be taken into consideration. Fig. 1 below illustrates the process charts.

The needed information and data for this study have been collected by many different methods. Generally there were three types of data collection. Firstly, direct survey by which the information gathered by the observation. Time study conducted by stop watch method and observation of the process area of the company.

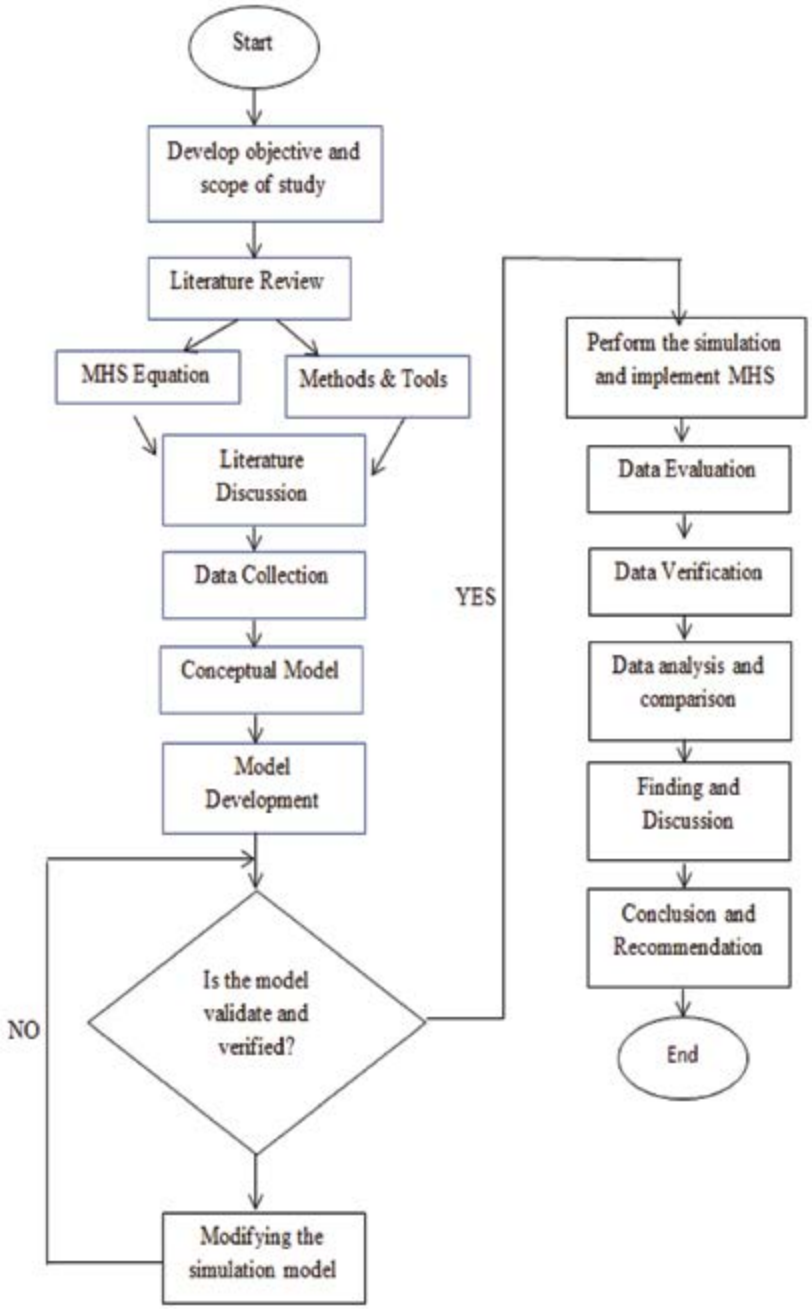

Fig. 1. Flow chart of the proces

Result and Discussion

The graph below shows the evaluation marks of MHE tested in simulation and comparison of data in term of waiting time, total throughput and working percentage to be considered. Based on three alternatives of MHE, the higher percentage of waiting time is similar between GRC and unit load at 36.28% while pick and place is lesser with 20.06%. The output produced shows that pick and place produced most, followed by GRC and unit load with 71.87, 71.83 and 35.93% respectively. The working percentage is similar between unit load and pick and place while GRC recorded the highest percentage. This results prove that the best MHE to be applied is pick and place.

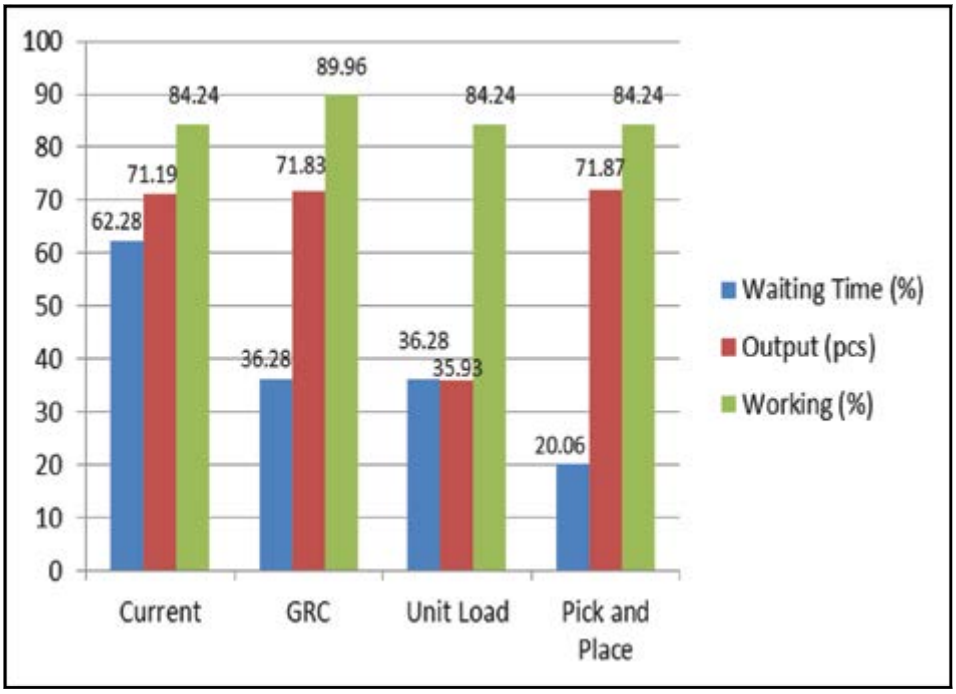

Fig. 2. Comparing performance of MHE

Unfortunately, if we considered all of the criteria mentioned previously, the ideal MHE to be chosen is GRC system as it is more worthy to the company as compared to the automation, with cost constraint to be considered. The weakness point of choosing the GRC is the slightly higher working percentage with increment of 6.7% while the best points to be measured are improvement in waiting time at 41.75% and its output of 0.9%. Thus, by considering production efficiency and cost effectiveness and based on the results evaluated, GRC is the ideal system to be implemented.

By comparing with previous study the result evaluated based on the performance analysis of the production line through computer simulation. A comparison between before and after implementation of GFR was carried out in order to ensure that the manufacturing performance had improved or otherwise. The results show significant improvement on cycle time as well as the inventory level.

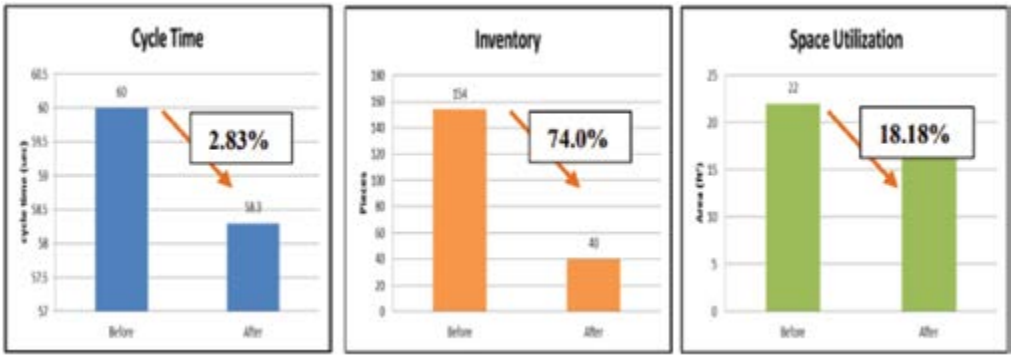

Fig. 3. Percentage of improvement after implementing new GFR system to the production line for cycle time, inventory level and space utilization (Hayati et al, 2015)

Based on the results obtained as shown in Fig. 3, the cycle time at the workplace is targeted to be reduced by 2.83%. This reduction may come from elimination of the minor stoppages at the line after the application of GFR system. Then, for the inventory level, it is targeted to be reduced by 74% through elimination of the trolley. While for the space utilization, it is targeted to be reduced by 18.18% through the application of GFR system in the line. These results proved that by introducing the GFR system, it can definitely improve the material handling system by eliminating the non-value added activities in the assembly line and hence optimize the line productivity.

Conclusion

This research predominantly concentrating on the improvement of material handling system (MHS) by selecting the correct method to be implemented with the help of simulation model to measure their system performance. The simulation will help to visualize the actual problem happens in production shop floor. And with the help of designed model, it will determine or measure the parameters of the MHS needed to be improved.

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Integrated Pest Management for Educational Institute

Nor Hazlin Md Gharip[1,a],Farzana Abdul Samad[2,b],Zuriati Abdul Majid[3,c]

[1,2,3] Civil Engineering DepartmentPolytechnic Sultan Salahuddin Abdul Aziz Shah,

Shah Alam, Malaysia

[a] norhazlin@psa.edu.my,[b] Fasco1402@gmail.com , [c] zuriati @psa.edu.my

Keywords: Integrated pest management; Educational institute; Awareness; Recommendation

Abstract. Integrated pest management (IPM) is a broad based approach that integrates practices for pests economic control. IPM is a process to solve pest problems while minimizing risks to people, property and the environment Implementation of IPM is affordable and low cost-effective, could reduce pesticide exposure and pesticide use. However, their implementation and adoption remains low. The goal for this research is to promote IPM practice in educational institute. In conjunction to achieve research goals three objectives had been identified. The objectives are: i. To identify integrated pest management concept ii. To assess the level of building consumer awareness towards IPM and iii. To promote IPM implementation to educational institute. This research found that the concept of IPM is widely and easily implemented. The level of building consumer awareness towards IPM as objective two also achieve the target .It is a good sign for IPM. For third objective findings from questionnaires survey determine that IPM brings benefits to educational institute. This research could come in hand to help facilities management industry to reduce or even prevent pest harassment in educational institute through IPM not as usual practice, using chemicals which might harm people. This research also has provided important and benefits of using integrated pest management in educational institute. Safety for educational institute is essential as most people spend their time there

Introduction

Integrated pest management is a process used to solve pest problems while minimizing risks to people, place and environment. It also a broad based approach that integrates practices for pests economic control. IPM is a systematic approach in managing pests based on long term prevention or suppression with a variety of methods, which are more cost effective and also minimize risks for human health and the environment. Urban pests can just be harassment and might cause significant health problems, damage to buildings and additional economic losses because of food contamination, diminished aesthetics and pest management costs [1]. IPM in museums, libraries, archives and historic buildings play an important part of preventive conservation, focusing on the prevention of pest infestations and the reduction of pesticide application. The concept of IPM was developed in the 1950s in the food industry. Starting in the 1980s, it has also been applied in museums mainly in the UK, USA, Canada and Australia [2].

An article from extension.org shows their research towards IPM found that IPM programs are

designed to reduce health hazards towards people who inhabit the building or structures. IPM programs accomplish this by using approaches such as sanitation, pests baiting, trapping pests and monitoring for pests and using the least hazardous least toxic pesticides when needed. By having an IPM program in place, they are taking special protective measures to reduce pesticide exposure to non-pest organisms and the environment [3]. IPM programs focus on preventing pest problems by getting rid of the food, water and shelter that pests need to survive. When pest management is needed, IPM uses a combination of common-sense, least harmful practices. IPM works because combined and integrated approaches for pest management are more effective in the end than a single approach. IPM in a facility is always a team effort between the program staff, janitorial staff, the building manager, landlord and pest management professional. Everyone has a role to play and must communicate and cooperate [4].

In conjunction to achieve research goals three objectives had been identified. The objectives are: i. To identify integrated pest management concept ii. To assess the level of building consumer awareness towards integrated pest management and iii. To promote for integrated pest management implementation to educational institute

Significant of study

Pest harassment can cause damage to human and property. Numbers of students, teachers, lectures and support staff substantial amounts of time in educational institute. The depending of chemicals for pest management became significant. Unmanaged pest problems and unsafe pesticide use practices threaten their health and property itself. This research could come in hand to help facilities management industry to reduce or even prevent pest harassment in educational institute through integrated pest management not as usual practice, using chemicals which might harm people.

Research methodology

Abduction approach used by researcher which involved semi structured interview (qualitative) and questionnaires survey (quantitative) to chosen responden.. In order to gain data towards pest management in both UiTM, facilities management company in both site were taken as respondent. There is 22 staff at UiTM Campus Seremban while UiTM Campus Tapah consists of 42 staff members. Questionnaire consists of 4 sections. Section A focus on the backgrounds of the respondents. Section B to identify the respondents' knowledge of the concept of IPM. Section C is to determine respondent's level of awareness towards IPM and section D is to measure respondent's opinion to the advantages of IPM program. At the end of the questionnaire, respondents were given space to express their own opinions and suggestions.

Research finding

The data collected analysed using Statically Package Social Science (SPSS) to analyse

questionnaires survey where set of questionnaires distribute to selective respondents. From 62 respondents only 56 were analysed.

Respondents Personal Information

Respondent's personal information includes gender, working experience, workplace, pest's danger awareness and integrated pest management awareness. Male respondents leading this questionnaires survey consists of 79% as they work in facilities management areas in educational institute chooses. For working Experience data shows that majority of respondents worked less than 5 years followed by 11 – 15 years working experience and for the Integrated Pest Management awareness from data collected was minority as 30% never heard about IPM meanwhile majority as 70% heard about IPM means that IPM has not been widely implement in local educational institute selected,

4.2 Section B: To identify the respondents' knowledge of the concept of IPM

Table 1: Identify Integrated Pest Management Concept

Do you agree with integrated pest management concept as listed below is easy and implementable? Please tick the most suitable answer below.	N	MEAN
Systematically examination and periodically to the presence of pesticides around building areas are steps to be execute.	56	3.59
Efficient management involves various aspects of cooperation between staff and documentation.	56	3.54
The implementation of action plan should be drafted carefully after the type of pest identified.	56	3.54
Different methods are implemented to address problems related to different pests.	56	3.50
Identify the type of pest presence helps in determining the methods of prevention and control	56	3.46
Observation is a method that is implemented continuously after action was taken.	56	3.30

The scale was selected using the range 1 to 4 where 1 represent strongly disagree and 4 strongly agree. The highest mean for Section B is 3.59, 57% from total respondents strongly agree that systematically and periodically examinations to the presence of pesticides around building areas are steps to be executed. This situation supports the statement given by United States Environmental Protection Agency (2011). According to [5] inspection is a systematic examination of a site for pest's activity or conditions that might encourage or allow pests become problem. Systematically and periodically examination will helps management to identified pests. Positive recognition will help to determine the best plan of action. Identification of pests required to identify which pests are present in and around facility. Learning pests presence sign such as dropping or damage even when pests not around works to identify pests. Another ways to identify pests is by identifying its characteristics and habits [4]. Total of 30 respondents strongly agree with efficient management involves various aspects of cooperation between staff and documentation.

Approaches for managing pests are often grouped [6]. IPM action plan must include description of IPM roles for all staff, occupants and others community members, list of key pests, inspection schedules for facilities and lists of resources for resolving technical questions. Setting and drafting is critical to guiding pest control decisions. A defined action will focus on the scope, size and intensity of IPM plan [5].From the data collected, there are 39 respondents agree that observation is a method that is implemented continuously after action was taken, this concept support by Kogan et al,2003. Regular observation is critically important. Monitoring for pests is an ongoing process that is very important in an IPM program Monitoring pests involves regularly inspecting facility for pests and pest damage, identifying sources of food and water that might attract pests and assessing the effects of pests management strategies [4] .

4.3 Section C: To assess the level of building consumer awareness towards IPM

Table 2: Assess the Level of Building Consumer Awareness towards IPM

Based on your experience, do you agree that integrated pest management has been implemented without you realizing it? Please tick the most suitable answer below.	N	MEAN
Household garbage or trash can covered neatly reduce pests sources of food and drinks.	56	3.29
Proper sanitation will help reduce pest's presence and breeding.	56	3.25
Installation of fine net in windows or doors will reduce the presence of insects such as mosquitoes and flies.	56	3.20
A tiny hole in building structures such as walls or floors is one of the main routes of pest.	56	3.11
Lighting factors play its own role in attracting pests.	56	3.00
Only cleaning employees responsible for maintaining the cleanliness of the residential buildings.	56	1.75

Table 2 shows regarding the awareness of IPM implementation, household garbage and trash disposal get highest mean 3.29 out of 4, means that respondent are agree and aware that item is the IPM that they are implement in their IPM. This awareness are parallel with the finding from University of California San Francisco, 2011, Common pests search for food in garbage and trash include cockroaches, ants, flies, mice and rats. These pests bring diseases and harm to human health and property. Garbage containers must have lids and lining to avoid pests from entering and looking for sources.

Proper sanitation will help reduce pest's presence and breeding. This statement was strongly agreed with 3.25 mean. Basis for an effective pest management program is a good sanitation. Many of pest problems can be reduced, or even prevented from occurring, if building consumers followed proper sanitation practices. The more cooperation received from these parties the better the results achieved by the IPM program. Others factor such as installation of fine net in windows or doors will reduce the presence of insects such as mosquitoes and flies as no 3 from the factor implement as IPM. Follow by Tiny holes as pest routes with 3.11 mean, meanwhile only 2% respondent strongly disagree with it. Thousands of tiny doorways can be found and became entrance for tiny pests such

as ants. Some of the holes are easy to identify while others will be discovered when there are ants marching through it. The entrance holes need to be seal using silicone caulk, putty, glue or plaster. All the gaps around windows, door and walls must be blocked off.

Sealing and repairing cracks, gaps and holes inside building is another way to prevent pests from entering building [4]. Light affects insect behaviour and development in a variety of ways that can be divided into several categories. It is well known that insects fly toward streetlamps or other outdoor illumination at night. This innate photo tactic behaviour has provided the basis of the design of electric insect killers. Equipped with UV-emitting fluorescent tubes, the insect killers effectively attract insects such as moths and beetles and prevent these insects from entering into greenhouses and stores that are open at night. [7]

A research on 2015 shows that flickering light can be used to reduce night-time insects attracted to human habitats or building and mitigating artificial light on surrounding [8] Placing outdoor lights several feet away from doors, windows or entrances also concentrates pest's activities away. For the statement which is only cleaning employees responsible for maintaining the cleanliness of the residential buildings, the means value 1.75 clearly stated that respondent quit disagree that this factor as a part of IPM action It is because supervisory staff members or cleaner might be able to address sanitation problems or report potential building problems, while maintenance staff members can take care of physical problems like missing door sweeps or windows that won't close according to Lysa Holland [9] .

4.4 Section D: To promote IPM implementation for educational institute

Table 3: To promote IPM implementation for educational institute

Do you agree implementation of Integrated Pest Management bring benefits to the institution? Please tick the most suitable answer below.	N	MEAN
Implementations of integrated pest management give advantages to human health and the environment.	56	3.48
Workplace environment that is not open to chemicals is safer.	56	3.48
Integrated pest management program will save costs while protecting human health.	56	3.45
Integrated pest management programs have a positive impact for a long period of time compared to the usual method.	56	3.38
Elimination of pest habitat will prevent their presence for the long term.	56	3.36
Integrated pest management is environmentally friendly and the use of pesticides is the last step.	56	3.21

A third objective is to produce integrated pest management implementation to educational institute. From figure 5.17, it is shown 50% respondents strongly agree that implementations of integrated pest management give advantages to human health and the environment and 45% respondents agree. Meanwhile there is 5% respondents disagree that the implementations will give advantages to human health and the environment. Question D 1 rank 1 with 3.48 mean. IPM, is a process that can be used to solve pest problems while minimizing risks to people and the environment. IPM can be used to manage all kinds of pests anywhere [10].Pesticides play a key role

in implementing IPM by their nature, however most pesticides pose some risk.

Integrated pest management program will save costs was strongly agreed by 46% respondents. and 52% agree that IPM will save cost against 2% respondents disagree with 3.45 mean. Implementation of integrated pest management is cost saving according to United States Environmental Protection Agency. IPM might be more labour intensive than conventional pest control and might require more up front resources. Despite of that, however costs are generally lower over time because of the underlying cause from pest problem addressed. IPM practices also provide financial benefits unrelated to pests. As an example, weatherization's of buildings not only terminated pests but also save energy and reduce moisture problems [5]

According to University Park Lysa Holland said that the IPM plan mandates non-pesticides solutions as an initial response. If pesticides are necessary, only the least toxic pesticides are used, unless a need is formally demonstrated for a stronger substance [9]. University of California San Francisco (2011), states that if all non-chemicals steps don't work, uses the least harmful pesticides to manage pest problem. Non chemicals strategies must be implemented before justified used of pesticide.

63% respondent agree while 37% strongly agree with implementation of IPM have positive impact for long period of time rather than usual method. Usual method using pesticide will go away or fade in time and need to be implemented regularly. IPM combination techniques last longer and hard to break. IPM is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques. With IPM, actions taken is to keep pests from becoming a problem, such as by growing a healthy crop that can withstand pest attacks or caulking cracks to keep insects or rodents from entering a building [6].

Pest population can be decreased by eliminating or manipulating of its environment such as food, water and shelter. Elimination of habitat supplemented with other strategies can achieve a lasting degree of pest management. Permanent elimination of pest breeding sites and other sources of pest infestation will stop their growing populations [12]. 30 respondents strongly agree that a workplace environment that is not open to chemicals is safer that workplace expose to chemicals it shows mean 3.48 as highest rank. Workplace environment bring impacts to employee morale, productivity and engagement in both positively and negatively. Creating a work environment in which employees are productive is essential to increased profits. According to Laws of Malaysia (2015) it shall be the duty of every employer and self-employed person to endure, so far as is practicable, the safety, health and welfare at work of all his employees.

Conclusion

This paper is response to a growing global interest in environment health, green practices and sustainability in facilities management practices and industries. Integrated pest management should be considered to be implementing in facilities management not only for educational institute but as worldwide in order to maintain property, people and environment. Pest problem is too important to be postponed since it existence bring harm to property and people. It is agreed that most people

known few of the integrated pest management concepts but the implementations are limited and not widely. Finally, it is researcher hope that this dissertation would provide motivation to facilities management industries to implement integrated pest management to ensure that property, people and environments especially in educational institute is well managed and taking cared.

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Fabrication Of Floor Tiles From Recycled HDPE Bottle Filled Recycled Glass Composite Using Hot Press Method

Nurlina A.R1, a and Zuzilah H.H2,b

1 2Department of Mechanical Engineering, Politeknik Ibrahim Sultan, Johor, Malaysia
anurlinaaimi@yahoo.com, bzbh3103@gmail.com

Keywords: Floor Tiles; rHDPE; rSLSG; Hot-press; Flexural.

Abstract. rHDPE tiles are made out of plastics that can be used to cover walls and floors. The purpose of this experiment is to produce rHDPE tiles that are from rHDPE plastic bottles and some portion of Soda Lime Silicate Glass (SLSG) in selected ratio. It is in the interest of this experiment to solve the problems with conventional tiles, which are easily broken and discoloured. rHDPE plastic bottles melted at 140°C for around 4 minutes then the proportion of SLSG powder were poured and the mixed composition were crushed before hot press proses into the designated mould with size (200mm x 200mm x 5mm). The fabrication of the tile is using Hot Press Method. The estimate time needed for the cooling process is between 5 minutes setup within the hot press machine. These samples go through a type of test which are Flexural Test. All the mechanical properties of proportion behavior recorded in the table and analysis on the new properties were done.

Introduction

Floor was the important structure for support the load inside the building structure. Load means here include the weight of tiles as floor finishing and also the human (user) weight. Floor tiles is not only for finishing purposes or to touch-up the final looking of the structure, but actually the tiled floor is stronger than non-tiled floor (Dinanurjilla, 2009).
High Density Polyethylene (HDPE) was one of the plastic polymer that widely used in manufacturing. It is because HDPE was light, has high density and durability and also has a good tensile strength. The best point is, HDPE is not effected by high temperature up to 120˚C (Thomas, 2012). This is the main factor why HDPE was chosen rather than other type of plastic waste. Commonly, the HDPE symbol can be seen on bottles and food containers. Thus, it means that rHDPE was safe to use because it has ability to prevent the chemical reaction between the plastic packaging with drink or food stuffed in them.

This research go through melting, making and moulding process of rHDPE tile before going for several testing for analysis purposes. This is to ensure that this new purpose tile is good and ready enough to replace the current one. Flexural strength tests are performed to measure the bending for floor, wall and roof packaging (Samsudin, 2006). Flexural strength also known as the strength of material bend. This is the test to measure the maximum tile strength before it start to crack. Thus objectives to be accomplished at the end of this project are:

i. To study the effect of SLSG powder as filler loading on rHDPE's tiles.
ii. To evaluate the mechanical properties of rHDPE: SLSG composite by mechanical testing

(Flexural and Impact Test).

iii. To correlate the mechanical properties with filler loading of rHDPE: SLSG composite.

Background of Study

Plastics have become an essential part of daily lives. The amount of plastic used every day become higher day by day, it increased in steadily mode. Because of low density, strength, designs, fabrication abilities, duration of live, light in weight, and cheap offered by the plastic, they become the factors behind such phenomenal evolution. Plastics have been used widely in wrapping, manufacturing, automotive, medical, housing, communication materials, and many more. With these such broader applications, plastics contribute large amount in the solid waste stream. Based on the world's annual consumption, the plastic materials has increased from around 5 million tons in the 1950s to nearly 100 million tons in 2001 (Siddique et al., 2008).

Glass is one of the earliest human made materials. It had been manufactured in various forms such as packaging and container glass, bulb, and many more. They all have their own limited life manufactured forms thus they need to be recycled to avoid environmental issues if they was ignored and throw-out to the landfills.

The amount of plastic and glass waste have been rising promptly during the recent decades due to the increasing of industrial development and the improvement in the standards of living style, but unfortunately, these waste quantities are not being recycled in total but somewhat abandoned causing serious problems to the environment such as the lacking natural resources and pollution (Husni Al-Najar, 2005).

Thus by recycling of this plastic and glass waste by converting it to aggregate components, it might be help to reduce the area of landfill used and also moderate the demand for natural raw material for construction actions.

‘



Fig. 1. K-Chart for research study

Table 1. Mechanical properties and cell classification of HDPE (ASTM International Standard)

Property	ASTM Specification	Classification Requirement
Density	ASTM D 1505 – Test method for density of plastic by the density-gradient technique	0.941 – 0.955 gm/cm^3
Melt Index (MI)	ASTM D 1238 – Test method for flow rates of thermoplastics by extrusion plastometer	$0.4 > MI \geq 0.15$
Flexural Modulus (E_f)	ASTM D 790 – Test method for flexural properties of unreinforced and reinforced plastics and electrical insulating materials	$758 \leq E_f < 1103MPa$ $110000 \leq E_f < 160000psi$
Tensile Strength (f_t)	ASTM D 638 – Test method for tensile properties of plastic	$21 \leq f_t < 24MPa$ $3000 \leq f_t < 3500psi$
Slow crack growth resistance – ESCR	ASTM D 1693 – Test method for environmental stress-cracking of Ethylene Plastics	Test condition, 24 hr duration 50% failure (max)
Hydrostatic Strength Classification – HDB	ASTM D 2837 – Obtaining hydrostatic Design Basis for Thermoplastic Pipe materials	(Not pressure rated)
Colour (C)	(not specified by ASTM)	$2\% \leq C \leq 5\%$

Table 2. Compositions and the uses of different common forms of glass (Schott Group, 2007):

Type of Glass	Composition (by weight)	Usages
Soda-Lime-Silica	73% Silica – 14% Soda – 9% Lime – 3.7% Magnesia – 0.3% Alumina	Glass Widows – Bottles – Jars
Alumino-Silicate	64.5% Silica – 24.5% Alumina – 10.5% Magnesia – 0.5% Soda	Fiberglass Insulation – Halogen Bulbs
Lead (Crystal)	57% Silica – 31% Lead Oxide – 12% Potassium Oxide	Lead Crystal Tableware
Boro-Silicate	81% Silica – 12% Boron Oxide – 4% Soda – 3% Alumina	Pyrex Cookware – Laboratory Glassware

Table 3. Previous research studies in different points of view and perspectives.

Research Title	Year	Method	Raw Material/ Replacement	Finding
Low Cost Roofing Tiles using Agricultural Wastes	2017	Replace significant quantity of river sand with rice husk powder and rice husk provides an appropriate proportion	River Sand	Replacement of river sand in making roof tiles will be effective if the replacement ratio has below 5%
Polymer-sand tile and paving slabs	2008	Different kind of plastic waste are shredded, mixed with dry, clean sand and colouring material, placed into an extruder, and this mixture is heated up. The melt material is placed into a high pressure machine and formed.	Sand & Cement	The plastic tile is lighter than the reinforced tile, fire and shock resistant, and result on sharp temperature changes.
Ceramic Ceramic Tile With Recycled Glass	2010	Not Stated	Reduce the portion of clay	Ceramic tile with recycled glass to have a useful life of 50 years. Maintenance of the tile floor during this period – e.g., cleaning, polishing – is not included within the system boundaries.
Plastic Photovoltaic Roof Tiles	2008	Investigated the feasibility of incorporating photovoltaic cells into plastic roof tiles using injection moulding	Not Stated	Photovoltaic roof tiles would currently be expensive and would not compete economically with grid-based electricity in South Africa. Other factors such as sustainable development and health benefits could be seen to outside the short-term economic issues, though, from a public interest perspective

Methodology

The exact procedures carried out is based on the scope covered of this research in order to achieve the objective. ASTM as a main references used to carried out the whole procedure to make sure the sample and testing conducted using a standard tools, technique and correct value of testing variables.

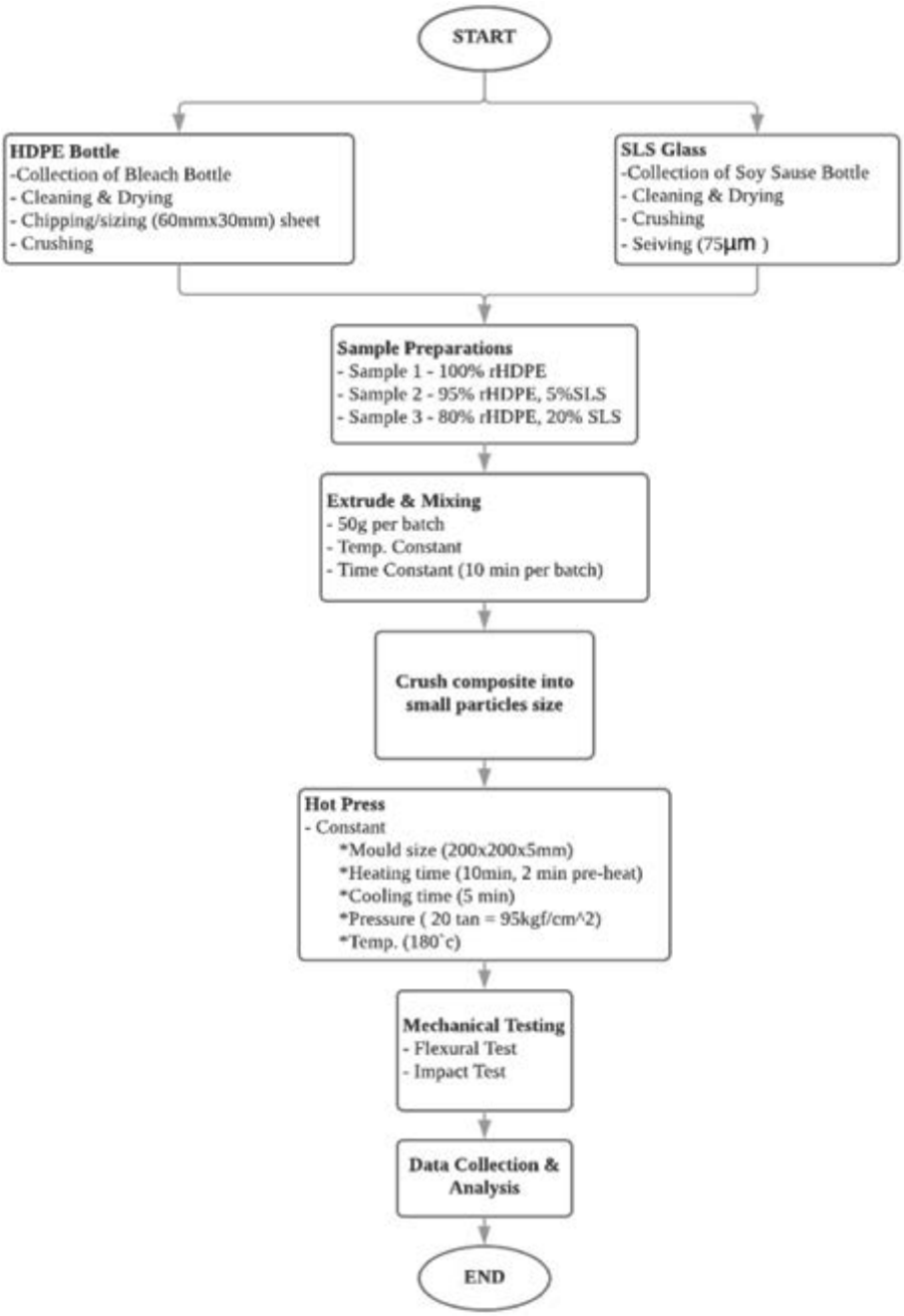

Fig. 2. Overall process flowchart

Several process to prepare the sample including batch formulation, mass calculation, and weight per composite.

Table 4. Proportion and volume fraction for each sample

Samples	rHDPE $\rho_{HDPE} = 950\ kg/m^3$ (ref: ASTM D3350)		SLSG $\rho_{SLS} = 2500\ kg/m^3$ (ref: ASTM E688 – 94)	
	Proportion	Volume Fraction	Proportion	Volume Fraction
S^1	100%	1.00	0%	0.00
S^2	95%	0.95	5%	0.50
S^3	80%	0.80	20%	0.20

$$\rho_{composite} = \rho_{HDPE}(Volume\ Fraction_{HDPE}) + \rho_{SLS}(Volume\ Fraction_{SLS})$$

Mass Calculation for 1st sample:

$$\rho_{composite} = 970\ kg/m^3\ (1.00) + 2500\ kg/m^3\ (0.00)$$

$$= 970\ kg/m^3$$

$$From\ \rho = \frac{m}{V_{mould}} \rightarrow m = \rho V_{mould}$$

$$= \left(970\ kg/m^3\right)(0.0002m^3)$$

$$= \mathbf{0.194kg}$$

$$\therefore m_{HDPE} = 100\% \times 0.194kg = 194g$$

$$\therefore m_{SLSG} = 0\% \times 0.194kg = 0g$$

*** Method to calculate the mass for sample #2 and #3 are the same.*

The rHDPE flakes and glass powders were mixed by following the mass proportion above to make sure the even distribution of materials composition before extrude process. The process began with melted and mixed the rHDPE flakes and the glass powder using HAAKE™ Rheomix OS Lab Mixers before crushing composite from a blob form (resulting from extruder) into small particles.

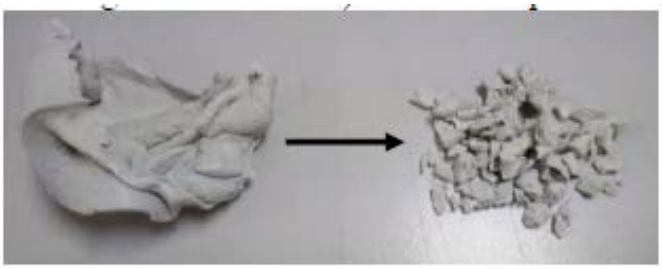

Fig. 3. Blob form

The particles resulted from crushing the composite previously are now ready for final stage of sample preparation which is Hot Press. This process involved the use of Hydraulic Hot Moulding Machine. Hot-pressing method applied high-pressure for forming a composite compact at a high temperature that enough to induce fabrication processes. The process conducted by placing compacted composite preform into the (200x200x5) mm mould.



Fig. 4. Compacted composite in mould



Fig. 5. The successful sample just after go through hot-pressing method

Flexural Test

Flexure tests are generally used to determine the flexural modulus or flexural strength of a material. Testing conducted by following the ASTM D790 standard. Compression speeds applied to

tile samples rHDPE is 10mm per second and length range was calculated by referring ASTM D790. There are three parameters that set to be constant during this test which are support span range (80mm), the speed of the loading (100mm per min), and the maximum deflection (50%) for the test. During the testing, there are no any fracture occurred at the specimens until end. By refer to ASTM D790, in this case test will stop until the specimen bend by 50% from the span height. It is to avoid the specimen slack from the span point. Thus, all the discussion in this section was consider the non-failure specimen condition.



Fig. 6. Flexural testing

From the result above, within approximately same maximum time range (106 sec), the average maximum forced applied to reach the ultimate strength on the 1st sample is 20.5N and it increasing by 13.6% after adding 5% of SLSG and continue increase for another 41.6% for 3rd sample (20% of SLSG).

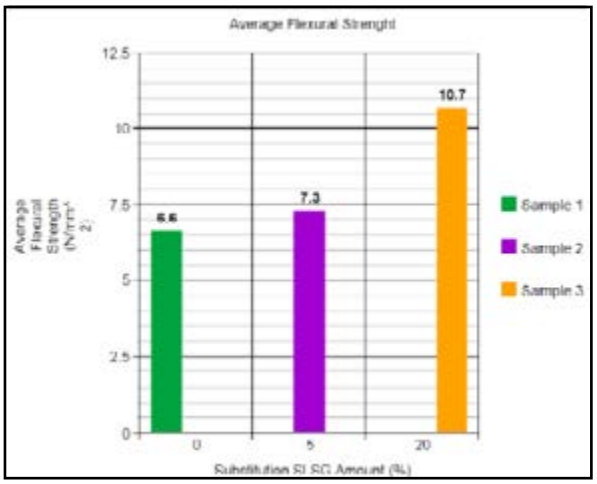

Fig. 7. Average Flexural Strenghth

Sample #	SLSG Composition (%)	% increasing of flexural strength
1	0	-
2	5	10.6%
3	20	62.1% > 50% strength increasing

Table 5. % increasing of flexural strength

There was 10.6%, and 62.1% extension in the flexural strength for tiles containing 5% and 20% SLSG powder. The graph show that the average flexural strength of rHDPE tile is prone to increase with the increase of the SLSG ratio in these mixtures. This trend can be attributed to the increase in adhesive strength between the surface of waste plastic particles and the SLSG powder. By adding 20% of SLSG power resulting increasing more than 50% of tile's strength. The flexural strengths of the waste plastic HDPE tile composites compared similarly with those of previous work (Hannawi et al., 2010; Rahmani et al., 2013). By referring graph above, once reaching the ultimate strength, none of the tile composite fail, they are just bending and back to original shape after a few moment, which is additional evidence of the superior bonding between the HDPE waste and the SLSG powder. On observation, the 80:20 for tile showed better results than the 100:0 tile.

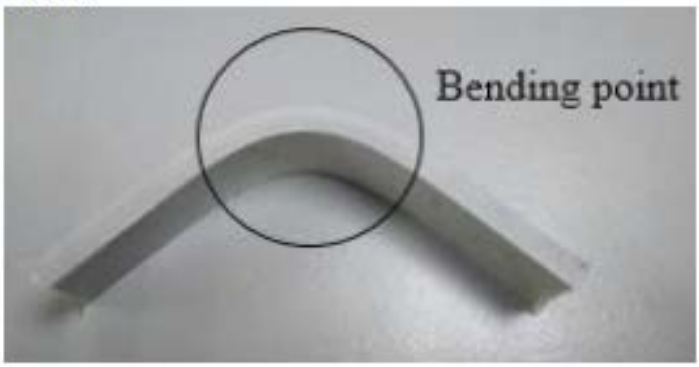

Fig. 8. Physical specimen after flexural test conducted

Flexural Stress-Strain Curve

While continue to increase the load, the specimen undergo a process of strain hardening (linear remaining line). This show the relationship between stress and strain is linear. The specimen, while still undergoing some deformation at this point, is still able to receive more flexural stress without weakening. By refer to Figure 4.4, the ultimate point shown is the point where the specimen cannot handle any more increase of flexural stress and start to bend. By following the theory of Hooke's Law, within these elastic region, the material tends to returns to its original length when

the stress is removed. No changes recorded on length and shape basis at this stage. When load was continuing applied to the material's surface (stress increase), an ending point in the linear relationship is lastly reached and material is now begin to yield (changes in slope at upper end of the linear region). And this yield point is the remark of beginning the plastic region. Thus the Hooke's Law not be a guide any more at this stage because is perform a non-linear relationship.

As a load is increased, the slope of the curve change radically. As a final point, the applied load reached a maximum value (maximum load) and engineering stress at this point is called ultimate flexural strength. There are different value of strength recorded from different proportion of SLSG powder in the tile. As for 20% of addition SLSG powder, we can say that more composition of SLSG powder in rHDPE tile, more strength the tile.

As conclusion for flexural test conducted, strengthens of rHDPE tile tend to increase by increasing the proportion of SLSG powder. However the result is valid for maximum 20% of the glass powder only, and the increasing for more glass powder might resulting different finding due to brittle characteristic of the glass. This result agrees with the finding of Dr. Hassan H. Jony et al., 2010; Janusz W. Sikora et al., 2016.

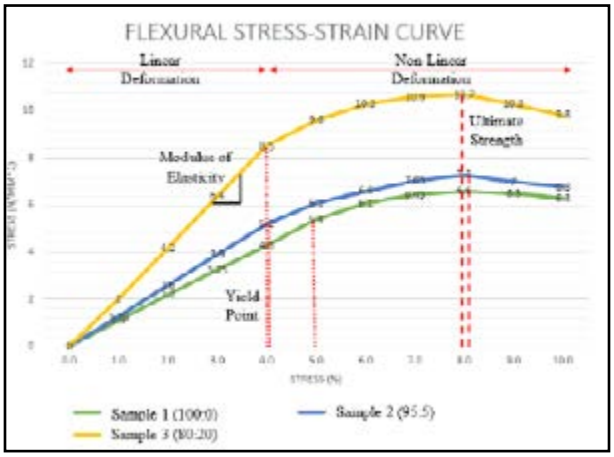

Fig. 9. Flexural Stress-Strain Curve

Conclusion

The primary objective of this research was to study the effect of waste glass powder content on the properties of rHDPE tiles when added as a partial replacement of recycled HDPE. This objective was achieved through the following:

1. Identifying the effects of adding waste glass powder on the fresh properties of HDPE waste.
2. Studying the influence of waste glass on the hardened tiles properties.

These targets were reached by conducting a standard series of flexural strength tests. The output

results gained from this experimental research indicated dependable data points and promising further research horizons.

As conclusion, tiles with waste HDPE and SLSG can be used as an effective plastic and glass waste management practice in future. At last it can be said that future of this product is very bright. With expectation of high profitability it is assumed that it would be the perfect product to be manufactured in today's environment. Based on data and analysis done as per discussed, conclusion of this project aligns as follow:

• Recycled HDPE plastic can be used as a replacement of natural aggregate with a percentage can be reached to 100% (pure rHDPE).
• Increasing recycled glass aggregate from 0% to 5% and then to 20% leads to an increased in the strength values of the tiles.
• The use of the recycled plastic and recycled glass in the tiles reduced the weight of the tiles when compared to conventional tiles which lead to produce light-weight tiles.
• Flexural strength increases as the SLSG powder aggregate content increases. By replacement of 5%, and 20% by SLSG aggregate, increment in flexural strength were noticed by 10.6%, and 62.1%, respectively.

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Tahap Kesediaan Menggunakan MOOC Dalam Pengajaran dan Pembelajaran di Politeknik Ibrahim Sultan

Z. Norfarahi[1, a], A.H Adilah[2,b], A. Ummul[3,c] dan M.K Hajaratul[4,d]

[1234]Politeknik Ibrahim Sultan, Johor, Malaysia

[a]norfarahi@pis.edu.my, [b]adilahafizah@gmail.com, [c]hajaratuladhwa@gmail.com, [d]uhafizah@pis.edu.my

Kata kunci: Tahap kesediaan; MOOC; teknologi pendidikan;

Abstrak. Pelan Pembangunan Pendidikan Malaysia (PPPM) 2015-2025 (Pendidikan Tinggi) sangat memberi penekanan yang begitu tinggi terhadap penggunaan teknologi maklumat dan transformasi penyampaian proses pengajaran dan pembelajaran (pdp). Pelan ini meletakkan anjakan kesembilan iaitu pembelajaran dalam talian tahap global. untuk transformasi sistem pendidikan dengan memanfaatkan teknologi maklumat bagi meningkatkan kualiti pembelajaran di Malaysia. Perkara ini bertepatan dengan Pendidikan 4.0 yang mengketengahkan kemahiran abad 21 yang sangat penting untuk diaplikasikan dalam pendidikan.. Massive Open Online Courses (MOOC) merupakan satu platform yang diperkenalkan sebagai satu pendekatan baru dalam proses pdp. Justeru kajian ini dijalankan untuk melihat tahap kesediaan pelajar dalam menggunakan MOOC dalam pengajaran dan pembelajaran di Politeknik Ibrahim Sultan. Kajian dijalankan secara kuantitatif dan soal selidik ditadbir kepada 213 orang pelajar untuk mendapatkan maklum balas. Data diukur dengan menggunakan skala likert 1 hingga 5 dan dianalisis menggunakan *Statistical Package For Social Science* (SPSS) dengan mengukur min dan peratus. Dapatan kajian menunjukkan tahap kesediaan pelajar menggunakan MOOC berada pada tahap tinggi dengan min keseluruhan mencatat 4.0238.

Pengenalan

Perkembangan pesat pendidikan masa kini menunjukkan kemunculan pelbagai pendekatan baru berteraskan teknologi yang boleh digunakan dalam pdp. Teknologi pendidikan turut membuka peluang dan platform baru bagi memperkasakan pembelajaran, mengubah bentuk penyampaian ilmu dan meningkatkan kreativiti dalam proses pdp bahkan turut mengubah ekosistem pendidikan di Malaysia. Penggunaan teknologi sememangnya memberi implikasi baru yang lebih efektif dalam pdp sekaligus akan menyumbang kepada kelancaran dalam pendidikan (Norazah & Ngau Chai Hong, 2009). Arus perubahan ini menuntut berlakunya proses transformasi yang pesat dalam semua bentuk proses pendidikan sama ada dari sudut kurikulum, komunikasi, kreativiti, kaedah pengajaran, gaya pembelajaran, bentuk bahan bantu mengajar mahupun rekabentuk pengajaran yang menggunakan penedekatan teknologi. Hal ini juga selaras dengan Spector (2012) yang menyatakan integrasi teknologi di dalam pendidikan melibatkan disiplin suatu aplikasi pengetahuan yang bertujuan membantu proses pengajaran, pembelajaran dan prestasi.

Pendidikan Teknik dan Vokasional yang dikenali sebagai TVET (*Technic Vocational Eduaction Training*) tidak ketinggalan dalam arus perdana untuk mengejar trend terkini dalam perkembangan teknologi semasa untuk memenuhi aspirasi dan halatuju pendidikan di Malaysia. Ini adalah selaras PPPM (PT) 2015-2025 di bawah lonjakan ke-4 Graduan TVET Berkualiti, lonjakan ke-9 Pembelajaran Dalam Talian Secara Global dan Lonjakan ke-10 Transformasi Penyampaian Pendidikan Tinggi yang memerlukan lonjakan ketara dalam proses pdp berteraskan teknologi bagi penambahbaikan kualiti pengajaran dan kaedah penyampaian pendidikan yang disesuaikan untuk semua pelajar. MOOC di Malaysia merupakan agenda keutamaan Kementerian di bawah Lonjakan 9: Pembelajaran Dalam Talian Tahap Global *(Globalised Online Learning)* di bawah PPPM (PT) 2015-2025 (www.mohe.gov.my). MOOC merupakan kursus pembelajaran dalam talian (online) yang terbuka secara percuma dan ditawarkan kepada pelajar dalam dan luar negara (http://jpt.mohe.gov.my). MOOC di Malaysia juga telah dilancarkan pertama kalinya pada September 2015 untuk meningkatkan kualiti dan kebolehcapaian dalam pendidikan tinggi dan ketika itu MOOC telah mempunyai 450 kursus yang ditawarkan oleh universiti awam, universiti swasta, politeknik dan kolej komuniti (https://www.bharian.com.my, 26 September 2017). Menurut Marshal (2014) konsep MOOC yang diperkenalkan jelas telah mengkaji semula kaedah pembelajaran dalam talian di peringkat institusi pengajian tinggi. MOOC kini telah berkembang dan menjadi pendekatan terkini bagi pembelajaran dalam talian untuk menawarkan pembelajaran kepada pelajar tanpa mengira limitasi tempat, waktu dan suasana. MOOC merupakan pembelajaran dalam talian bertaraf global yang mampu menampung kapasiti pelajar pada skala yang besar (Nordin, Norman, & Embi, 2015).

Latar Belakang Kajian

Politeknik Ibrahim Sultan sebagai institusi TVET premier telahpun mula mengorak langkah dengan mengintegrasikan teknologi pendidikan dalam proses pdp dengan penggunaan MOOC sebagai pendekatan pengajaran dalam kebanyakan kursus yang ditawarkan. Seperti contoh di Jabatan Pengajian Am, MOOC telah dibangunkan oleh pensyarah bagi kursus DUE3012 Communicative English 3, DUB1012 Pengajian Malaysia dan DUA6022 Komunikasi dan Penyiaran Islam untuk ditawarkan kepada pelajar bagi mengakses bahan pembelajaran, tugasan dan juga aktiviti. Terdapat pelbagai kebaikan dalam penggunaan MOOC yang menarik perhatian akademia dan juga pelajar. Menurut Cole & Timmerman (2015), MOOC membolehkan pelajar berinteraksi dengan rakan kursus yang terdiri daripada pelbagai latar belakang pendidikan yang berbeza serta berkongsi pandangan dan idea. Hudiya et. al (2017) menjelaskan kursus atas talian, rekabentuk yang fleksibel dan pembangunan interaktiviti adalah elemen yang tekandung dalam MOOC yang menyumbang keterujaan penggunaannya.

Penggunaan MOOC dalam pdp ini merupakan satu usaha mengintegrasi teknologi dalam memastikan pelajar menerima maklumat dan bahan pembelajaran selaras secara atas talian. Hal ini bagi memastikan MOOC menjadi salah satu medium utama yang menghubungkan pensyarah dan pelajarnya dalam segala bentuk ruang Namun penggunaan MOOC di Politeknik Ibrahim Sultan masih lagi baru dan belum menyeluruh kepada semua kursus yang ditawarkan. Justeru, kajian ini ingin melihat tahap kesediaan pelajar menggunakan MOOC dalam pdp di Politeknik Ibrahim Sultan.

. Kajian lepas banyak menunjukkan kepentingan mengkaji tahap kesediaan pelajar dalam penggunaan MOOC. Kajian Olga et.al (2016) mendapati pelajar bersedia menggunakan MOOC sebagai platform pembelajaran atas talian bagi meningkatkan pengetahuan serta kemahiran mereka. Nurul Ain dan Radatul (2018) pula dalam kajiannya menunjukkan kesediaan penggunaan MOOC bagi pelajar Sijil Pengoperasian Perniagaan berada pada tahap yang sederhana. Md.Yusoff et. al (2017) menunjukkan dalam kajiannya bahawa pelajar siswazah di Fakulti Pendidikan Universiti Kebangsaan Malaysia (UKM) mempunyai kesediaan yang tinggi dalam menggunakan MOOC sebagai platform pembelajaran yang baharu. Tahap kesediaan pelajar diukur melalui empat (4) penilaian iaitu jangkaan prestasi, jangkaan usaha, pengaruh sosial dan keadaan kemudahan. Namun dalam kajian ini hanya melihat kepada tahap kesediaan secara keseluruhan.

Objektif Kajian

Objektif kajian yang ingin dicapai dalam kajian ini ialah :

i. Untuk mengenalpasti tahap kesediaan pelajar menggunakan MOOC dalam pengajaran dan pembelajaran

Metodologi Kajian

Kajian tinjauan deskriptif dijalankan dalam kajian ini dengan menggunakan soal selidik sebagai instrumen kajian untuk mendapatkan data dan memperoleh maklumat. Menurut Creswell (2005) reka bentuk kajian tinjauan adalah prosedur dalam penyelidikan kuantitatif dan kualitatif yang mana pengkaji menjalankan satu tinjauan terhadap sampel atau keseluruhan populasi. Seramai 213 orang pelajar telah dipilih secara rawak sebagai responden dalam kajian ini yang mewakili semua jabatan akademik di Politeknik Ibrahim Sultan. Instrumen kajian adalah menggunakan borang soal selidik yang diadaptasi daripada kajian Daud, M.Y et.al (2017). Model kajian ini adalah daripada Model UTAUT iaitu The Unified Theory of Acceptance and Use of Technology (UTAUT) yang bertujuan untuk menjelaskan penerimaan teknologi. Venkatesh et.al (2003) menjelaskan bahawa Model UTAUT telah disahkan apabila diuji pada data yang terdahulu daripada pengkaji Teory Acceptance Model (TAM). Data yang dikumpul diukur dengan menggunakan skala likert 1 hingga 5 dari sangat tidak setuju hingga sangat setuju. Data dianalisis menggunakan program *Statistical Package For Social Science* (SPSS) dan analisis deskriptif menguji mod, min dan peratus untuk mengukur dapatan daripada responden.

Analisis dan Dapatan Kajian

Demografi responden

Demografi responden dalam kajian ini merujuk kepada jantina, kategori umur, tahap semseter pengajian dan jabatan. Jadual 1 di bawah menunjukkan seramai 213 orang responden terlibat dalam kajian ini. Seramai 116 orang responden terdiri daripada lelaki atau 54.7% manakalah seramai 96 orang atau 45.3% terdiri daripada responden perempuan. Didapati jumlah responden lelaki adalah lebih ramai berbanding responden perempuan.

Jadual 1 : Jantina Responden

Jantina	Kekerapan (N)	Peratus (%)
Lelaki	117	54.9
Perempuan	96	45.1
Jumlah	**213**	**100.0**

Jadual 2 di bawah menunjukkan kategori umur responden.Seramai 141 orang atau 66.2% daripada responden berumur bawah 21 tahun, 71 orang atau 33.3% daripada responden bermur 21 hingga 5 tahun dan 1 orang atau 0.5% daripada responden berumur 26 hingga 30 tahun. Ini menunjukkan majoriti responden berumur bawah 21 tahun dan tiada responden dicatat pada kategori umur 26 tahun ke atas.

Jadual 2 : Umur Responden

Umur	Kekerapan (N)	Peratus (%)
Bawah 21 tahun	141	66.2
21 hingga 25 tahun	71	33.3
26 hingga 30 tahun	1	0.5
31 hingga 35 tahun	0	0.0
36 hingga 40 tahun	0	0.0
Atas 40 tahun	0	0.0
Jumlah	**213**	**100.0**

Sesi pengajian di Politeknik Ibrahim Sultan bermula dari semester 1 hingga semester 6 dan soal selidik ini telah diedarkan secara rawak kepada pelajar-pelajar. Jadual 3 menunjukkan tahap pengajian responden. Seramai 78 orang responden atau 36.6% daripada Semester 1, 1 orang responden atau 0.5% daripada Semester 2 dan 38 orang responden atau 17.8% daripada Semester 3. Terdapat 24 orang responden atau 11.3% daripada Semester 4, 70 orang responden atau 32.9% daripada Semester 5 dan 2 orang responden atau 0.9% daripada Semester 6.

Jadual 3 : Tahap Pengajian Responden

Tahap Pengajian	Kekerapan (N)	Peratus (%)
Semester 1	78	36.6
Semester 2	1	0.5
Semester 3	38	17.8
Semester 4	24	11.3
Semester 5	70	32.9
Semester 6	2	0.9
Jumlah	**213**	**100.0**

Responden kajian terdiri daripada pelajar-pelajar di jabatan akademik di Politeknik Ibrahim Sultan. dan keseluruhannya terdapat 4 buah jabatan akademik. Jadual 4 di bawah menunjukkan 58 orang responden atau 27.2% daripada Jabatan Rekabentuk dan Komunikasi Visual (JRKV), 49 orang responden atau 23% daripada Jabatan Pelancongan dan Hospitaliti (JPH), 59 orang responden atau 27.7% daripada Jabatan Kejuruteraan Mekanikal (JKM) dan 47 orang responden atau 22.1% daripada Jabatan Kejuruteraan Elektrik (JKE).

Jadual 4 : Jabatan Responden

Jabatan	Kekerapan (N)	Peratus (%)
Jabatan Rekabentuk dan Komunikasi Visual	58	27.2
Jabatan Pelancongan dan Hospitaliti	49	23
Jabatan Kejuruteraan Mekanikal	59	27.7
Jabatan Kejuruteraan Elektrik	47	22.1
Jumlah	**213**	**100.0**

Kesediaan Pelajar Menggunakan MOOC

Bil	Item	Min
1	Saya mendapati penggunaan kursus MOOC berkesan untuk sesi pengajaran dan pembelajaran terkini	4.0563
2	Penggunaan MOOC ini membantu saya menyiapkan aktiviti dengan cepat	4.0329
3	Penggunaan MOOC dapat meningkatkan produktiviti saya	4.0423
4	Pembelajaran menggunakan MOOC mudah dipelajari	4.1315
5	Kursus yang dijalankan di dalam MOOC jelas dan mudah difahami	4.0939
6	Kursus yang dijalankan di dalam MOOC mudah digunakan	4.0940
7	Pembelajaran sesuatu kursus di dalam MOOC boleh meningkatkan lagi kemahiran saya tentang subjek itu	4.0704
8	Orang yang penting kepada saya berpendapat bahawa saya perlu belajar dengan menggunakan MOOC.	3.8498
9	Orang yang mempengaruhi tingkah laku saya berpendapat saya perlu belajar dengan menggunakan MOOC	3.8075
10	Orang yang pandangannya saya hargai suka apabila saya menggunakan MOOC	3.9202
11	Saya mempunyai sumber yang diperlukan untuk menggunakan MOOC dalam pembelajaran saya	4.0188
12	Saya mempunyai pengetahuan yang diperlukan untuk menggunakan MOOC dalam pembelajaran saya	4.0282
13	Saya boleh mendapatkan bantuan orang lain apabila menghadapi kesukaran menggunakan MOOC	4.1643

Jadual 4 : Kesediaan Pelajar Menggunakan MOO

Jadual 4 di atas menunjukkan tahap kesediaan pelajar menggunakan MOOC dalam pdp di Politeknik Ibrahim Sultan. Tahap kesediaan pelajar memberi pengaruh kepada penggunaan MOOC sebagai pendekatan pembelajaran berteraskan teknologi pada masa kini yang menggantikan pembelajaran secara tradisional. Hasil kajian menunjukkan pelajar mempunyai tahap kesediaan yang tinggi dan secara keseluruhannya kesediaan pelajar mencatat min 4.0238. Item 13 mencatat min paling tinggi iaitu 4.1643 dengan penyataan "Saya boleh mendapatkan bantuan orang lain apabila menghadapi kesukaran menggunakan MOOC". Ini diikuti dengan item 4 iaitu "Pembelajaran menggunakan MOOC mudah dipelajari" mencatat min 4.1315. Seterusnya item 6 mencatat min 4.0940 iaitu "Kursus yang dijalankan di dalam MOOC mudah digunakan" dan item 5 mencatat min 4.0939 dengan penyataan "Kursus yang dijalankan di dalam MOOC jelas dan mudah difahami".

Secara keseluruhannya tahap kesediaan pelajar menggunakan MOOC adalah tinggi. Ini menunjukkan pelajar Politeknik Ibrahim Sultan telah bersedia untuk menggunakan MOOC dalam pdp mereka. MOOC didapati mempunyai elemen yang membantu meningkatkan tahap kesediaan pelajar dari aspek mudah dipelajari, mudah digunakan serta jelas dan mudah difahami. Terdapat pelbagai implikasi perlaksanaan MOOC dan teknologi dalam pendidikan antaranya adalah boleh meningkatkan komunikasi, memelihara komuniti serta meningkatkan pencapaian pelajar itu sendiri (Anderson et al. , 2011). Justeru, para pensyarah perlu mengambil perhatian terhadap kepentingan elemen ini untuk sentiasa menambahbaik platform MOOC yang telah dibangunkan agar memberi impak dalam proses pdp.

Kesimpulan

Tahap kesediaan pelajar menggunakan MOOC telah berada pada tahap tinggi. Justeru, hasil kajian ini memberi maklumat dan gambaran sebenar tentang penggunaan MOOC di Politeknik Ibrahim Sultan. Para pensyarah boleh mengambil inisiatif untuk merancang strategi dan keperluan pengajaran yang terbaik untuk memanfaatkan penggunaan MOOC dalam proses pdp dalam usaha untuk memajukan dan melengkapkan diri dalam pengajaran abad ke 21.

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The Impact of Physical Distribution Service Quality and Brand Image on Customer Satisfaction

Sandriana Marina[1, a], Raden Didiet Rachmat Hidayat[2,b], Mochamad Syahrizal[3,c], Olfebri[4,d], Rohana Sitanggang[5,e]

[1]Trisakti Institute of Transportation and Logistics, Jakarta, Indonesia

[2]Trisakti Institute of Transportation and Logistics, Jakarta, Indonesia

[3]Trisakti Institute of Transportation and Logistics, Jakarta, Indonesia

[4]Trisakti Institute of Transportation and Logistics, Jakarta, Indonesia

[5]Trisakti Institute of Transportation and Logistics, Jakarta, Indonesia

[a]sandrianamarina09@gmail.com, [b]didiet.hidayat@yahoo.com, [c]gatotsyahrizal@gmail.com, [d]olfebri@yahoo.co.id, [e]rohana_dms@yahoo.com

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Abstract. This study aims to determine the effect of physical distribution service quality (PDSQ) and brand image on customer satisfaction of PT. XYZ Indonesia, which is one of leading logistics limited liability company (Ltd) in Indonesia that implements an integrated end-to-end supply chain management and as a partner to some of the largest multinational companies in the world. Survey methods are used to collect primary data. Census technique was chosen to determine 30 customers of PT. XYZ Indonesia and all questionnaires were returned and sent for analysis by multiple regression analysis to explain customer satisfaction. The results showed that the physical distribution service quality and brand image had a significant positive effect on customer satisfaction. Which is physical distribution service quality had a more dominant influence on customer satisfaction.

Introduction

Providing a high level of customer satisfaction is important to win the competition and create a sustainable business (Midoro, Musso, & Parola, 2006). Companies are required to have the ability to understand and ensure the services received by customers. In fulfilling the basic function to connect production and consumption, logistics companies need to pay attention to the physical distribution services quality (PDSQ) to ensure that goods are distributed on time, availability of stock items, maintaining the condition of goods and ensuring ease of return. The company's ability to provide customer satisfaction from the aspect of service quality can make a differentiaton from

competitors and contribute a profit to the company (Vuorinen, I., Ja¨rvinen, R. & Lehtinen, 1998). Besides PDSQ, brand image is evaluated as one of the main factors that customers consider in terms of recommendations and their intention to buy (Kandampully & Suhartanto, 2000). Every successful brand represents its loyal customers (Wang, Hsu, & Hsu, 2014). Base on an intangible nature, brand image and image creation are very important for companies to have long-term and successful services (Bello & Holbrook, 1995; Onkvisit & Shaw, 1989; Turley, & Moore, 2006). This study focuses on customer satisfaction in the logistics service industry which is influenced by PDSQ and brand image based on customer perceptions and this research will justify or deny the study hypothesis.

1. Theory and research hypotheses

1.1 Service quality and customer satisfaction

Many researchers explain that the quality of service as a customers's comparison between the expectations of the service they consume and their perceptions about the service company (Oliver, 1997). Several authors also define service quality as a comparison of expectations compared to perceived performance (Grönroos, 1984; Parasuraman, Zeithaml, & Berry, 1988). While (Parasuraman et al., 1988) define the quality of service as a customer assessment of the overall superiority or excellence of service products. (Bitner, M.J. & Hubbert, A.R., 1994), stated that service quality is the overall impression of consumers on the relative advantages of a company and its services, and how far the services provided can meet customer expectations. A quality service as well as the value of the services is important thing to build customer satisfaction in the service industry (Gilbert & Wong, 2003; Bitner, M. J., & Zeithaml, 2003; Kandampully & Suhartanto, 2000; Bogicevic, Yang, Bilgihan, & Bujisic, 2013; Bouzaabia, Rym; Bouzaabia, Olfa ; Capatina, 2013). Many researchers have found service quality as an antecedent of satisfaction and a major element affecting satisfaction (Parasuraman, Zeithaml, & Berry, 1988; Ruyter, Wetzels, & Bloemer, 1998). (Wong & Zhou, 2006) said customers who perceive service quality as being at a high level are more likely to be positively satisfied and/or delighted. Determining measures of service quality, especially in the logistics industry services, physical distribution service quality (PDSQ) has been studied to measure the quality of service in logistics companies (Mentzer, Gomes, & Krapfel, 1989; Emerson & Grimm, 2006; Bienstock, Mentzer, & Bird, 1997). A positive relationship between service quality and customer satisfaction proven in the previous studies in service sector such as (Chou, Lu, & Chang, 2014; Xing, Grant, McKinnon, & Fernie, 2010; Thai, 2015). Similary in logistic industry, (Limbourg, Thi, Giang, & Cools, 2016; Meidutė-kavaliauskienė, Aranskis, & Litvinenko, 2014; Xing, Grant, McKinnon, & Fernie, 2010). Accordingly, this research hypothesises that:

H1: Physical distribution service quality influences customer satisfaction

1.2 Brand image and customer satisfaction

Consumers who usually used to certain brands tend to have consistency with the brand

image (Rangkuti, 2004). Brand image is a reflection of a brand which embedded in customer's mind. Basically, brand image is what come into the customer's mind when they see a brand. It's mean, when the customers evaluate a brand name, they will think the features of that a brand spontaneously (Saleem & Raja, 2014). The corporate brand is a valuable intangible asset, that is difficult to imitate, and which may help to achieve sustained superior financial performance (Roberts & Dowling, 2002). Brand image is also accepted as an important variable that influences marketing activities because of its ability to influence customer perception about the goods or services offered (Zeithaml, V. A., Bitner, M. J., & Gremler, 2006). Providing good physical distribution service is important in logistic industry, which can increase customer satisfaction, and in turn, creates a positive image. Although a little research was found in the subject of brand image and customer satisfaction in logistic services, the importance of brand image positive significantly influence the customer satisfaction has been widely discussed (Mohammed & Rashid, 2018; Behboudi & Hosseini, 2016; Lahap, Safiah, Mohd, & Mohd, 2016; Kandampully & Suhartanto, 2000; Schulz & Omweri, 2012). Base on the the above literature, the researcher proposes the following hypothesis:

H2 : Brand image influences customer satisfaction

Research Method

1.3 Sample and Data Collection

The purpose of this paper is to describe and analyze the influence of physical distribution service quality and brand image toward customer satisfaction in logistics service provider context. The object of this investigation covered one company of logistics service industry. The selection was based on the position of this company as one of leading logistics company in Indonesia that implements an integrated end-to-end supply chain management and as a partner to some of the largest multinational companies in the world. The customers consists of an oil and gas, chemical, food and bavarage, electronic and medical and health industry. Unit analysis of this study was PT XYZ Indonesia main distribution center located in Cibitung, Bekasi, West Java, Indonesia. To gain the perception of the customers through the quetionnaires, census technique used to determining the 30 respondents from ten companies as the customers of PT XYZ. One company represented by three operational staff who interacted with PT XYZ service unit directly, they are : customer relationship management staff who ordered the items they need, information of delivery staff who make a confirmation about the items they ordered and prove of delivery staff which reported all items are received completely. The questionnaire was carried out directly to the respondens at each company and all questionnaires were completed. An overview of the demographic profile of the respondents gives a fair representation of all customers. All the respondents are men in the more than 35 years age group (60 per cent), working period in 6-10 years (43 per cent), and university educated (47 per cent).

3.2 Measurement

Measurement of PDSQ developed and validated by (Xing et al., 2010) was measured the variabel into 4 dimensions and 15 indicators, (1) timeliness: specify delivery date, specify delivery time slot, deliver on the first date arranged, deliver in time slot, ability to deliver quickly; (2) availability: availability confirmation, alternative offer, order checking, waiting time for out-of-stock situation; (3) condition: order accuracy, order completeness, order condition; and (4) return: easy return, prompt of collection, prompt of replacement. Brand image was measured by 5 items, consists of easy to identify by name, always remember, famous, characteristic, and equity (Aaker & Keller, 2012). For measurement customer satisfaction, adopted from (Dutka, 1994) which are: (1) attribute related to the product: value price relationship, product quality, product benefit; (2) attribute related to the services: guarantee or warranty, delivery; problem solving; (3) attribute related to purchase: communication, courtesy, company reputation. A five-point response scale with 1: strongly disagree, 2: disagree, 3: neutral, 4: agree, and 5: strongly agree, was used. The questionnaire was pre-tested by using product moment formula in a 5% significant level for validity and cronbach's alpha coefficients for reliability, it was known that all instruments were valid and reliable.

1.3 Result

This section provides the results of the analysis on the mentioned variables above. In addition to descriptive statistics, multiple regression analysis technique is used in processing data with the aim of verifying the results related to hypothesis testing. For descriptive analysis, the most dominant PDSQ performance according to respondents' perceptions was timeliness (86,7 per cent), with indicators: specify delivery date, specify delivery time slot, deliver on the first date arranged, deliver in time slot, ability to deliver quickly. The lowest dimension was condition (78,2 per cent), which consists of three indicators, namely; order accuracy, order completeness, order condition. This means that PT XYZ focuses on the PDSQ indicators above. Famous, was the highest score for brand image performance (86,7 per cent) and the lowest score refer to characteristic (79,3 per cent). The attributes related to product was dominant customer satisfaction base on respondents' perception (86,9 per cent), with indicators: value price relationship, product quality, product benefit. Attribute related to the services: guarantee or warranty, delivery; problem solving as the lowest one (83,6 per cent).

By using SPSS 24 sofware version, the results of the F test calculation show that Fcount>Ftable (11,829>3,35) or SigF <5% (0,000<0,05). This means that simultaneously the PDSQ (X_1) and brand image (X_2) variables have a significant effect on customer satisfaction (Y). Thus the hypothesis which states that PDQS and brand image simultaneously have a significant influence on customer satisfaction variable was proven to be true. The results of the calculation of the correlation coefficient (R) shows the value of 0.683 which is almost close to +1, which means the correlation between the variables PDSQ and brand image on customer satisfaction is strong, positive. The coefficient of determination (R^2) was 46.7% which can be interpreted that the PDSQ and brand image has a 46.7% contribution to customer satisfaction and 53.3% was influenced by other factors not examined in this study. The regression equation model : $Y = a + b_1X_1 + b_2X_2 + e = 13.234 + 0.235\ X_1 + 0.522\ X_2 + e$. Which mean constants of 13,234 explain that if PDSQ (X1) and brand image (X2) are ignored then the customer satisfaction (Y) = 13,234. Furthermore, the value of b_1, which are a regression

coefficient of variable X_1 (PDSQ) of 0.235 means that if PDSQ increases by 1 unit, then customer satisfaction will also follow to increase of 0.235 units assuming other variables remain or constant. The value of b_2 which are the regression coefficient of the variable X_2 (brand image) of 0.522 means that if the brand image increases of 1 unit, then customer satisfaction will also follow to increase by 0.522 units assuming other variables remain or constant. Thus it can be seen if the PDSQ and brand image have increased or improved to be better than before, then customer satisfaction will also increase. Partially, statistics-test shows, PDSQ t_{count} (3,670) > t_{table} (1,701) or sig.t 0,001< 0,05, which means that PDSQ significantly influence customer satisfaction. Thus the hypothesis which states that PDQS have a significant influence on customer satisfaction variable was proven to be true. And the next statistics-test shows, t_{count} (3,540) > t_{table} (1,701) or sig.t 0,001<0,05 this means that brand image significantly influence customer satisfaction. Thus the hypothesis which states that brand image have a significant influence on customer satisfaction variable was proven to be true.

3.4 Conclusion and Discussion

This research proves that the physical distribution service quality and brand image influence the customer satisfaction. Meaning, the research model which is formed by the literature review and previous studies are consistent with the results of this study. To increase customer satisfaction, PT XYZ need to improve the implementation of physical distribution service quality (PDQS) and create the brand image that is acceptable and pleasant customer well. PDSQ has contributed the most in creating the customer satisfaction. Brand image also contributes in creating customer satisfaction. Even so, PDSQ had a more dominant influence on customer satisfaction. Meaning, there is perception that customers prioritize PDSQ formed by timeliness, availability, condition, and return. Valuable implications for operational managers are also derived from the findings of this study. First, operational managers could understand the dimensions and indicators of physical distribution service quality (PDSQ) and brand image that customers appreciate and request through this current study which validated PDSQ and brand image. Operational managers can be use and develop as a standard measurement scale of PDSQ and brand image to measure customer satisfaction. Second, because this research confirmed that service quality and brand image has a significant positive impact on customer satisfaction, operational managers should invest in the PDSQ and brand image of their services because very importance to doing this to retaining existing customers and to attract potential customers.

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Halal Cold Chain Warehouse National Standard Operating Procedure Review for Halal Logistics in Indonesia

Aisyah Rahmawati1,a, Raden Didiet Rachmat Hidayat2,b, Lira Agusinta3,c, Aswanti Setyawati4,d, Hasanuddin Yasni5,e, Norzaidi Mohd Daud6,f
1Trisakti Institute of Transportation and Logistics, Jakarta, Indonesia
2Trisakti Institute of Transportation and Logistics, Jakarta, Indonesia
3Trisakti Institute of Transportation and Logistics, Jakarta, Indonesia
4Trisakti Institute of Transportation and Logistics, Jakarta, Indonesia
5Indonesia Cold Chain Association, Jakarta, Indonesia
6Universiti Teknologi MARA, Selangor, Malaysia

ayas_syh@yahoo.com, bdidiet.hidayat@yahoo.com, cagusinta@yahoo.com, dwanti61@yahoo.com, ehasan.yasni@yahoo.com, fnorza544@salam.uitm.edu.my

Keywords: Halal Cold Chain Warehouse, Halal Logistics, Halal Assurance, Standard Operating Procedure

Abstract: This study aims to review the Halal Cold Chain Warehouse National Standard Operating Procedure (SOP) for Halal Logistics in Indonesia. As Indonesia is the biggest Muslim population in the world and has the opportunity to be Hub of Halal Logistics in the world. Another issue, the Halal Product Assurance Act (JPH Law) No. 33 of 2014 will soon be implemented in 2019 in Indonesia. This research was conducted using a qualitative approach because it wanted to clearly and deeply describe the activities that had been carried out by PT. Multi Terminal Indonesia Halal Logistics & Cold Storage as the only one state-owned Halal Warehouse in Indonesia to obtain Halal Cold Chain National Warehouse Standard Operating Procedure (SOP). The objective of this result is to review whether Halal Cold Chain Warehouse National Standard Operating Procedure already issued. The results showed that Halal Cold Chain Warehouse National Standard Operating Procedure (SOP) for Halal Logistics not yet issued and the derivate regulation of JPH Law from Government called the Government Regulation (PP) not yet released. For a model suggestion, besides Temperature Control, Halal Assurance Control will be embedded in Halal Warehouse activity covering Inbound, Put Away, Storage and Outbound.

Introduction

Indonesia is a country with the largest Muslim population in the world of 236.4 million people with 87.2% according to the census [1] taken by the Central Statistics Agency (BPS) in 2010. Looking at this large number, it can be concluded that Indonesia has a great opportunity for the Halal food market in the world, both as a producer and as a consumer. Despite having good opportunities in the Halal business, ironically, Indonesia only has 1 (one) Halal Warehouse state-owned company by PT. Multi Terminal Indonesia Halal Logistics & Cold Storage (MTI). [2]

For the implementation of Halal warehouses, it certainly requires a National Standard Operating Procedure (SOP) and is issued by the guarantor institution of Halal activities in Indonesia,

in this case the Halal Product Assurance Organizing Agency (BPJPH), an agency established by the Indonesian government under Law No. 33 of 2014 concerning Halal Product Guarantee (JPH) [3]. This paper describes the activities that have been carried out by relevant stakeholders to review the Halal Cold Chain National Warehouse Standard Operating Procedure (SOP) in Indonesia.

Literature Review

Definition of SCM according to [11] is a series of approaches applied to integrate suppliers, entrepreneurs, warehouses and other storage places efficiently so that products are produced and distributed with the right quantity, the right location and the right time to minimize costs and satisfy customer needs. In the context of the Supply Chain Management (SCM) system, halal product processes include activities: production, processing and packaging, storage, and product sealing to customers. The halal product process requires the location, place, and processing equipment of halal products to be separated by location, place, and tools for slaughtering, processing, storing, packaging, distributing, selling, and serving non-halal products [9]. Whereas [10] explain the principles in halal logistics that halal products are separated from non-Halal products to avoid contamination, to avoid error and to ensure consistency with Sharia and Muslim customer expectations.

[12] has an argument that the warehouse as a logistics system of the company serves to store other production products and equipment, such as raw materials, good-in process, finished goods, spare parts, supplies, and dead stock. As well as providing information on the condition of the material/product condition stored in the warehouse so that the information is easily accessible to anyone who has an interest and is always up-to-date. Warehousing is one of the 5 elements of logistics in general, namely: Customer Service and Order Processing, Inventory Planning & Management, Supply, and Transportation. According to [13], what is meant by a warehouse (noun) is a building used for storing merchandise. Whereas warehousing (verb) is an act of storing in a warehouse. The main function of warehousing is the storage of raw materials, intermediate goods, as well as the storage of final goods. Besides that, it is also a place to store goods that will be sent or newly arrived goods.

The function of warehousing from the beginning until now has not changed much from its basic principle, namely as a place to store goods, both industrial goods, raw materials, crops, and others. New things in warehousing are ways of handling and managing warehousing that has been improved to be more efficient and adapted to the occurrence of development over time so that the function of warehousing is increased and not just a place of storage but a central rather than the distribution of goods logistics.

One of the fastest growing businesses in the world is Cold Chain and Halal Logistics. It is estimated that the peak of the business will occur in 2018. A Cold Chain is a temperature-controlled supply chain. An unbroken cold chain is an integrated series of storage and distribution activities that maintain a given temperature range. It is used as fresh agricultural produce, seafood, frozen food, photographic film, chemicals, and pharmaceutical drugs. In another sense, a cold chain is the regulation of temperature and handling of fresh products, from the time of harvest to the time of purchase. The benefits of cold chain are to extend the shelf life, to maintain fresh product appearance so that it is possible to be marketed at a higher price and to minimize the percentage of decay.

According to [14], Cold Chains are temperature controlled supply chains. Unbroken Cold Chain is a series of uninterrupted storage and distribution activities that maintain a certain temperature range. This is used to help extend and ensure the shelf life of products such as fresh agricultural products, seafood, frozen foods, photographic films, chemicals, and pharmaceutical drugs

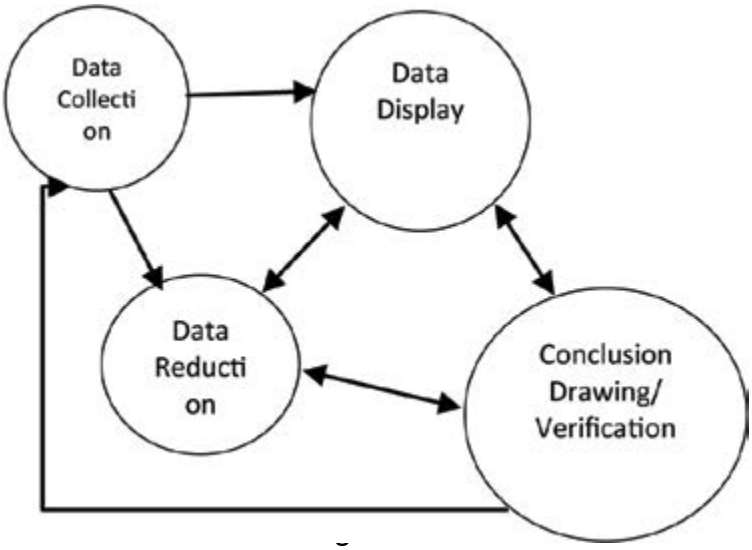
According to [8], it is to ensure Halal compliance in storage and warehousing by the handling of only Halal products and ensure that it receives each product's Halal certificate prior to the arrival of products. In this case, the Logistics Service Provider which creates a service called Halal SCM to meet the demand from Halal industries all over the world.

Methodology

The approach of this research is qualitative to depict in depth how Halal Cold Chain Warehouse National Standard Operating Procedure (SOP) Modelling for Halal Logistics in Indonesia. Data collection is done through a structured interview, semi-structured and in-depth interview and focuses group discussion.

The data analysis techniques used in this study use an approach developed by Miles and Huberman that include (after data collection) data reduction, data separation from unfocused, too detailed and others so that the data will reveal patterns or themes. Next is to display data (data display) that serves to help understand for advanced analysis of an information or event. The last process is the conclusion of the researchers based on the pattern and theme. Withdrawal conclusion is done continuously, that is while doing at the time of data reduction and data display done [4].

Site visit and the interview have been carried out at PT. Multi Terminal Indonesia Halal Logistics & Cold Storage (MTI) and another place. General discussion on Halal Logistics also have been carried out at ITL Trisakti Campus.



Data Processing Technique
Source: Miles, Huberman, & Saldana (2014)

Data sources in this paper are informants who have the capability and competence so that the

information provided is credible and in accordance with the needs of this research (purposive). Because of this research, the main goal is to review Halal Cold Chain National Warehouse Standard Operating Procedure (SOP), so it is necessary for informants who not only have academic expertise in Supply Chain Management but also practitioners who are daily involved in the SCM.

There 10 informants with details 7 informants coming from Association which are Indonesia Cold Chain Association (ARPI), Indonesian Logistics and Forwarders Association (ALFI), Indonesian Trucking Association (APTRINDO), Indonesian Depot Container Association (ASDEKI), Indonesian Logistics Association (ALI), Indonesian Logistics Community (ILC), Supply Chain Indonesia (SCI), 1 informant from PT. Multi Terminal Indonesia Halal Logistics & Cold Storage (MTI), 1 informant from the food industry and 1 informant from academia.

Result and Discussion

The Indonesian government already passed Law No. 33 of 2014 concerning Halal Product Assurance (JPH) and will be implemented in 2019 and already has a Halal Product Assurance Organizing Agency (BPJPH) which was inaugurated in 2017. Even for the next step, the process of issuing Halal certificates will at least involve three parties, namely the BPJPH, the Indonesian Council of Ulama (MUI) and the Halal Examination Agency (LPH). The government is currently focusing on Halal Assurance for food and beverage products, both local and imported so that in 2019 Indonesia is expected to operate all Halal activities ranging from farm to fork or from the process to distribution to the last mile according to existing legislation. [3]

There are 12 principles in the Halal Assurance System (HAS) conducted by the Assessment Institute For Food, Drugs, and Cosmetics, The Indonesian Council of Ulama (LPPOM-MUI), namely: [5]

Table 1.1
Halal Assurance System (HAS)
Source: LPPOM-MUI

No	Activity
1.	Maqoshidu Sharia
2.	Honest
3.	Trustworthy
4.	Systematic
5.	Socialized
6.	Key Person Involvement
7.	Management Commitment Implementation
8.	Delegating
9.	Traceability
10	Absolute Materials
11.	Specific

All of these principles must be carried out by a LPH in a transparent manner. For Chain of Adminis-

tration System (CAS) from HAS can be explained from Purchasing, Receiving, Storage, Production & Operations, Distribution & Storage. So that forms a holistic end to end flow.

These principles also applied for all actors involved in the Halal industry, including Logistics Services Provider especially in warehousing to keep the assurance of Halal.

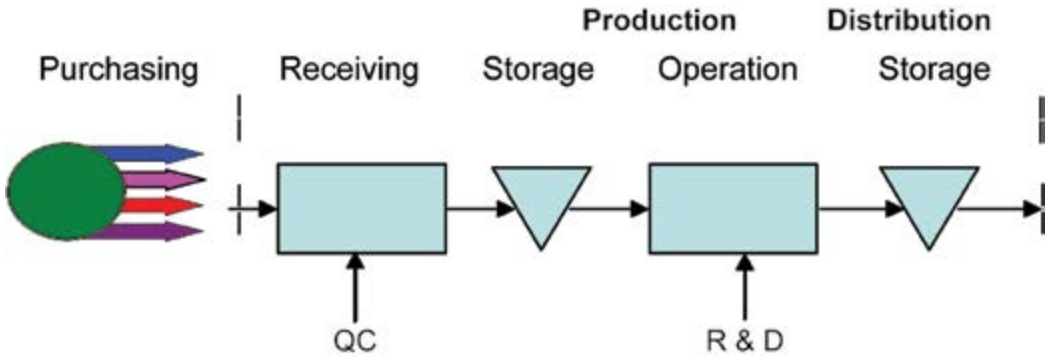


Figure 1.2.
Chain of Administration Systems for HAS
Source: LPPOM-MUI (2008)

Based on the discussion with informants, the below table is to give an idea on Halal Cold Chain Warehouse National Standard Operating Procedure (SOP) Model with Halal Assurance Control (HAC) in every step.

Table 1.2
Halal Cold Chain Warehouse National Standard Operating Procedure (SOP) Model Review
Source: Author

Activity	Action
Inbound	Goods receiving Temperature Control Halal Assurance Control
Put Away	Temperature Mapping Thermometer Calibration Halal Assurance Control
Storage	Storage Room Pick and Pack Temperature Control Halal Assurance Control
Outbound	Validation Temperature Control Halal Assurance Control

However, since Indonesia still not yet issued Halal Cold Chain Warehouse National Standard

Operating Procedure (SOP), even during this paper being prepared, Indonesia may benchmark what Malaysia has already done for Halal Warehouse. To obtain Halal certification in Malaysia, according to Jabatan Kemajuan Islam Malaysia (JAKIM) or Malaysia Department of Islamic Development, the company must meet the documents, management responsibility of Halal Cold Chain Warehouse National Standard Operating Procedure (SOP) with conditions as follows [6]:

1. Establish the Internal Halal Committee with reference to HAS

2. Appoint a minimum of two Muslim workers, and shall be a permanent post, an Indonesian citizen, competent in Halal Management Systems (HMS) and full-time work in the handling/coordinating of Logistics operations.

3. Establish the Halal Assurance Systems (HAS).

4. Warehouse condition:

a. The warehouse to be Halal certified shall store only Halal products/goods.

b. Operates Halal documentation systems which are continuously updated.

c. The Halal good products will be segregated according to the appropriate category as product dried shall be separated from the wet product.

d. Have a well-regulated storage temperature, suitable for storing the Halal goods/products.

e. The operator shall ensure the pest control is conducted systematically.

f. The warehouse compound shall a control mechanism to prevent animals and unauthorized personnel from entering or being present in the premise of the warehouse.

g. Halal detection system shall function effectively.

h. Tool and elements of religious worship are strictly prohibited in the warehouse compound.

i. Ritual cleansing called sertu process shall be conducted if the warehouse is contaminated with materials categorized as najs mughallazah or not Halal.

j. The environment surrounding the warehouse shall be cleaned in accordance with the regular sanitation schedule.

Another issue that JPH Law is still awaiting the issuance of Government Regulation (PP) as a derivative of the legal product concerning Halal Product Assurance (JPH) still not yet released by the Government. [7]

Conclusion

Based on the above result, the conclusion can be put forward as Halal Cold Chain Warehouse National Standard Operating Procedure (SOP) not yet issued and the derivate regulation of JPH Law from Government called the Government Regulation (PP) still not yet released.

Suggestion

Based on the above conclusions, the suggestion can be put forward that The Indonesian Government should lead Halal Supply Chain activities in Indonesia in all aspects together with another related stakeholder since the implementation of Halal Product to be implemented as mandatory in 2019. Indonesia may benchmark Malaysia for Halal Cold Chain Warehouse National Standard Operating Procedure (SOP) and tailor-made with local content. There is also an opportunity to do another research for Halal Transportation, Halal Distribution, Halal Brand Equity, Halal Synergy, Halal Awareness Strategy and Blockchain in Indonesia due to this a new business for Indonesia.

Acknowledgments

We would also like to show our gratitude to Trisakti Institute of Transportation and Logistics (ITL), PT. Multi Terminal Indonesia Halal Logistics & Cold Storage (MTI), Indonesia Cold Chain Association (ICC), Indonesian Logistics and Forwarders Association (ALFI), ASEAN Freight Forwarders Association (AFFA), Indonesian Trucking Association (APTRINDO), Indonesian Depot Container Association (ASDEKI), Indonesian Logistics Association (ALI), Supply Chain Indonesia (SCI), Indonesian Logistics Community (ILC), Barry Callebaut, PT. Papandayan Cocoa Industries (PCI), University Teknologi MARA (UiTM) for the assistance during the research.

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Performance of the 25kw Stirling Engine - Parabolic Dish under Malaysia Environment by Using Simulation Method

Rosnani Affandi[1,a], Zamali Omar[2,b], Mohd Ruddin Ab Ghani[3,c] and Chin Kim Gan[3,c]

[1] Politeknik Melaka, No 2, Jalan PPN 10, Melaka, Malaysia
[2]Politeknik Merlimau, Jalan Jasin, Melaka

[3] Faculty of Electrical Engineering, Universiti Teknikal Malaysia Melaka, Malaysia

arosnani_affandi@polimelaka.edu.my , bzamali@pmm.edu.my , cdpdrudin@utem.edu.my, ckgan@utem.edu.my

Keywords: Stirling engine; modeling; simulation; performance; concentrating solar power **Abstract.** Concentrating Solar Power (CSP) is one of the technologies that have ability to harness solar energy for producing the electricity. It's also known as concentrating solar thermal power, representing a powerful, clean as well as a reliable source of energy. However, the evaluation for the performance of the CSP for 25kW Parabolic Dish (PD) system by using experimental method is still expensive and time consuming. At the same time, the modelling and simulation for the PD system is getting more significant. Nevertheless, as the range of irradiance for the PD system to operate is between 200 and 1,000 W/m^2 and the PD cannot operate at irradiance levels lower than 200 W/m^2, therefore, most of the previous studies for the performance of PD system by using modelling and simulation for PD system are just concentrating on the location with an excellent of solar radiation. The location that is situated in the tropical regions with the lower solar irradiation such as Malaysia has not been paid adequate care. Therefore, an accurate example for the 25kW PD system modelling become essential, especially for investigate the performance of the PD system under various environments. Thus, the intent of this paper is to examine the performance of the PD such as the output power and net power for the 25kW PD system under Malaysia environment using Matlab Simulink software. Overall, the result has shown that, the 25kW PD modelling for this study starts to operate at irradiance level 220 W/m^2. For that reason, the output and net power achieve zero if the solar irradiance is below than 220 W/m^2. While, the tropical settings become as a main factor that the value of solar irradiance fluctuate and affect to the performance of the 25kW PD system.

Introduction

Solar energy has become as one of the Renewable Energy that attracted special attention in many countries all over the world. Basically, there are two ways to extract electricity from solar radiation, which are Photovoltaic (PV) and Concentrating Solar Power (CSP) [1]. PV system converts solar energy directly to electrical energy, while CSP systems do not produce electricity directly through solar radiation, but use concentrated solar energy to indirectly generate heat and power.

Basically, there are four types of CSP technologies that are; parabolic troughs, linear Fresnel, power tower and Parabolic Dish (PD) system [2]. Meanwhile, among the CSP technologies, PD is the CSP technologies that has the highest efficiency, which is around 12-31% [1]. Since, the PD

system is small and modular; it is suitable with Malaysia where lands with low population are difficult to obtain.

The PD system consists of three main components, which are concentrator, receiver and Stirling Engine (SE) (Fig 1). SE is the component that is situated at the focal point of the concentrator. The range of irradiance for PD system to operate is between 200 and 1,000 W/m^2 [4]. This range is typical for most locations around the world. The PD system cannot operate at irradiance levels lower than 200 W/m^2 [4]. Whilst, to maximize the output, it is important to have as high and as long time possible for the input irradiance. However, cloudiness, rain and humidity that associated with the tropical settings in Malaysia make the solar irradiation are less than adequate; except for certain times of the year. At the same time, the studies on the PD system for investigate the output and net power for the 25kW PD system under various environments such as tropical environment in Malaysia is still limited [5].

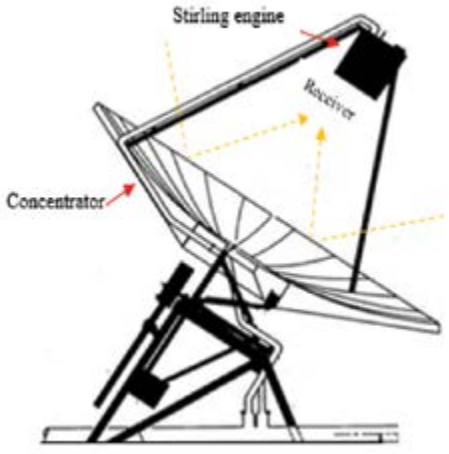

Fig. 1 : Parabolic Dish System

PD is still an emerging industry in Malaysia with no operation plant installed so far. Therefore, before developing the PD plant under Malaysia environment, considerations of the solar irradiance data as well as the output power and the performance of the PD system data should take place. Thus, the intent of this paper is to present and to examine the output and net power of the SE for the 25kW PD system under Malaysia environment with the assumption of perfect solar tracking mechanism using Matlab Simulink software. This study is useful to evaluate the output and net power of a PD system so that the performance of the 25kW PD system can be predicted. Moreover, output power from the PD system is one of the most important targets in PD design to show the effectiveness of the system.

Methodology

Modeling and Simulation for the 25kw PD Concentrating Solar Power System

In this study, the 25kw PD sysem are developed based on the mathematical models and equations

which was referred to work made by Aker, Howard and Fraser in [6][7][8]. However, the modelling and simulation of PD systems performance requires few external inputs such as the location data that is site or location, solar irradiance data and Stirling engine parameters. All of the input data for every subsystem in the PD components are based on the parameters obtained from the geometric design for 25kW PD system modelling in [9]. Meanwhile, alpha type with 25kW power rated SE from Stirling Energy Systems Inc. (SES) type was selected for the SE modelling. This is due to the commercial or near commercial status, which allowed accurate system pricing for SE to be obtained. Moreover, the 25kW SES Stirling engine has been used by a few researcher such as [6], [7] and in the simulation software System Advisor Model ("SAM Model").

Location and Solar Irradiation Data

Selecting a suitable location/site is one of the most crucial parts for developing a viable solar CSP plant such as the PD technology. Fundamental to the siting of CSP technologies is PD facilities requires an abundant of Direct Normal Irradiation (DNI) in order to generate electricity. As, George Town, Penang has the highest DNI in Malaysia. Therefore, to show the performance of PD system under Malaysia environment, the DNI data for George Town are used for the simulation purpose.

The DNI data for locations in this study is downloaded by using the Meteonorm 7 Software with radiation period from year 1986 – 2005. From the meteonorm data, DNI in George Town is equal to 1,246 kWh/m^2/year Meanwhile, as the solar irradiance are determined by the meteorological factors such as cloud cover, humidity and local environmental factors such as air pollution and dust; therefore, the daily solar irradiance data used in this study are three (3) sample days' data. The three (3) sample day's data are selected from one year (365 days) data, one (1) day with low irradiance data, one (1) day with medium irradiance data and another one (1) day with high irradiance data. Low irradiance data is on 9 January with value range from 1 W/m^2 to 213 W/m^2, medium irradiance data is on 1 November with value range from 339 W/m^2 to 610 W/m^2 and high irradiance data is on 15 January with value range from 27 W/m^2 to 1,004 W/m^2. Fig 2 shows the low, medium and high irradiance data for George Town, Penang.

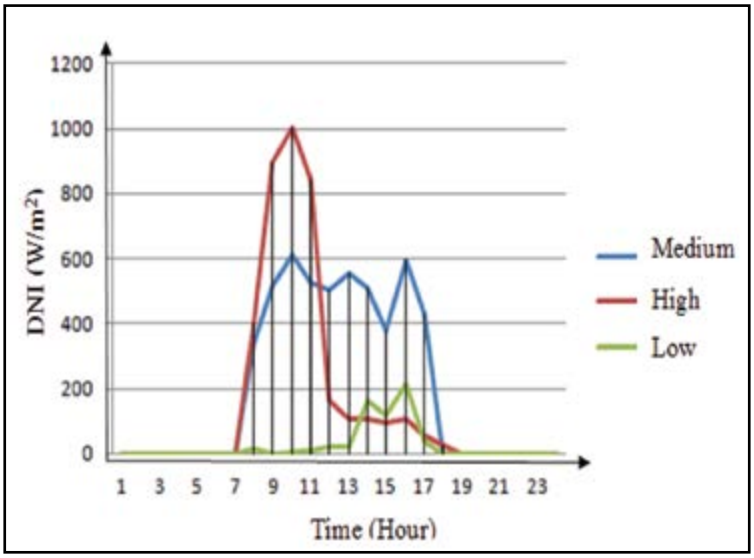

Fig 2: The low, medium and high irradiance for George Town, Penang

Output Power Stirling Engine

The output power ($P_{out,SE}$) is the output electrical power of the SE which is equivalent to the system gross power [6]. Therefore, the output power ($P_{out,SE}$) of the SE in the model is predicted by using mathematical equation;

$$P_{gross} = Beale_{curve} \cdot (P_{mean} \cdot V_{SW} \cdot f \cdot T_{correct}) \quad (1)$$

$$Beale_{curve} = 0.0391 + 0.0000221 \cdot P_{in,SE} - 3.55x10^{-10} \cdot P_{in,SE}^2 \quad (2)$$

$$T_{correct} = 1 - \left(\frac{T_c}{T_E}\right)^{0.5} \quad (3)$$

From equations 1 to 3, $Beale_{curve}$ is the Beale number includes a temperature correction term $T_{correct}$. T_E is the expansion space temperature of the SE and T_C is the compression space temperature. Meanwhile, P_{mean} is the mean engine pressure, V_{SW} is the swept volume of the engine and *f* is the SE frequency. The Beale number power correlation is more practical than the theoretical analysis. Fraser in [6] claims that the Beale number power correlation is more accurate in predicting the performance of a PD system. The power input Stirling engine ($P_{in,SE}$) in the model is predicted by using equation [10];

$$P_{in,SE} = P_{in,rec} - Q_{total} \quad (4)$$

$$Q_{total} = q_{conv} + q_{rad} \quad (5)$$

Power input SE is the thermal input power to the SE ($P_{in,SE}$). SE receives its input energy from output of the concentrator [11]. However, some of the input energy from the concentrator diminished by receiver thermal losses that are the convection and radiation losses (Q_{total}) [12].

Net Power Output

The net power output (P_{net}) is calculated by subtracting the parasitic power of the tracking and controls from the gross output power of the engine [6]. The net power from a PD system model is given by Equation (6);

$$P_{net} = P_{gross} - \sum P_{parasitics} \quad (6)$$

Simulation Result

By using model that has been developed based on the mathematical models using Matlab Simulink software. The simulation result for the output power SE under low, medium and high solar irradiance

are obtain as shown in Fig 3. From simulation result in Fig 3, the 25kW PD system modelling in this study shows that there is no output power produced from PD for solar irradiation low than 200 W/m^2. For example, at high solar irradiance data; the output power produced from PD system is 4,028 watts, during solar irradiance value is 399 W/m^2 at 8.00 am. The output power then is increase to 16,897 watts during the irradiation 1004 W/m^2 at 11.00 am. Meanwhile, there is no output power produce from 12.00 in the middle of the day until evening; because the solar irradiance is low than 200 W/m^2.

For medium solar irradiance, with solar irradiance range from 339 W/m^2 to 610 W/m^2 from 8.00 am to 17.00 pm. During the lowest solar irradiance value (339 W/m^2), the output power produced from PD system is low, which is 2,923 watts. It achieves the highest output power which is 8,536 watts when the solar irradiance data is 610 W/m^2 at 10.00 am. However, for low solar irradiance, the output power produced for the day is equal to zero. This is because the solar irradiance is below than 200 W/m^2 for the day. Meanwhile, in order to see the relation between monthly solar irradiance and the power output, refer to Fig 4. It shows that the generated power is increases along with the increase of DNI. Therefore, the output power produced by a 25 kW PD system modeling is found to be a linear function of the solar irradiance.

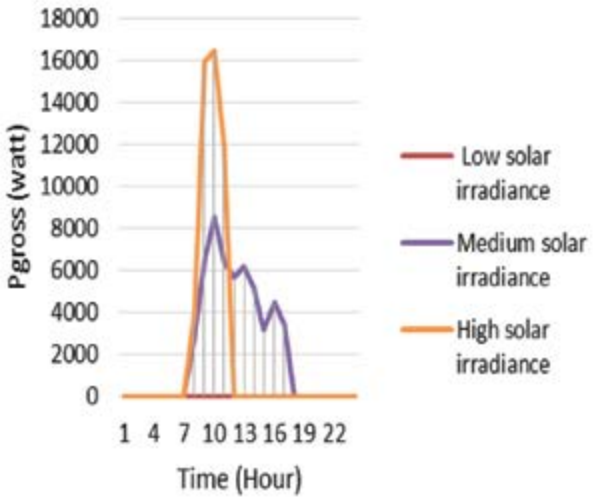

Fig 3: Output power SE

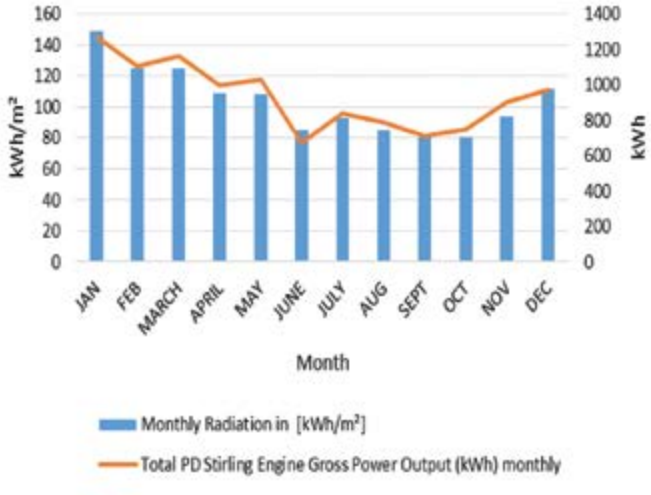

Fig 4: Monthly output power January to December

Next, for the net power output simulation result for three solar irradiance data in George Town that are low, medium and high solar irradiance is shown in Fig 5. From the figure, it shows that the net power output is equal to zero for solar irradiance low than 223 W/m^2. There is no net power output produced at low solar irradiance with value of the solar irradiance from 1 W/m^2 to 213 W/m^2. Meanwhile, during the medium irradiance with solar irradiance value from 339 W/m^2 to 610 W/m^2, the lowest value net output power is 1,663 watts at 8.00 am with solar irradiance value 339 W/m^2. It achieves the highest output power 7,276 watt when the solar irradiance is 610 W/m^2 at 10.00 am. During the high solar irradiance with solar irradiance value from 27 W/m^2 to 1004 W/m^2, the net power output achieves the higher value which is 15,237 watts at the irradiation 1,004 W/m^2 and

there is no net power output produce for time between 12.00 noon to 18.00 pm, because the solar irradiance is low than 223 W/m^2. Fig 6 shows the yearly net power output for George Town.

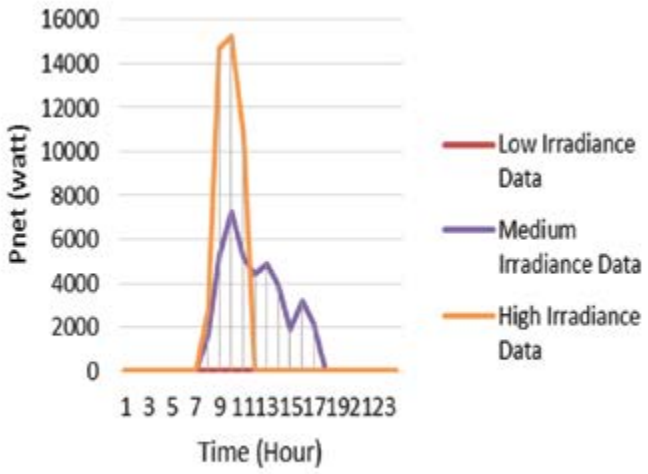

Fig 5: Net power output

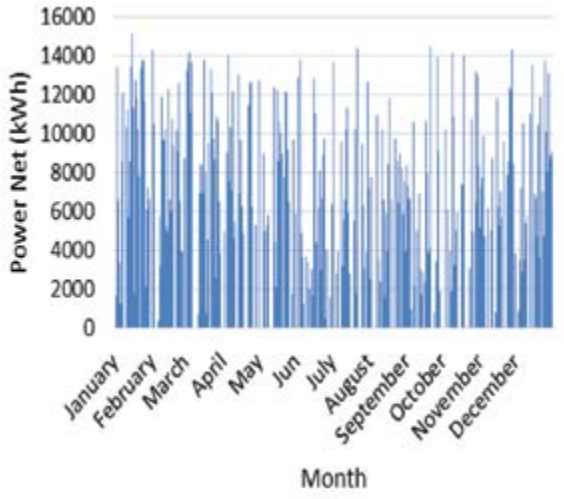

Fig 6: Yearly net power output

Conclusion

The result in this study shows that the 25 kW PD system modelling is operate in the typical range as the actual PD system. In which, the range of irradiance for PD system to operate is between 200 and 1000 W/m. The 25kW PD modelling for this study starts to operate at irradiance level 220 W/m^2. Therefore, the simulation result proved that the PD system cannot generally operate at irradiance levels lower than 200 W/m^2. Meanwhile, from the result, the patterns of net power output are similar as the output power of SE. Only that, the net power output value is subtracted by the parasitic power, therefore it produces net power output value that is slightly less than the value for output power of SE. It can be indicated that on many days, the output and net power would be very low and achieve zero if the solar irradiance is below than 220 W/m^2. The tropical settings such as heavy rainfall, high value of cloud cover, wind blow as well as high value of humidity become the main cause for the fewer days with solar irradiance above 200 w/m^2 in a year in Malaysia. All of the meteorological factor fluctuate and decrease the value of solar irradiance in Malaysia and indirectly affect the output and net power.

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Level of Safety and Health Awareness of the Workers House in Construction Sites at Merlimau, Melaka

Zamali Omar[1, a], Rosnani Affandi[2,b]

[1]Politeknik Merlimau, Jalan Jasin, 77300 Merlimau, Melaka

[2]Politeknik Melaka, No 2 Jln PPN 10, Plaza Pandan Malim, 75250, Melaka

azamali@pmm.edu.my , brosnani_affandi@polimelaka.edu.my

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Abstract. The construction industry of our country is growing rapidly in line with the country's progress. However, the industry has also recorded a lot of accidents whether at the construction sites or in the workers house. The objective of this study highlights the level of safety and health awareness in the workers house and identifies the specifications of the workers house at construction sites in Merlimau, Melaka. This study was conducted based on three workers houses. Data are collected via questionnaire and interview session with the employers. 51 respondents were involved in this study. They represented 17 respondents from each workers house. The questionnaire is divided into three parts, namely Part A focuses on the specification of the workers house, Part B is on the safety of the workers house and Part C covers the health and welfare of the workers living in the workers house. Data obtained were analyzed using the Statistics Package for Social Science (SPSS) version 2. The results of the analysis postulate that the level of awareness on the safety and health of the workers house at construction sites in Merlimau, Melaka is under control and is compliant with the specific requirements guide lines. Employers are also concerned about the safety and health of workers in the workers house. In addition, the worker must also play a role in maintaining a good, clean and safe workers house. In short, the study shows that workers houses in construction sites at Merlimau area are comfortable and safe.

Introduction

The most important thing in the construction industry is the level of awareness on the safety and health of workers either at the construction sites or in the workers house [1]. The existence of workers house in construction sites is the practice in the country since decades ago. This is because of, it is considered on the efficient and cost savings of the construction work. However, many studies have shown that some employers are less concern on the safety and hygiene problems of their workers. Therefore, it's become as one of factor that exposes the construction site workers to the hazards and diseases [2]. In addition, the employers and workers are responsible for working in a safe and healthy environment. Thus, the developer should impose strict conditions and ensure that the rules are followed by workers in the workers house. Even so, in fact the matter is not fully done by the developer [3].

The workers must practice the safe and healthy practices at the construction site as well as the

workers house that is provided by the employer [4]. Workers also need to know about the risks, health and safety factors which will give a bad impact if neglected [5]. Therefore, to avoid accidents involving workers and the public, developers and contractors must perform the best occupational safety and health (OHHM) practices at construction sites and work areas [6]. At the same time, hygiene at the workers house is also an important factor for the workers, if neglected; this will affect the health of the workers and will interfere the construction process. If one of the workers are ill or injured, the total labor force will be less and inadequate. This indirectly will shortage the amount of labor and inevitably cause construction projects to be completed within the stipulated period [7]. In addition to place the safety regulations on construction sites, enforcement should also be intensified so that employers are more responsible for the safety and health of workers at their construction site and at the workers house [8] [9].

Employers should provide the basic amenities such as clean water supply for workers and provision of electricity. As mentioned by the managing director of Andaman Property Management Sdn. Bhd., Datuk Seri Dr. Vincent Tiew said, developer and construction contractor, must ensure the basic needs of workers are provided such as clean water supply, toilets and comfortable beds [10]. Meanwhile, the employer should limit the number of labour to 10 labour per house. At the same time, the location of the workers house at the construction site must located at the safe area.

Lecturer at Department of Social Science and Development, Faculty of Human Ecology Universiti Putra Malaysia (UPM), Prof. Madya Dr. Nobaya Ahmad said: „Actually, the current workers house on the construction site is mostly are in poor condition and sometimes it only uses wasted materials. More worryingly, if the housekeeping‘s cleanliness is not regulated or protected. It will contribute to health problems and followed by the spread of the epidemic and may affect the workers and the surrounding communities [11]. Living in not conducive environment, narrow and unattended will easily spread the epidemic [10]. Therefore, the construction of workers house must follow the guidelines set by the local authority or the District Council.

Based on the information described above, the importance of this study is to raise awareness to employers and local authorities in emphasizing the safety, health and comfort of workers house at construction sites. Additionally, awareness to workers that the safety and health care at the workers house is important to prevent undesirable things and hinder the construction process [12]. Therefore, the objective of the study is to examine the level of awareness of safety and health at the workers house and to identify the specifications of the workers house at construction sites.

METHODOLOGY

Sampling Techniques

The sampling of this study was taken at three construction sites around Merlimau and Taman Serkam Jaya. The sample of this study consists of workers living in the workers‘ house at the construction site and the employer‘s. The total sample was 51 respondents. Each construction site consists of 17 respondents. Samples selected randomly for the purpose of obtaining the number of samples representing the population (Blumetal.1986). Surveys and visits to workers ,homes at

the construction site are also carried out to check in more detail and get to know more about the emphasis given to workers' safety and health aspects.

Data Collection

Primary Data

The primary data is the data obtained from the questionnaire distributed to each respondent. The main source is the latest data required in the investigation. Usually this data is more objective and meets the criteria and goals of this research. Although there are various empirical methods that can be used to collect data from major sources such as questionnaires, interviews and observations only the appropriate methods will be used.

Secondary data

Apart from the questionnaire, interviews were also conducted on employers and workers as additional data. Unofficial interviews involve employers or supervisors and those directly or indirectly involved in obtaining information and views through experience and information on safety and health awareness at workers house.

Data Analysis

To achieve the goal of research, data analysis of relevant information has been conducted. To simplify the analysis process, computer software has been used. The computer software in question is the Statistical Package for Social Science for Windows (SPSS for windows). This software analyzes data collected statistically. It can also present the results of analysis in the form of graphs or charts that are more easily understood and interesting. In applying statistical data with SPSS software to analyze data, multiple fractions of statistical methods can be used for users. Among them statistics, average analysis, correlation analysis, general model linear analysis and more. However, in this study only the frequency method is used. The statistical analysis of frequency generally indicates the percentage of frequency for a variable or a question when referring to this study.

DATA ANALYSIS

Demographic Profile

The data were analyzed using several statistical analyses. Descriptive analysis was used to describe workers and employers background. A total of 51 respondents workers and employers were survey for questionnaire, most respondents from male (100%) with majority of the workers and employers, were Malay (19.6%), then followed by Chinese (7.8%), Indian (3.9%) and a few of others (68.6%). The result showed that majority of the workers living at workers house is others (foreigner). The result showed that most of the workers and employers who lived at workers house in the study

were aged ranging from 20-30 years old (35.3%), 31-40 years old (45.1%), 41-50 years old (17.6%) and 51-60 years old (2.0%). The result showed the highest result 31-40 years old (45.1%). The result for position was labors (92.2%), supervisor (7.8%), employers (0%), others (0%). The highest position was labors (92.2%).

Analysis of Section A (Specification Of Workers House)

The data for this section were collected from questionnaire and survey to get the information from respondents about the workers house. All the results are shown in **Table 1**.

Table 1: Analysis Section A (Specification Of Workers House)

No	Question	Yes	No
1.	Did workers house is available for workers?	100%	0%
2.	Did workers house made from wood?	100%	0%
3.	Did workers house made from cabin?	0%	100%
4.	Did workers house have electricity supply?	100%	0%
5.	Did a workers house have water supply cleaned?	100%	0%
6.	Did workers house provide is very satisfying in terms of the size of the house?	88.2%	11.8%
7.	Did workers house are built in the constructions site?	94.1%	5.9%
8.	Did canteen provide nearest the workers house?	33.3%	66.7%
9.	Did environment of workers house clean and safety condition?	88.2%	11.8%

Table 1 shows the specification of workers house in 3 site constructions. From the question, question No 1,2,4 and 5; totally respondent answer YES (100%) while (0 %) respondents say NO. Meanwhile, for question No 3, (100%) respondent say NO for house made from cabin while (0 %) respondents say YES. Almost all of the respondents (88.2 %) say YES for question no 6; that the size of workers house is very satisfying. While (11.8 %) say NO. For question no 7, respondent answer YES is (94.1 %) and NO (5.9 %) for workers house built in construction site. For question No 8, almost all of the respondents say NO (66.7 %) that the canteen are not provide at the workers house area, while YES only (33.3 %). For question No 9, respondents say YES that the workers house clean and safety condition (88.2%), while (11.8 %) of the respondents say NO. From the result, it shows that the workers house is in good condition because the employers always monitored the workers house. Respondents say no because certain environment of workers house at construction site is not in satisfaction condition.

Analysis of Section B (Workers house Security)

The data in this section we collected from questionnaire and survey to get information from respondents about the workers house. All the results are shown in **Table 2**.

Table 2 Analysis Section B (Workers house Security)

No	Question	Yes	No
1.	Did employer always monitoring the condition of workers house?	100%	0%
2.	Did employer provide sufficient extinguisher at workers house?	86.3%	13.7%
3.	Did workers house obey safety procedure at workers house?	5.9%	94.1%
4.	Did workers house from construction site in a safe distance?	98%	2%
5.	Did employer make policies and safety regulation at workers house?	98%	2%
6.	Did employer provide safety guide at workers house?	33.3%	66.7%

Table 2 shows the analysis result for workers house security. From question 1, (100%) responded say YES that employer always monitoring the condition of the workers house. while (0%) say NO. From question 2, (86.3 %) respondent say YES that the employer provide sufficient extinguisher, while (13.7 %) of the respondent say NO. For question 3, respondents say YES (94.1 %) while (5.9 %) say NO that workers obey safety procedure at workers house. Almost all of the respondents (98 %) say YES for question no 4, that workers house is in safety distance with construction site, while (2 %) say NO. For question 5, (98 %) respondents say YES, while (2 %) say No on employer make policies and safety regulation at workers house. Lastly for question 6 is the respondents (66.70%) say NO that the employer provide safety guide at workers house, while certain respondents (33.3 %) say YES.

Analysis of Section C (Health And Welfare)

All of the result is shown in **Table 3**.

Table 3: Analysis Of Section C (Health And Welfare)

No	Question	Yes	No
1.	Did stool reservoir tank is completely repaired?	100%	0%
2.	Did employer an organized waste disposal system?	84.3%	15.7%
3.	Did employer provide the comfort toilet?	100%	0%
4.	Did employer provide toolkit or cooking utensils for cooking?	33.3%	66.7%
5.	Environment a condition workers house is manage by employer?	96.1%	3.9%
6.	Workers not allowed to nurturing animals at the workers house?	60.8%	39.2%
7.	Did employer provide isolate the sick workers from the others?	80.4%	19.6%
8.	Did employers provide clinical treatment to sick workers?	98%	2%
9.	Did workers take a good care of cleanliness and safety ay workers house?	100%	0%

From question 1, show the highest respondent say YES (100 %) that the stool reservoir tank is completely repaired, while (0%) say NO. For question 2 majorities say YES (84.3 %) that the employer an organized waste disposal system, while (15.7 %) say NO. For question 3, the result showed that (100 %) say YES, while (0 %) of respondents say NO. From the result shows that almost respondents say YES that provide of comfort toilet at workers house. For question 4, the

result showed that (33.3%) say YES, while (66.7%) of respondents was say NO. From the result shows that almost respondents NO that employer provide toolkit or cooking utensils for cooking. For question 5, almost all of the respondents (96.1%) say YES that this environment a condition workers house is manage by employer, while (3.9) say NO. For question 6, result showed that (60.8%) respondents say YES, while (39.2%) of respondent was say NO that workers are not allowed to nurturing animals. For question 7, (80.4%) say YES that the employer provide isolate the sick workers from the others, while (19.6%) of the respondents say NO. For question 8, the result shows that (98%) respondents say YES, while say NO (2%). Lastly for question 9, almost all of the respondents (100%) say YES, while (0%) say NO.

CONCLUSION

This study is a survey of the level of awareness on the safety and health of the construction site workers living in the workers house. This study shows that all the construction sites around Merlimau provide the workers house facilities. Overall, the level of safety and health of workers living in the workers house is high. This is because employers and workers are playing a role in ensuring the occupied workers house is clean and safe. Employers are also available to provide workers house equipped with facilities that guarantee the health and welfare of their workers to ensure that workers are in good health and can work with happy and safer.

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Kesan Isipadu Martensit Terhadap Sifat Kekuatan Dan Pengerasan Kerja Bagi Keluli SNC415

Norhazlina Amon[1, a] Siti Ruziati Tomin[2,b] dan Suhaila Mohd.Sharif[3,c]

[1]Politeknik Port Dickson, Si Rusa, Malaysia

[2]Politeknik Port dickson, Si Rusa, Malaysia

[3]Politeknik Port Dickson, Si Rusa, Malaysia

[a]norhazlina@polipd.edu.my, [b]ruziati@polipd.edu.my, [c]suhaila@polipd.edu.my

Keywords: Fasa duaan; Keluli SNC415; Interkritikal; Kaedah Holloman.

Abstrak. Penggunaan keluli fasa duaan dalam bidang automotif semakin penting kerana kombinasi sifat kekuatan dan kemulurannya yang tinggi. Mikrostruktur utamanya yang terdiri daripada kombinasi struktur martensit yang keras dan ferit yang lembut dapat memenuhi permintaan dalam bidang ini. Penyelidikan ini mengfokuskan kepada sifat ketegangan dan pengerasan kerja bagi keluli fasa duaan jenis SNC415. Ini merupakan penyelidikan lanjutan terhadap bahan yang sama yang telah di kaji sifat kekerasannya setelah menjalani rawatan haba penyepuhlindapan interkritikal. Ujian tegangan dengan beban 20kN dijalankan ke atas sampel 20%, 50% dan 80% pecahan isipadu martensit. Keputusan ujian tegangan menunjukkan bahawa tegasan alah dan tegasan muktamad meningkat apabila peratus pecahan isipadu martensit bertambah. Namun begitu nilai keterikannya adalah rendah. Analisis pengerasan kerja pula menunjukkan kadar pengerasan kerja keluli fasa duaan meningkat dengan pertambahan isipadu martensit dimana 80% pecahan isipadu martensit telah menghasilkan kadar pengerasan kerja yang tinggi dan 20% pecahan isipadu martensit telah menghasilkan nilai pengerasan terikan yang tinggi. Indeks kekuatan dan kemuluran T.S (kekuatan tegangan) x U.E (pemanjangan seragam) menurun dengan peningkatan peratus pecahan isipadu martensit. Kesimpulannya, keseluruhan ujikaji ini menunjukkan bahawa peningkatan dalam peratus isipadu martensit akan meningkatkan nilai tegasan maksimum atau muktamad, kekuatan alah dan pengerasan kerja bagikeluli SNC415. Peningkatan sifat mekanik ini sangat diperlukan dalam pembuatan rangka kereta kerana keluli yang berkekuatan tinggi dengan kebolehubahbentukan yang tinggi dapat menggurangkan berat kenderaan dan penggunaan bahan api.

Pengenalan

Pada lewat era 70 an, keluli karbon rendah yang telah dirawat haba secara khas untuk membentuk campuran struktur ferit dan martensit telah mendapat perhatian yang meluas di Amerika Syarikat. Bahan ini dikenali sebagai keluli fasa duaan (*dual-phase*). Keluli fasa duaan mempunyai martensit yang keras dan ferit yang lembut telah mendapat permintaan yang tinggi dalam bidang pembuatan automotif. Ini kerana industri ini memerlukan keluli yang berkekuatan tinggi dengan

kebolehubahbentukan yang tinggi untuk mencapai pengurangan berat supaya dapat mengurangkan penggunaan bahan api. Keluli fasa duaan ini memberikan kemuluran dan kekuatan yang baik ekoran daripada kadar pengerasan kerja yang cepat ketika ubah bentuk plastik permulaan menyebabkan ia diminati di dalam industri automotif [1].

Keluli fasa duaan ini dihasilkan dengan menggunakan kaedah rawatan haba dengan suhu interkritikal pada tempoh masa tertentu bagi menghasilkan fasa ferit dan austenit (α + γ) dan diikuti dengan proses lindapkejut dengan menggunakan air sebagai media penyejukkan [2]. Proses pemanasan serta penyejukkan ini akan menyebabkan perubahan mikrostrutur dan mampu memberi kesan terhadap sifat-sifat mekanik bahan tersebut seperti sifat kekerasan dan ketegangan. Oleh sebab itu, pelbagai jenis rawatan haba telah dilakukan bagi memastikan bahan yang digunakan memenuhi ciri-ciri sifat mekanik serta morfologi yang diperlukan.

Rawatan haba penyepuhlindapan interkritikal adalah salah satu cara bagi menghasilkan keluli karbon rendah (kandungan karbon < 0.2) kepada mikrostruktur fasa duaan dengan kombinasi kekuatan dan kemuluran yang tinggi. Dengan menggunakan kaedah ini fasa austenit akan bertukar kepada fasa martensit yang dikenali sebagai struktur ferit-martensit.

Tujuan peningkatan kekerasan ini adalah untuk memberi kekuatan dan ketahanan keluli terhadap kestabilan pembentukan rangka kenderaan. Kaedah ini juga dapat memberi kesan di dalam penurunan berat kenderaan, ekonomik dan dapat mengurangkan penggunaan petrol atau diesel. Banyak kajian mengenai keluli fasa duaan telah dilakukan oleh penyelidik untuk mengenalpasti hubungan antara mikrostruktur dan sifat mekanikalnya. Terdapat beberapa jenis rawatan haba yang telah dijalankan untuk menghasilkan keluli fasa duaan. Kajian-kajian terdahulu telah mendapati bahawa rawatan haba yang berbeza akan menghasilkan corak mikrostruktur yang berbeza dan seterusnya memberi kesan kepada sifat mekanik bahan itu sendiri.

Fasa duaan adalah fasa yang yang terbentuk dengan kehadiran ferit dan martensit. Untuk mendapatkan mikrostruktur ferit-martensit, keluli dikenakan proses rawatan haba yang ditakrifkan sebagai proses pemanasan pada suhu interkritikal iaitu suhu antara A1 dan A3 dalam tempoh masa yang tertentu dan kemudiannya dikenakan proses lindapkejut. Kajian telah dibuat terhadap kesan-kesan unsur aloi pada garisan bawah suhu genting (A1) dan garisan atas suhu genting (A3) bagi gambarajah keseimbangan fasa Fe-Fe3C di mana suhu genting A1 dan A3 boleh dianggarkan mengikut mikrostruktur yang diperlukan semasa proses pemanasan [2].

Proses penyepuhlindapan interkritikal yang telah dilakukan hendaklah diikuti dengan proses lindapkejut dengan menggunakan air sebagai media penyejuk [3]. Disamping itu juga didapati bahawa pecahan isipadu martensit meningkat apabila suhu penyepuhlindapan meningkat.

Antara sifat-sifat yang kerap dibuat kajian bagi keluli fasa duaan ialah sifat kekuatan tegangan dan kekerasan [4]. Pecahan isipadu dan marfologi martensit fasa kedua bertambah secara bersistem dengan mengawal suhu penyepuhlindapan interkritikal kadar pemanasan suhu [3]. Takat alah dan kekuatan bahan bergantung kepada pecahan isipadu dan bukan marfologi. Sebaliknya pemanjangan bergantung kepada marfologi martensit. Pembentukan plastik martensit memberi kesan terhadap pengerasan kerja keluli di mana ia paling penting dalam sifat patah [5]. Hasilnya mereka mendapati bahawa rawatan haba penyepuhlindapan pada suhu interkritikal boleh memberi sifat optimum kepada kekuatan dan kebolehbentukan keluli [3,5 .

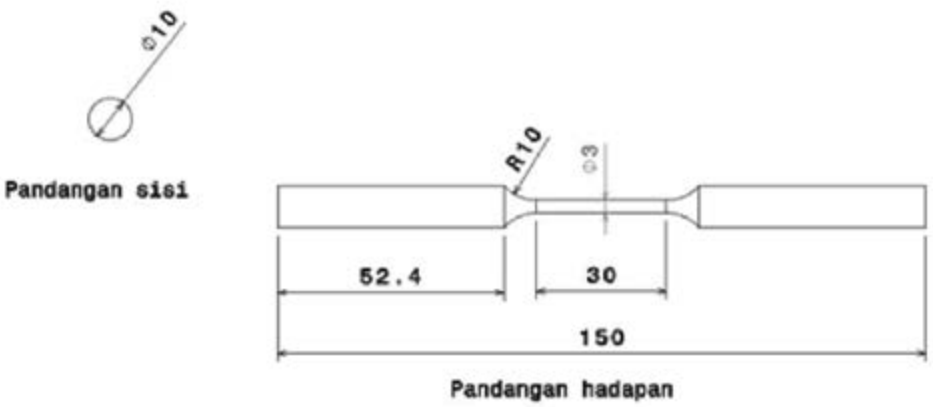
Meskipun telah banyak kajian tentang kesan rawatan haba dan pecahan isipadu martensit pada suhu interkritikal dilakukan, namun kajian tentang rawatan haba dan pecahan isipadu martensit bagi keluli yang lebih dispesifikkan iaitu keluli gred SNC415 belum pernah dilakukan oleh penyelidik-penyelidik terdahulu. Lazimnya, keluli SNC415 yang telah dikeraskan banyak digunakan sebagai komponen otomotif seperti seperti komponen gear, pinan dan sebagainya.

Tujuan utama kajian ini dijalankan adalah bagi mengkaji kesan pecahan isipadu martensit terhadap sifat mekanik bagi keluli SNC415. Di antara objektif kajian ini adalah untuk mengetahui kesan pecahan isipadu martensit terhadap sifat tegangan dan pengerasan kerja bagi keluli SNC415.

Metadologi Kajian

Rawatan haba penyepuhlindapan interkritikal selama 120 minit dipilih untuk menjalani ujian tegangan berdasarkan pada hasil ujian kekerasan dan mikrostruktur. Ini kerana pada tempoh masa pemanasan selama 120 minit, perubahan mikrostruktur dan nilai purata kekerasan mempunyai jurang perbezaan yang besar. Sebanyak sepuluh sampel disediakan iaitu dua sampel tanpa dirawat haba, dua sampel telah dirawat haba pelarutan dan 2 sampel bagi setiap 20%, 50% dan 80% pecahan isipadu martensit dirawat haba penyepuhlindapan interkrital diikuti dengan proses lindapkejut ke dalam air. Kemudian semua sampel ini dikisar dibahagian tengahnya dengan menggunakan kertas pasir. Setelah dikisar, bacaan diameter bagi spesimen pada bahagian tengah di ukur dengan menggunakan angkup vernier seperti yang ditunjukkan dalam Rajah 1 .

Alat yang digunakan bagi ujian tegangan adalah Universal Testing Machine Zwick/ Roell. Kelajuan yang digunakan ialah 1.8 mm/min. Kemudian sampel diletakkan pada bahagian penggenggam mesin. Kedudukan sampel mestilah selari dengan paksi penggenggam mesin. Gengaman terhadap spesimen mestilah ketat untuk menggelakkan gelinciran semasa ujian sedang dijalankan. Ekstensometer digunakan bersama dengan Universal Testing Machine Zwick/Roell untuk mengukur pemanjangan spesimen.



Rajah 1. Ilustrasi pemotongan sampel dumbel untuk ujian tegangan.

Analisis ujian tegangan dijalankan setelah data keputusan bagi ujian tegangan diperolehi.

Dengan menggunakan perisian Microsoft Excel, nilai tegasan sebenar dan terikan sebenar dapat diperolehi dengan menggunakan kaedah pengiraan seperti berikut.

Tegasan sebenar ditakrifkan sebagai beban , F dibahagi dengan luas keratan rentas ketika A_i pada mana ubah bentuk sedang berlaku atau ,

$$\sigma_T = F/A_i \quad (1)$$

Tegasan kejuruteraan,

$$\sigma_e = F/A_o \quad (2)$$

Dimana terikan kejuruteraan,

$$\varepsilon_e = \frac{\Delta L}{L} \quad (3)$$

Terikan sebenar,

$$\varepsilon_t = \ln(1 + \varepsilon_e) \quad (4)$$

Jika tiada perubahan isipadu berlaku semasa ubah bentuk, iaitu jika,

$$A_i l_i = A_o l_o \quad (5)$$

Luas keratan rentas semasa,

$$A_i = \frac{A_o l_o}{l} \quad (6)$$

Tegasan dan terikan sebenar, dan tegasan dan terikan kejuruteraan boleh dihubungkan [5].

$$\sigma_t = \sigma_e(1 + \varepsilon_e) \quad (7)$$

$$\varepsilon_t = \ln(1 + \varepsilon_e) \quad (8)$$

Graf tegasan melawan terikan kejuruteraan diplotkan untuk mendapatkan nilai kekuatan alah dan juga kekuatan tegangan maksimum. Kekuatan alah boleh diperolehi melalui kaedah ofset 0.2% daripada garisan garisan lurus yang dilukis pada bahagian graf yang masih dalam pembentukan elastik dan sebelum berlakunya pembentukan plastik. Daripada nilai kekuatan alah dan juga nilai kekuatan tegangan maksimum, graf untuk tegasan melawan terikan sebenar dapat diplotkan bertujuan untuk menganalisis kadar pengerasan kerja sampel.

Pengerasan kerja ialah kejadian dimana bahan menjadi lebih kuat secara ubah bentuk plastik. Pengerasan ini berlaku disebabkan oleh pergerakan kehelan dalam struktur hablur bahan. Fenomena ini juga dikenali sebagai pengerasan terikan atau kerja sejuk kerana suhu ketika ubah bentuk berlaku adalah suhu di bawah penghabluran semula [7].

Graf tegasan sebenar melawan terikan sebenar diplotkan bagi kadar pengerasan kerja. Data yang diambil adalah dari titik alah hinggalah titik kekuatan tegangan maksimum. Persilangan antara dua graf ditentukan bagi mendapatkan nilai terikan setiap spesimen.

Keputusan dan perbincangan

Hasil ujian kekerasan dan mikrostruktur yang telah dijalankan terhadap sampel yang dirawat haba penyepuhlindapan interkritikal selama 120 minit menunjukkan perbezaan yang ketara [8]. Oleh

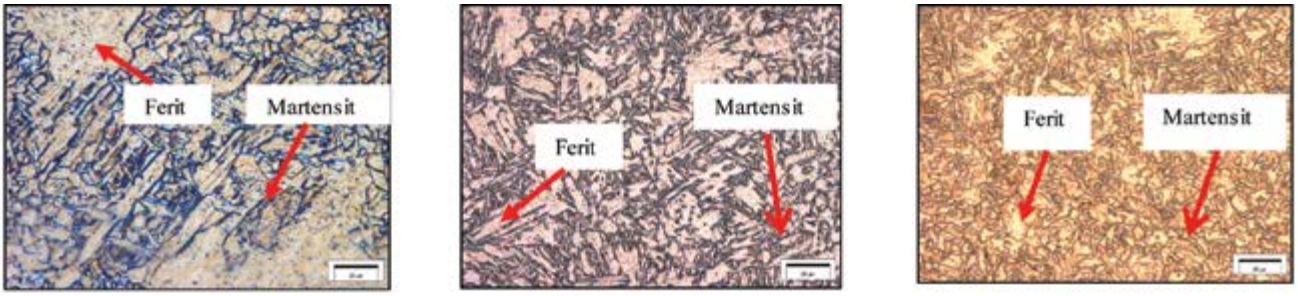
kerana itu, sampel ini dibandingkan bagi menganalisa kesan pecahan isipadu martensit terhadap sifat tegangan.

Ujian tegangan telah dijalankan ke atas dua spesimen untuk setiap sampel 20%, 50% dan 80% dan dirawat haba selama 120 minit. Antara dua data ini hanya satu data yang lebih mendekati kajian akan digunapakai manakala satu data lain akan dijadikan sebagai rujukan termasuklah ujian tegangan bagi spesimen awal bahan dan spesimen yang dirawat haba pelarutan pada suhu 1000°C dan dilindapkejutkan ke dalam air.

Melalui Jadual 1, kesan peratus isipadu martensit melalui proses rawatan haba penyepuhlidapan interkritikal dapat diperhatikan. Ketiga-tiga sampel 20%, 50% dan 80% pecahan isipadu martensit menunjukkan bahawa kekuatan tegangan muktamad dan kekuatan alah meningkat dan melebihi sampel bahan awal. Walaupun nilai kekuatan muktamad bagi sampel 20% pecahan isipadu martensit ialah 604 Mpa iaitu hampir sama dengan sampel bahan awal namun nilai kekuatan alah bagi ini adalah jauh lebih tinggi iaitu 444 MPa. Menerusi Rajah 2(c), sampel bagi 80% pecahan isipadu martensit dengan saiz ira martensit yang lebih halus menawarkan lebih rintangan kepada pergerakan kehelan dan kejadian ini dipercayai menyebabkan nilai kekuatan muktamad yang tinggi diperolehi iaitu 1150 MPa. Namun nilai pemanjangan bagi kesemua sampel adalah berkurangan daripada nilai sampel awal bahan. Dipercayai juga pengembangan saiz ira menyebabkan peningkatan dalam terikan. Fenomena ujian tegangan ini boleh dilihat dengan jelas menerusi Rajah 4.5

Jadual 1. Data hasil ujian tegangan

Spesimen	Dia, [mm]	E, [Gpa]	σ muktamad, [Mpa]	σ alah, [Mpa]	ε seragam, %	ε%
Bahan awal	3.00	201	601	327	14.7	20.5
Rawatan haba pelarutan	2.80	206	967	642	2.8	5.4
20% isipadu martensit	2.70	201	604	444	12.3	18.1
50% isipadu martensit	2.73	204	879	480	5.6	7.5
80% isipadu martensit	2.70	205	1150	802	3.2	6.5

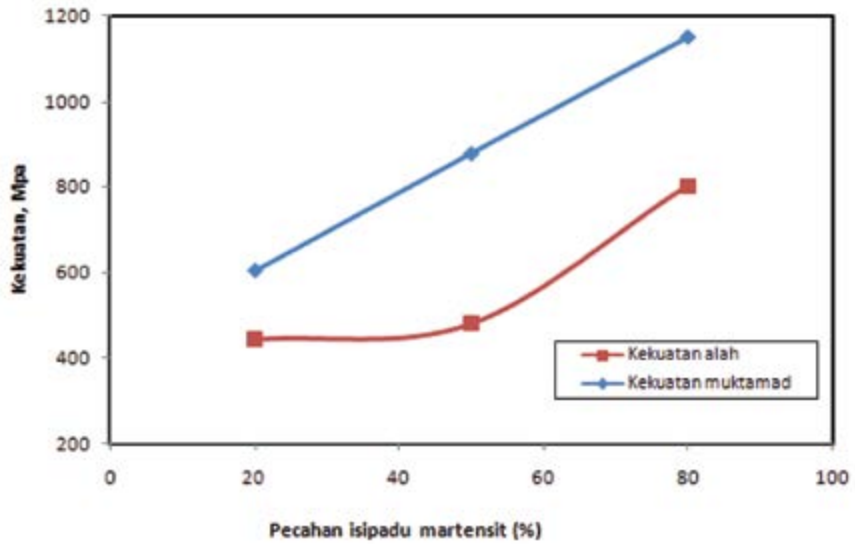


a b c

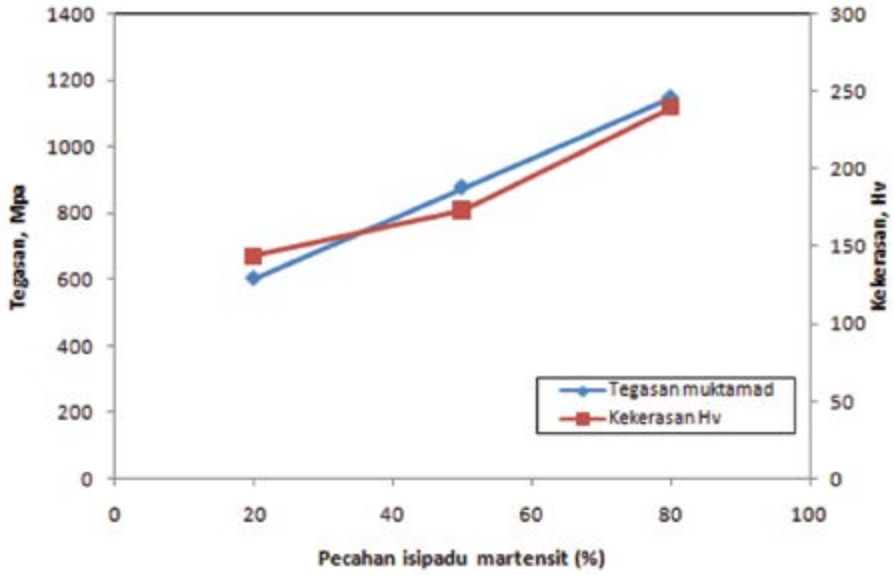
Rajah 2. Mikrograf optik pada pembesaran 50x bagi setiap sampel setelah disepuhlindapkan selama 120 minit dan dilindapkejutkan (a) 20% martensit (b) 50% martensit (c) 80% martensit.

Rajah 3 adalah graf kesan peratus pecahan isipadu martensit terhadap sifat kekuatan. Menerusi Rajah 3 ini, nilai kekuatan tegangan muktamad adalah berkadar terus dengan peratus pecahan isipadu martensit. Nilai kekuatan alah bagi 20% dan 50% pecahan isipadu martensit hanya mengalami peningkatan yang sedikit sahaja. dan meningkat lebih tinggi dari 50% ke 80% pecahan isipadu martensit. Melalui proses ini, jarak pemisahan di antara kehelan akan berkurang dan membuatkan kehelan menjadi bertambah rapat. Peningkatan proses ini juga menyebabkan pertambahan ketumpatan kehelan yang terbentuk dalam spesimen yang dilakukan semasa pengerasan kerja ke atasnya. Ini akan mewujudkan tambahan rintangan terhadap pergerakkan kehelan. Pergerakan kehelan seterusnya akan tersekat dan membuatkan proses ubahbentuk plastik lebih sukar. Kajian terdahulu telah membuat kesimpulan bahawa takat alah dan kekuatan bahan bergantung kepada pecahan isipadu martensit [1,3].

Menerusi Rajah 4, nilai tegasan muktamad boleh dikaitkan dengan keputusan ujian kekerasan di mana sampel yang mempunyai sifat kekerasan yang kuat menghasilkan nilai tegasan yang tinggi. Fenomena ini berlaku disebabkan oleh setiap ira ferit yang dipisahkan oleh sempadan ira martensit semasa ubah bentuk plastik dimana berlaku pergerakan kehelan yang akan merentangi sempadan ira ini di mana sempadan ira ini menjadi halangan kepada pergerakan kehelan tersebut.



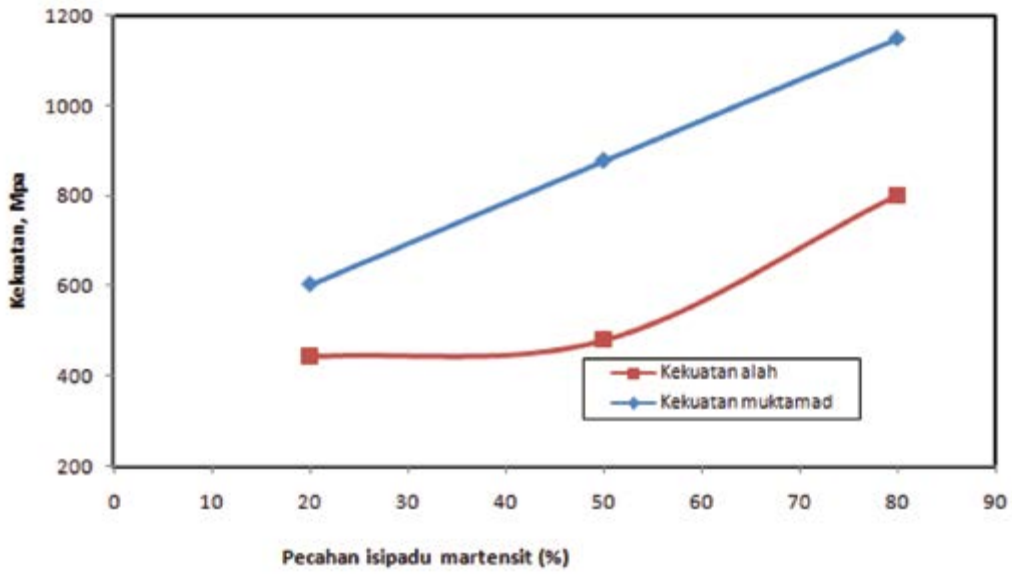
Rajah 3. Kesan pecahan isipadu martensit terhadap kekuatan alah dan kekuatan muktamad.



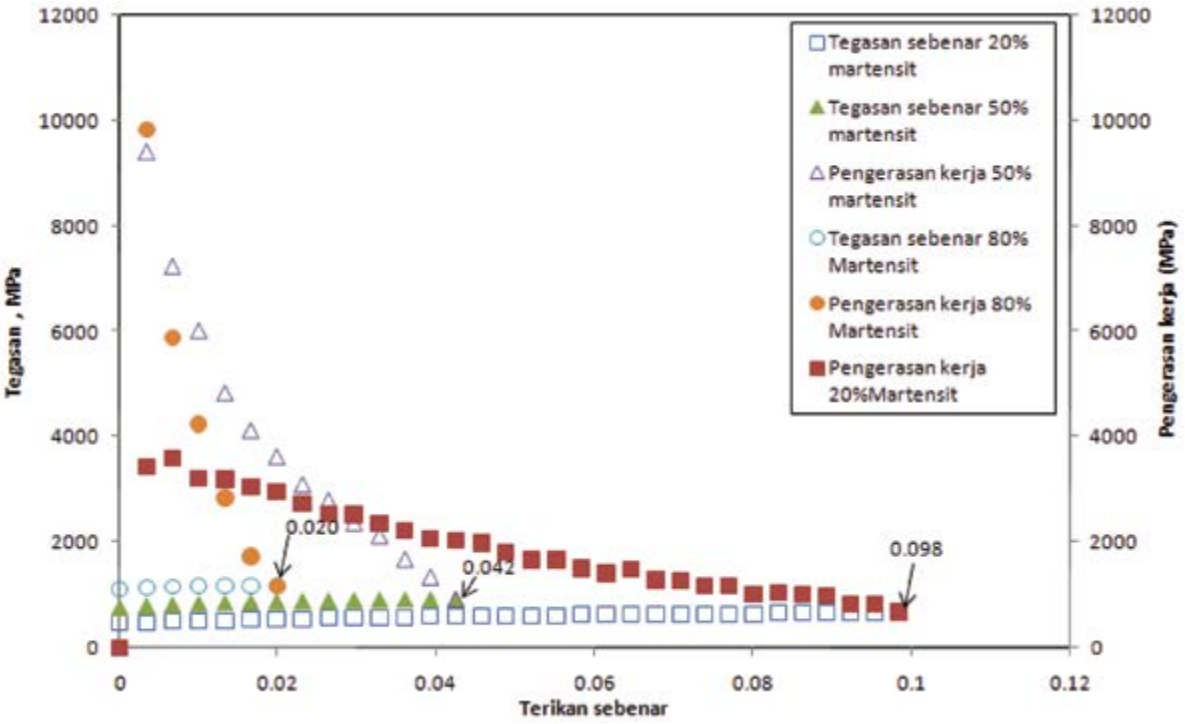
Rajah 4. Kesan pecahan isipadu martensit terhadap kekuatan tegangan dan kekerasan.

Rajah 5 menunjukkan peratus pemanjangan bagi ketiga-tiga spesimen bersandar secara songsang terhadap pecahan isipadu martensit. Bagi sampel 80% pecahan isipadu martensit, peratus pemanjangan hampir sama dengan nilai pemanjangan sampel 50% pecahan isipadu martensit iaitu 6.5% dan 7.5 %. Menurut kajian yang telah dijalankan, peningkatan suhu rawatan haba akan mengurangkan kandungan karbon dalam fasa martensit [9].

Menerusi Rajah 5 ini juga turut memaparkan nilai pemanjangan seragam pada ketika spesimen mencapai kekuatan tegangan yang maksimum. Kandungan 20% pecahan isipadu martensit menunjukkan peratus pemanjangan seragam yang paling tinggi diikuti oleh 50% dan 80% pecahan isipadu martensit.



Rajah 5. Kesan pecahan isipadu martensit terhadap pemanjangan



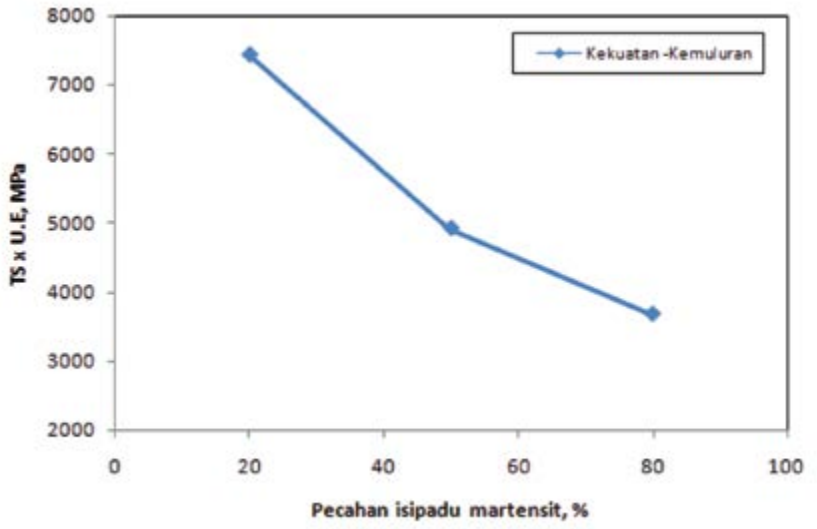
Rajah 6. Graf tegasan sebenar dan pengerasan kerja melawan terikan sebenar bagi spesimen 20%, 50% dan 80% pecahan isipadu martensit.

Menerusi Rajah 6, didapati 80% pecahan isipadu martensit memberikan nilai pengerasan kerja dan tegangan sebenar yang tinggi berbanding dengan sampel 20% dan 50% pecahan isipadu martensit. Graf pengerasan kerja ditentukan melalui kecerunan setiap titik bagi kekuatan sebenar. Titik-titik ini berada di antara titik kekuatan alah dan juga kekuatan muktamad. Titik persilangan antara titik pengerasan kerja dengan titik tegasan sebenar adalah nilai terikan sebenar pada 0.098, 0.042 dan 0.020 bagi sampel 20%, 50% dan 80% isipadu martensit.

Kadar pengerasan kerja hampir seragam yang diwakili oleh titik-titik membentuk lengkungan manakala tegasan sebenar diwakili oleh titik-titik membentuk seperti garis lurus. Menerusi Rajah 6 ini, menunjukkan bahawa perubahan bentuk plastik secara seragam berlaku selagi tegasan sebenar adalah lebih rendah daripada kadar pengerasan kerja. Ini telah dibuktikan bahawa kadar pengerasan kerja keluli fasa duaan meningkat dengan pertambahan isipadu martensit [3]. Pendapat yang sama juga dinyatakan menerusi kajian terdahulu, di mana kelakuan pengerasan kerja bagi keluli fasa duaan dipengaruhi oleh jumlah kandungan karbon pada ferit dan martensit [10].

Mengikut analisis Holomon yang digunakan oleh Movahed, ketidaklurusan garisan ln pengerasan kerja menandakan bahawa perlakuan pengerasan kerja tidak menunjukkan nilai tunggal pekali pengerasan kerja. Pengerasan terikan menunjukkan kebolehan ubah bentuk sesuatu bahan sebelum mencapai ketidakstabilan. Sampel bagi 20% pecahan isipadu mertensit menunjukkan nilai pengerasan terikan yang tinggi berbanding sampel lain dan terdapat dua peringkat peringkat pengerasan kerja atau nilai n iaitu eksponen pengerasan kerja dalam persamaan Holloman [11]. Beliau juga mendapati peringkat pertama dalam pengerasan kerja adalah disebabkan oleh

pembentukkan plastik oleh ferit dan manakala peringkat kedua pula disebabkan oleh pembentukan bersama oleh ferit dan martensit.



Rajah 7. Graf bagi peratus pecahan isipadu martensit melawan kekuatan-kemuluran.

Seterusnya Rajah 7 menunjukkan bahawa T.S (kekuatan tegangan) x U.E (pemanjangan seragam) bagi sampel 20% pecahan isipadu martensit adalah paling tinggi berbanding sampel lain. Diketahui bahawa TS x U.E merupakan indeks kekuatan-kemuluran keluli [11]. Gabungan kekuatan dan kemuluran sampel ini menunjukkan keberkesanan kerja yang boleh dilakukan oleh sampel tersebut terutamanya dalam bidang pembuatan rangka kereta. Bagi sampel 50% dan 80% pecahan isipadu martensit yang menghasilkan kekuatan yang tinggi tetapi memberikan peratus pemanjangan seragam yang rendah menyebabkan nilai kekuatan-kemuluran menjadi rendah. Ini akan meyebabkan daya yang tinggi diperlukan semasa proses fabrikasi [13].

Kesimpulan

Secara keseluruhannya, peningkatan pecahan isipadu martensit boleh meningkatkan nilai kekerasan, nilai tegasan maksimum atau muktamad, kekuatan alah serta pengerasan kerja. Namun begitu pemanjangan berkurangan dengan peningkatan pecahan isipadu martensit. Bagi sampel 80% pecahan isipadu martensit yang telah disepuhlindapkan selama 120 minit telah memghasilkan nilai kekerasan dan kekuatan tegangan yang paling tinggi iaitu 240 Hv dan 1150 Mpa tetapi nilai pemanjangan uniformnya adalah rendah berbanding sampel lain iaitu 3.2%. Disamping itu juga peningkatan dalam pecahan isipadu martensit menghasilkan pengerasan kerja yang tinggi. Namun begitu pecahan isipadu martensit sebanyak 20% memberikan indeks kekuatan-kemuluran dan nilai keterikan yang tinggi.

Perubahan yang berlaku pada mikrostruktur mempengaruhi perubahan yang berlaku pada sifat

mekanik. Fasa ferit memberikan impak terhadap sifat kemuluran dan kelembutan keluli manakala fasa martensit menghasilkan keluli yang keras dan rapuh. Saiz ira juga memainkan peranan yang penting kerana saiz ira yang kecil meningkatkan sifat kekerasan dan ketegangan bahan.

Secara kesimpulannya, kesan perubahan mikrostruktur dan sifat mekanik bagi setiap pecahan isipadu martensit dapat diperolehi serta difahami secara jelas melalui kajian ini. Walaupun perubahan mikrostruktur ysng berlaku melibatkan perubahan yang fasa yang rumit, namum ia boleh dijadikan asas terhadap kajian-kajian yang bakal dijalankan kelak.

Penghargaan

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Lap Shear Properties of Steel/FRP Double Strap Joint

N. A. Jamaluddin1,a, A. A. Dani1,b and S. Abu Hassan1,2,c

1School of Mechanical Engineering, Faculty of Engineering, Universiti Teknologi Malaysia, 81310 Johor Bahru, Johor, Malaysia

2Centre for Advanced Composite Materials (CACM), Universiti Teknologi Malaysia, 81310 Johor Bahru, Johor, Malaysia

akienoyie@gmail.com, bmairulamin1992@gmail.com, cshukur@utm.my

Keywords: Tensile; CFRP; GFRP; Epoxy.

Abstract. This paper describes a series of double strap shear tests under tensile load to investigate the lap shear properties between FRP sheets and steel plates. Adhesive failure at the steel-adhesive interface was observed to be the dominant failure mode for both glass fibre reinforced polymer (GFRP)-Steel and carbon fibre reinforced polymer (CFRP)-Steel DSJ. Strain distribution along the bond length shows that GFRP offer larger extension before debonding compared to CFRP. CFRP-Steel DSJ withstand higher ultimate load and possessed better lap shear strength compared to GFRP-Steel DSJ. The results reveal that the FRP type and bond area of a lap joint need to be taken into consideration for structural strengthening.

Introduction

The unique properties of FRPs offer many possibilities in civil infrastructure applications ranging from repair and rehabilitation to developing new structural elements. They are corrosion resistant and suitable for harsh environment application including direct contact with corrosive soils and marine (marine pollutants?), light weight and having high specific strength/modulus. Moreover, it is easy to manufacture and install due to FRPs formability. Application of the unidirectional laminates allows strengthening of the structural elements in the required direction, and gives a much better control over the desired strength and modulus [1]. Unfortunately, they are some disadvantages. Since FRPs are exposed to vandalism, fire and impact, they are susceptible to damage and they have low modulus and tensile strength compared to steel [2]. The investigation of the probability of damage happening in the system can be see through lap joint test and analysis.
However, performance of a pipeline repair system is decided by its load transfer ability and for FRPs, this led to the debonding issue which has been studied by many researchers [3-9]. This paper describes a series of double strap shear tests under tension to investigate the bond performance in terms of load distribution between FRP sheets and steel plates.

Materials and Sample Preparation

In this study, two types of samples, namely GFRP-Steel DSJ and CFRP-Steel DSJ were used in the bond test. The properties of materials associated in this study were further discussed.
Materials. There are three main types of materials involved in this study, namely; steel, a common pipeline material, FRP and epoxy adhesive which are commonly used in oil and gas for piping

rehabilitation application. Two types of FRPs, GFRP and CFRP are used in the sample in order to evaluate the effect of modulus difference between FRP and steel on joint strength. Sikadur 330 epoxy with high tensile strength properties is used as the bonding agent to prevent any tensile failure during the test. The details of the materials and its properties are shown in Table 1.

Table 1. Research materials details

Type	Material	Tensile Strength (MPa)	Extension at Maximum load (mm)	Tensile Modulus, E (GPa)
Steel	ASTM A36	528.20	15.29	182.56
Strengthening materials	GFRP	783.46	6.57	40.37
	CFRP	1834.35	6.47	140.62
Laminating Matrix	Epicote 2175	22.21	-	2.13
Bonding agents	Sikadur 330 Epoxy	35.65	2.56	3.21

Sample Preparation. In this experimental programme, each sample group consists of three specimens and was prepared according to strict bonding procedure. ASTM A36 structural steel was used as inner adherend with 7.11 mm average thickness. To produce a high quality bonding surface, the steel bond surface undergoes a sandblasting process and surface roughness is kept in the range of 50 to 70 microns profile height. Acetone was then used to remove any impurities and contaminations on the bond surface.

GFRP and CFRP were used as the outer adherend with average thickness of 1.05 mm and 1.10 mm respectively. Both materials systems were prepared using a vacuum infusion technique with 8 hours curing time. Sikadur 330 epoxy was used as the bonding agent in DSJ fabrication process. The 1 mm adhesive thickness was controlled usingTeflon tape in a mould designed to fabricate the sample.

In order to determine the strain along the bond length, ten strain gauges were installed onto FRPs outer surface, with the directions parallel to the applied load. The locations of the strain gauges are shown in Fig. 1.

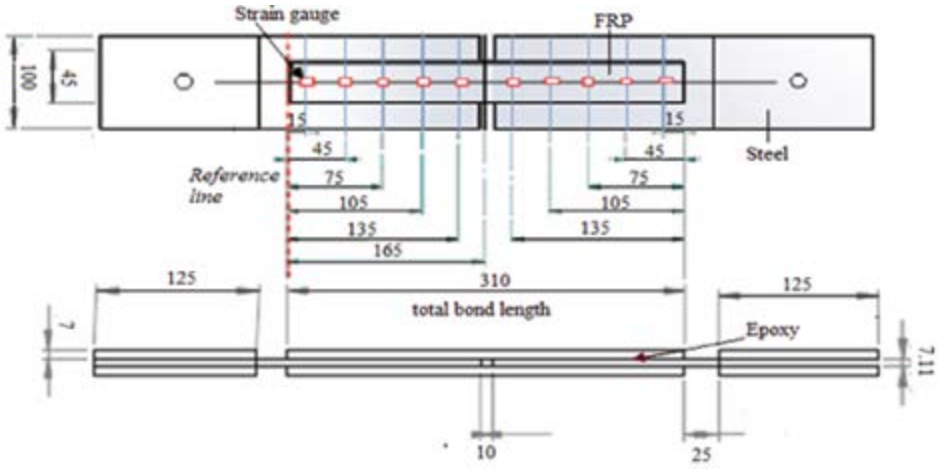


Fig. 1. Schematic diagram of DSJ specimen geometry

Test Method

The experimental investigation on bond performance for shear test under applied tensile load was carried out according to ASTM D3528 standard.

Bond Load Test. The Universal Testing Machine model INSTRON 100 kN was used to apply external load to the test samples using a pull-out test rig. The test rig was developed in a research study done by Shukur (2007) [10]. The test was conducted with the crosshead speed of 0.5 mm/min. The samples were subjected to loading up to failure as shown in Fig. 2.

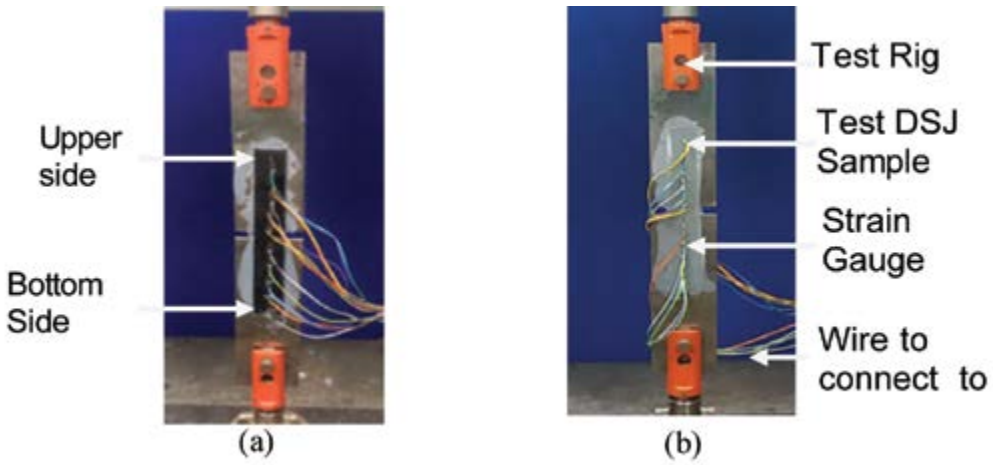


Fig. 2. Sample double strap joints (DSJ) under tensile load for (a) CFRP-Steel and (b) GFRP-Steel

Results and Discussion

The load versus displacement curves for both GFRP and CFRP steel DSJ samples are presented

in Figure 3. The bond test showed that both DSJ samples have the same elastic-plastic behaviour. However, the tensile strength for both samples are different. The result shows that the CFRP-Steel DSJ possess a better ultimate load with an average maximum load value of 30kN compared to 24.3kN of GFRP-Steel DSJ. CFRP-Steel DSJ also have bigger tensile modulus value compared to GFRP-Steel DSJ. However, GFRP-Steel DSJ have a bigger strain value that can be seen by its larger displacement on the graph. The maximum displacement value of GFRP-Steel DSJ is 1.58 mm compared to 1.20 mm for CFRP-Steel DSJ. Table 2 listed the average test result of both samples GFRP-Steel DSJ and CFRP-Steel DSJ

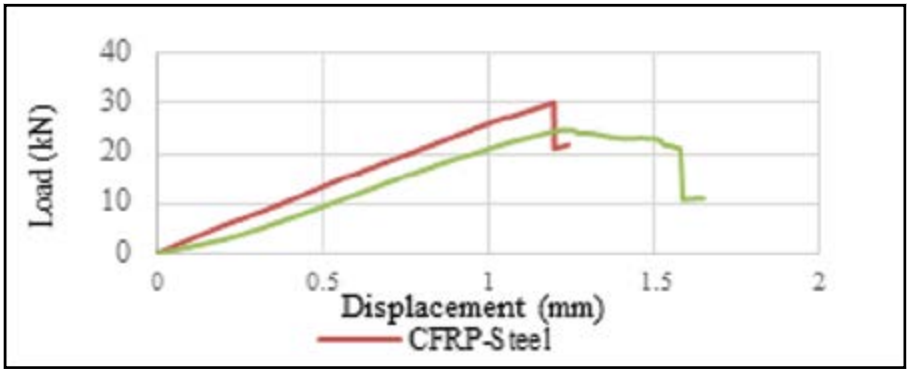


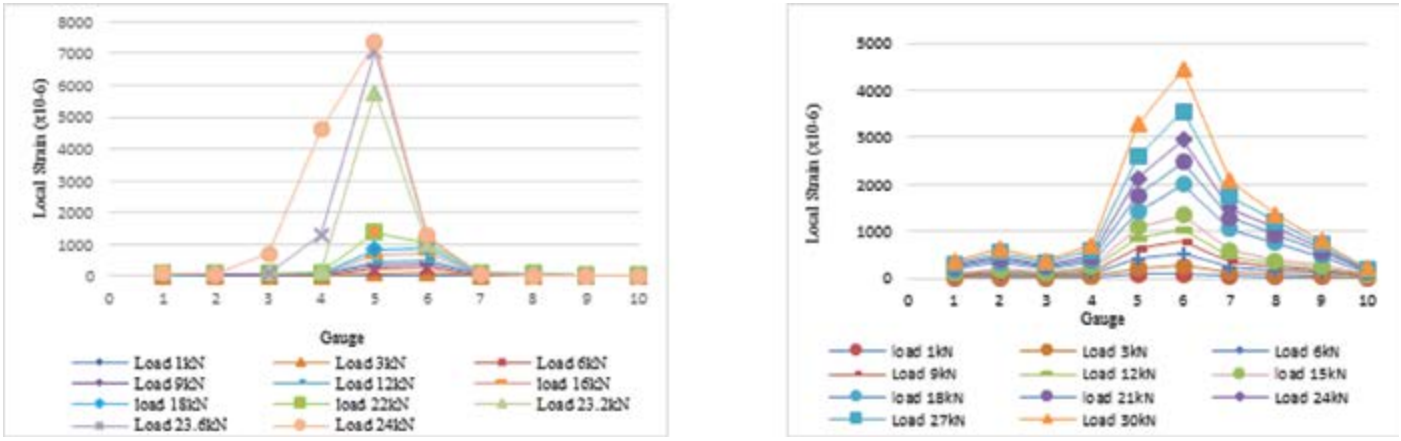
Fig. 3. Graph of Load versus Displacement for FRP-Steel DSJ

Table 2. Average bond test result for double strap joint samples

Sample	Shear strength, (MPa)	Extension at Max Load [mm]	Max load (kN)
GFRP-Steel DSJ	2.01	1.58	24.32
CFRP-Steel DSJ	2.22	1.20	30.01

CFRP-Steel DSJ have a better shear strength and maximum load while GFRP-Steel DSJ undergo further extension before break. This is probably because CFRP-Steel DSJ possessed higher strength and stiffness to withstand larger shear stress and load applied compared to GFRP-Steel DSJ. Meanwhile, high strain-to-failure properties of GFRP resulted in larger extension at the maximum load of GFRP-Steel DSJ compared to CFRP-Steel DSJ.

Strain and Load Distribution. Strain distribution along the bonded length can be obtained from the strain gauge reading at the top surface layer of the fibre. Assuming no stress variation occurs along fibre thickness, Figure 4 shows the strain readings at the epoxy layer of both GFRP-Steel and CFRP-Steel samples under different load levels respectively.



(a) (b)

Fig. 4. Graph of Local Strain Distribution versus Bond Length for (a) GFRP-Steel DSJ and (b) CFRP-Steel DSJ

It is clear from Figure 4 that the strain generally decreases from the middle towards the ends of the joints. The strain distribution for CFRP-Steel DSJ seems to be perfectly linear and reached the furthest strain location from the centre compared to GFRP-Steel DSJ where the outer strain gauge readings are too small and almost zero. The increment of strain for each load also seems to be linear for both samples at every strain location. However, when approaching the ultimate load, there was a sudden increase in strain value at the middle gauge of GFRP-Steel sample which is most likely caused by initial cracking and slip occurring at the epoxy-steel interface. Smaller strain values were also obtained for CFRP-Steel DSJ, which probably correspond to its stiffer properties.

Failure Mode. GFRP-Steel DSJ debonded at the upper side of the sample while CFRP-Steel DSJ debonded at the lower side of the sample as shown in Figure 5. Almost 90% of adhesive failure was observed for GFRP-Steel DSJ at the epoxy-steel interface. This shows the shear strength of epoxy-GFRP interfacial bond and the epoxy itself exceed the strength of epoxy-steel interfacial bond, probably due to a huge modulus ratio between Sikadur 330 epoxy and steel. On the other hand, there was mixed-mode failure (cohesive and adhesive failure) observed on the CFRP-Steel DSJ sample even though adhesive failure at the epoxy-steel interface was still the major failure. No sign of fibre break or steel cracking was observed on all specimens. From this, it can be which concluded that all the failures occurred at the adhesive layer and its interfaces. The modulus ratio of epoxy to steel and epoxy to CFRP are close in value, and provide almost equal strength at both interfacial bonds.

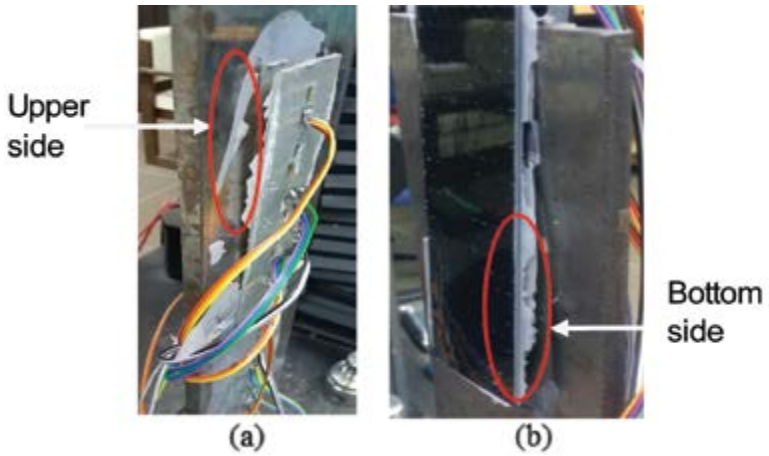


Fig. 5. Sample failure mode for (a) GFRP-Steel DSJ and (b) CFRP-Steel DSJ

Conclusion

A series of bond tests on double strap joints in tension were carried out to investigate the bond performance of GFRP-Steel DSJ and CFRP-Steel DSJ. The conclusions are made based on observations and test results. Different debonded areas were observed for GFRP-Steel DSJ (upper side) and CFRP-Steel DSJ (bottom side). Mix mode failure was observed for both DSJ with adhesive failure as the dominant failure. However, 90% of the failure mode on GFRP-Steel DSJ was adhesive failure at the steel-epoxy interface due to huge differences between its modulus ratio and epoxy to GFRP modulus ratio. CFRP-Steel DSJ on the other hand, was found to possess both high ultimate load and lap shear strength making it more suitable to overcome the debonded problem of a joint. Plus, the adhesive failures were almost balanced on steel-epoxy and CFRP-epoxy interface due to close modulus ratio between them. This provide higher bond strength to overcome shear as both adherends were too stiff to displace compared to GFRP in GFRP-Steel DSJ.

CFRP-Steel DSJ possessed higher ultimate load (30kN) and modulus compared to GFRP-Steel DSJ (24.3kN). Both DSJs show similar shape of strain distribution with the values decreasing from the centre towards the end of the joints. The strain increment as the load increases for both DSJs also seems to be in linear pattern even though there were sudden increases during the failure point of GFRP-Steel DSJ. However, a higher strain value was obtained with the maximum of 7372 με for GFRP-Steel DSJ compared to CFRP-Steel DSJ (maximum 4446 με).
It is recommended that a number of bond tests be made with different epoxy and fibre materials to further understand the correlation between material properties and performances of the bond made.

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Penyelidikan Dan Pembangunan Paramount Seat Bagi Pesakit Strok Melalui Aplikasi Model Shingley's

Nur Farahaizan Binti Idris

Wan Majdah Binti Ton Mamat

N . F Idris[1, a], W.M. Ton Mamat[2,b]

[1]Politeknik Sultan Salahuddin Abdul Azizi Shah, Shah Alam, Malaysia

[2]Politeknik Sultan Salahuddin Abdul Azizi Shah, Shah Alam, Malaysia

[a]farahaizan@psa.edu.my, [b]majdah@psa.edu.my,

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Abstrak. National Stroke Associaton of Malaysia (NASAM) menganggarkan setiap tahun 40,000 rakyat Malaysia mengalami strok. Strok adalah satu keadaaan di mana berlakunya penyempitan ke bahagian otak atau salur darah pecah. Strok adalah penyakit yang berbahaya dan boleh mengakibatkan kecacatan kekal dan kehilangan upaya. Pesakit strok memerlukan penjagaan rapi sama ada di rumah mahu pun di hospital. Penggunaan kerusi roda amat penting kepada pesakit strok. Namun kerusi yang sedia ada di pasaran kurang sesuai digunakan untuk pesakit strok kerana keadaannya yang tidak ergonomik dan sukar untuk mengalihkan pesakit dari kerusi roda ke katil. Satu kajian dan pembanguanan rekabentuk melalui aplikasi Model Shingley's telah dilakukan. Kajian Analisa Keperluan Pengguna (Product Need Analysys) telah dilakukan melalui pengedaran borang soalselidik kepada penjaga pesakit strok. Hasil analisa menunjukkan responden memerlukan satu produk inovasi untuk mengalihkan pesakit strok adalah tinggi dengan skor min yang diperolehi adalah 4.38. Ini kerana kaedah sedia ada mendatangkan kemudaratan kepada penjaga dan pesakit strok. Analisa pengujian bahan (Ujian Ketegangan) menggunakan *Instron Universal Testing Machine*juga telah dijalankan bagi menentukan sifat bahan yang digunakan dalam proses fabrikasi produk. Melalui ujian ini menunjukkan bacaan min nilai beban maksimum yang dapat ditampung oleh sebatang bahan tersebut adalah 1.125KN iaitu bersamaan dengan 114.46 kg. 2 besi telah digunakan untuk meningkatkan had beban produk bagi menampung beban pengguna produk. Bagi mendapatkan keselesaan pengguna, data antrometrik telah digunakkan bagi menentukan dimensi yang sesuai bagi proses rekabentuk produk. Selepas produk telah dihasilkan proses ujicuba telah dilakukan bagi meningkatkan tahap kepuasan hati pengguna. Hasil analisa ujicuba, produk ini telah diubahsuai sebelum paramount seat sebenar terhasil dan terbukti bahawa paramount seat sangat membantu penjaga dalam menjaga pesakit strok.

Pendahuluan

Perkembangan sektor teknologi di Malaysia telah membangun pesat seiring dengan kemajuan dan kejayaan yang telah dicapai oleh negara kita serta mendapat nama di mata dunia. Kemudahan di hospital juga berkembang dari masa ke masa bagi memberi keselesaan kepada pesakit. Produk yang kukuh dan mempunyai banyak fungsi dapat dibina apabila menggunakan bahan yang sesuai pada sesuatu struktur produk tersebut. Penghasilan idea baru yang bernas yang dihasilkan daripada Analisa Proses Rekabentuk Kejuruteraan dan Analisa Kajian Keperluan Produk. Bahan yang digunakan juga melalui proses Analisa pemilihan bahan. Penghasilan paramount seat ini merupakan inovasi daripada aplikasi fungsi kerusi roda asal yang digunakan oleh kakitangan hospital dalam membantu pergerakkan pesakit kepada fungsi yang lebih meluas iaitu boleh laras dari kerusi roda menjadi sebuah katil.

Pernyataan masalah merupakan isu atau masalah yang ingin dikaji dalam penyelidikan. Pernyataan masalah diperoleh melalui Analisa Kajian Keperluan Produk. Pemerhatian dan borong soal selidik telah diedarkan kepada responden primer yang terdiri daripada jururawat dan juga penjaga dengan mengedarkan 50 borang soal selidik di Klinik Kesihatan sekitar Sabak Bernam. Dapatan sekunder pula diperoleh daripada hasil kajian literatur daripada journal dan bahan bacaan yang sesuai. Berdasarkan analisa yang telah dibuat, masalah utama ialah, jururawat atau penjaga sukar untuk mengangkat pesakit angin ahmar ke katil atau untuk melakukan kerja harian. Menurut Hayes SH dan Carroll SR 1986 pesakit strok tidak boleh bergerak banyak kerana semakin banyak pergerakkan mereka, saraf mereka tidak boleh direhatkan. Strok ialah masalah kesihatan yang diakibatkan oleh salur darah tersumbat dan bekalan darah ke sebahagian otak diganggu (Berg, K., Hines, M. & Allen, S. ,1995). Bahagian otak tersebut tidak lagi menerima oksigen yang mencukupi dan sel-sel otak akan rosak atau mati. Pesakit strok akan mengalami kelemahan otot atau kekebasan (hemiplegia). Ini akan menyebabkan pesakit strok tidak mampu menguruskan diri sendiri dan memerlukan jururawat atau ahli keluarga untuk menguruskan mereka. Hal ini akan menyukarkan penjaga untuk mengalihkan mereka, mengikut kaedah mengangkat pesakit secara manual. Satu modifikasi dan inovasi terhadap kerusi roda perlu dijalankan bagi memudahkan proses memindahkan pesakit tanpa menggunakan tenaga yang lebih serta mendatangkan kemudaratan.

Kajian Literatur

Angin ahmar atau strok ialah masalah kesihatan yang diakibatkan oleh salur darah tersumbat dan bekalan darah ke sebahagian otak diganggu [3]. Bahagian otak tersebut tidak lagi menerima oksigen yang mencukupi dan oleh itu, sel-sel otak akan rosak atau mati, dan mengakibatkan bahagian badan yang dikuasai oleh bahagian otak itu tidak berfungsi. Penggunaan kerusi roda sangat diperlukan oleh penjaga dalam menguruskan pesakit strok. Kerusi roda dicipta khas untuk kegunaan individu yang tidak mempunyai kekuatan anggota bawah, disebabkan itu ia dicipta dengan fungsi khas untuk menggantikan kaki dan memerlukan sokongan tangan [2]. Oleh yang demikian kerusi roda sedia ada tidak sesuai digunakan oleh pesakit strok. Kaedah memindahkan pesakit strok yang memerlukan memerlukan tiga orang penjaga adalah paling sesuai untuk memindahkan pesakit strok

yang tidak berupaya bergerak dari katil atau dari pengusung [1]. Kajian ergonomik adalah kajian interaksi diantara manusia dan mesin atau persekitaran bagi memastikan pengguna akan berasa selesa, selamat, dan berkesan [18]. Untuk membangunkan produk ini data antropometrik digunakan untuk mendapatkan bentuk yang ergonomik bagi produk yang diinovasikan. Aplikasi penggunaan Model Shingley's digunakan untuk mendapatkan proses rekabentuk produk. Model ini merupakan asas proses rekabentuk dalam menghasilkan produk baru atau yang akan melalui proses inovasi [9]. Antara unsur asas proses reka bentuk ialah objektif dan kriteria, sintesis, analisis, pembangunan produk, pengujian dan penilaian. Sebelum mnjalankan kajian analisa kajian keperluan produk (PNA) dengan menggunakan borang soal selidik dan skala likert telah digunakan bagi mendapatkan maklumat mengenai keperluan produk tersebut untuk dibangunkan. Analisa ini melibatkan kajian secara kuantitatif dengan mengumpulkan maklumat melalui satu set soalan kepada satu sampel individu yang dipilih dari satu populasi yang hendak dikaji [8]. Sebelum memulakan proses fabrikasi, ujian ketegangan dijalankan. Ujian Ketegangan merupakan ujian piawai bagi logam yang selalunya dilakukan pada kadar pemisahan keratan rentas yang malar. Sifat-sifat mekanik sesuatu bahan mencerminkan perhubungan di antara tindak balas atau perubahan bentuk terhadap beban yang dikenakan [12].

Metadologi Kajian

Sebelum menjalankan kajian, kerangka rekabentuk kejuruteraan telah dirancang berdasarkan Model Shingley's. Komponen kerangka kajian mestilah merangkumi proses pembangunan kreativiti, penyataan masalah, spesifikasi, proses pembangunan, halangan, keselamatan dan etika serta impak kepada masyarakat. Didalam model ini juga, kajian keperluan pengguna (PNA) adalah sangat dititikberatkan. Sebanyak 50 borang soal selidik telah diedarkan kumpulan sasaran meliputi jururawat dan penjaga pesakit strok selam 7 hari. Data dianalisis menggunakan kaedah statistik deskriptif menggunakan skor min dengan membahagikan kepada 3 bahagian. Jadual pengkelasan tahap adalah seperti dibawah.

Jadual 1. Pengkelasan Tahap kepuasan

SKOR MIN	*TAHAP*
Tinggi	3.68-5.0
Sederhana	2.34-3.67
Rendah	1-2.33

(Sumber: Disesuaikan daripada Mohd Najib,2003)

Untuk memastikan produk berfungsi dengan baik analisa pengujian telah dijalankan iaitu Ujian Ketegangan dengan menggunakan *Instron Universal Testing Machine*. Ujian ini dilakukan bagi menguji tegangan-terikan bahan bagi mendapatkan had maksimum beban produk. Purata 4 bacaan telah diambil menggunakan jenis besi lembut yang sama sebagai spesimen. Produk ini direka bentuk menggunakan kaedah lakaran awal dan seterusnya dilengkapkan dengan menggunakan perisian Autodesk. Produk ini direka mengikut ketinggian katil di hospital dan di rumah bagi mewujudkan kesesuaian antara projek yang dibuat dengan katil yang sedia ada. Katil yang terdapat di hospital boleh dilaraskan ketinggiannya dan tidak mengalami masalah ketinggian apabila disuaikan dengan struktur ketinggian projek yang dihasilkan manakala untuk ketinggian katil yang berada di rumah diukur ketinggian maksimumnya dan akan disuaikan dengan ketinggian projek.



Rajah 1. Paramount Seat

Analisa Kajian

Bagi menguatkan lagi penyataan masalah, Analisa keperluan Pengguna (PNA) telah dijalankan dengan pengedaran borang soal selidik ini dibahagi kepada 4 bahagian utama iaitu faktor demografik, tahap kefahaman responden terhadap perkara berkaitan penyakit strok, tahap pengalaman responden terhadap perkara berkaitan penyakit strok dan tahap keperluan responden dalam menginovasikan kerusi roda sedia ada terhadap pesakit strok. 50 borang soal selidik kepada responden yang terlibat. Berdasarkan daripada kajian yang dilakukan, bilangan responden yang terlibat adalah 50 orang meliputi 31 perempuan dan 19 orang lelaki. Latar belakang reseponden meliputi kepada aspek jantina, bangsa, umur, profession, dan pengalaman menjaga pesakit strok. Rajah 2 menunjukkan keputusan hasil soal selidik yang telah diperolehi.

Jadual 2. Keputusan Analisa Keperluan Pengguna

Skor Min	Nilai min skor	Tahap
Kefahaman Responden Terhadap Pesakit Strok	2.68	Sederhana
Pengalaman Responden Terhadap Perkara Berkaitan Penyakit Strok	3.69	Tinggi
Keperluan Responden Dalam Menginovasikan Kerusi Roda Sedia Ada Terhadap Pesakit Strok	4.38	Tinggi

Jadual 3: Pengujian Sifat Bahan

	Load at Break (Standard) (kN)	Maximum Load (kN)	Load at Yield (Offset 0.02 %) (kN)	Energy at Maximum Load (J)
1	0.00137	1.18512	1.13736	11.87317
2	0.62094	1.22321	0.90125	5.86578
3	0.58883	0.92545	0.85266	7.73323
4	0.57876	1.16618	1.16086	8.52797
Mean	0.44748	1.12499	1.01303	8.50004
Standard Deviation	0.29795	0.13513	0.15866	2.51039

Jadual 3 menunjukkan analisa pengujian bahan iaitu ujiam ketegangan telah dijalankan terhadap besi yang digunakan. Ujian Ketegangan dengan menggunakan *Instron Universal Testing Machine*. Ujian ini dilakukan bagi menguji tahap kekuatan bahan bagi mendapatkan had maksimum berat pengguna produk.

Perbincangan dan Kesimpulan

Melalui keputusan keperluan pengguna dengan pengedaran borang soal selidik, menunjukkan nilai skor bagi kefahaman responden terhadap pesakit strok adalah 2.68 iaitu berada di tahap sederhana. Skor pengalaman juga adalah berada pada tahap tinggi iaitu 3.69. Ini menunjukkan bahawa responden mempunyai pengalaman dalam menjaga pesakit strok tetapi kurang memahami isu yang berkaitan dengan pesakit strok seperti ketidakupayaan pesakit strok, latihan atau kursus dan kemahiran mengalihkan pesakit strok. Tahap kefahaman yang sederhana telah membawa kepada tahap keperluan yang tinggi dalam keperluan menginovasikan produk yang membantu penjaga dalam mengalihkan pesakit strok. Kajian lepas menunjukan bahawa, kerusi roda yang telah diinovasikan hanya mampu berfungsi sebagai alat mobiliti pesakit strok tetapi tidak mengatasi masalah untuk memindahkan pesakit strok ke katil. Oleh yang demikian paramount

seat telah diinovasikan dengan membantu proses mengalihkan pesakit strok tanpa melibatkan tenaga kerja yang banyak. Fungsi asas kerusi roda juga telah dipelbagaikan dengan menambah fungsi sebagai katil bagi tujuan istirehat pesakit strok. Paramount Seat ini mampu untu ditinggikan atau direndahkan selaras dengan ketinggian katil hospital atau katil yang terdapat dirumah. Ujian Ketegangan terhadap besi telah dijalankan dan keputusan menunjukkan bahan yang digunakkan mampu menampung 1.12499KN bersamaan dengan 114.46 kg dengan ralat (*standard deviation*) 0.13513. Untuk meningkatkan lagi had beban 2 besi telah disambung secara paksi.

Kesimpulannya paramount seat memberi implikasi positif dalam menjaga pesakit strok dan merupakan alat mudahcara yang membantu dalam proses mengalihkan pesakit strok yang mempunyai kurang upaya untuk menggerakkan anggota badan dan penjaga tidak perlu lagi menggunakan tenaga yang banyak serta memerlukan lebih daripada seorang untuk memindahkan pesakit strok. Penjaga pesakit strok yang mempunyai kurang pengalaman serta latihan mampu menjaga pesakit strok melalui penggunaan paramount seat. Hasil pembangunan paramount seat ini sebenarnya dapat mengatasi kekurangan yang ada pada kerusi roda sedia ada yang hanya mempunyai fungsi asas untuk memindahkan pesakit.Pesakit strok sangat memerlukan sokongan moral dari ahli keluarga dan oleh yang demikian, paramount seat merupakan produk inovasi sangat sesuai digunakan terutamanya kepada yang menjaga di rumah. Untuk kajian dimasa hadapan, skop penggunaan kerusi roda ini akan diperluaskan bukan sahaja boleh digunakan terhadap pesakit strok malahan boleh digunakan terhadap ahli sukan yang mengalami kecederaan semasa dalam pertandingan.

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Reka Bentuk dan Pembangunan Sistem Pemantauan Akuakultur Berasaskan Kepada 'Internet of Things' (IOT)

Z. Ismail[1, a] dan H.A.M. Adam[2, b]

[1]Politeknik Tuanku Sultanah Bahiyah, Kulim, Malaysia

[2]Politeknik Tuanku Sultanah Bahiyah, Kulim, Malaysia

[a]zarinaismail@gmail.com, [b]husaini@ptsb.edu.my

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Abstrak. Dalam Akuakultur, hasil (udang dan ikan) adalah bergantung kepada ciri-ciri air kolam akuakultur tersebut. Untuk memaksimumkan hasil, parameter yang perlu berada pada paras optimum tertentu dalam air adalah suhu larut, dan paras pH. Parameter ini boleh berubah-ubah dalam tempoh sehari dan perubahan pantas ini berlaku bergantung kepada keadaan persekitaran luaran. Oleh itu, pemantauan parameter ini secara berterusan adalah diperlukan, untuk analisis dan tindakan yang tepat pada masanya dapat dilakukan. Ini memerlukan capaian dan sistem maklumat 'real time' yang tepat untuk memaksimumkan potensi tersebut. Sensor digunakan untuk memantau kolam atau kawasan akuakultur untuk parameter yang relevan, seperti tahap pH air, dan suhu air. Sistem ini direka bentuk terdiri daripada beberapa nod yang pemancar bacaan masa sebenar nilai pH dan suhu air ke 'gateway'. Di mana 'gateway' ini akan menyimpan data setiap nod yang diperolehi melalui radio frekuensi. Stesen penerima terdiri daripada modul Wi-Fi untuk menerima data penderia/pengesan dari pemancar melalui rangkaian Wi-Fi. Antara muka pengguna di bahagian 'wireless' monitor membolehkan menyampaian data daripada 'cloud' dianalisis dalam bentuk nilai kepada pemilik ke telefon mudah alih, 'tablet' atau komputer peribadi dan memberi data semasa keadaan parameter yang berlaku. Dengan adanya rekaan ini juga, pemilik akuakultur yang kurang pengetahuan tentang teknikal juga boleh berinteraksi dengan sistem dan dapat memahami maklumat untuk mengambil tindakan yang sesuai.

Pengenalan

Air merupakan satu keperluan asas yang sangat penting di muka bumi ini. Air ini juga merupakan satu ekosistem yang menghubungkan antara benda hidup dan benda bukan hidup yang mana ianya bergantung antara satu sama lain. Kepentingan air dalam akuakultur membolehkan pertanian akua dijalankan. Akualkultur adalah pertanian akua yang melibatkan proses ternakan spesis hidupan, iaitu haiwan atau tumbuhan air tawar atau air masin di dalam persekitaran yang terkawal. Antara akuakultur yang sering dijalankan adalah, ikan seperti tilapia, keli, patin, haruan, udang galah, udang harimau, ikan hiasan, tiram dan pelbagai lagi. Kualiti air adalah aspek paling penting dalam akuakultur dan ianya sukar untuk dikekalkan secara manual oleh penternak. Oleh itu, sistem pemantauan ini memainkan peranan penting dalam pengurusan ladang akuakultur. Pemantauan

automatik beberapa parameter air, secara 'real time' dan berterusan bukan sahaja memberikan pengurusan akuakultur berkualiti tinggi malahan ianya juga dapat memberikan data tepat yang dapat membantu mengoptimumkan proses pembiakan, meningkatkan kecekapan pembiakan, dan mengurangkan kos pertanian akuakultur tersebut [1, 2]. Adalah menjadi keperluan untuk diperbaiki sistem yang sedia ada, memandangkan kaedah makmal adalah merupakan kaedah yang lambat untuk operasi tindak balas berlaku dan tidak memaparkan keputusan 'real time' [3,4].

Kajian Sorotan

Kualiti air adalah merupakan parameter penting untuk menjaga kualiti hidupan akuakultur. Kualiti air ini dapat diketahui dengan adanya pengujian terhadap air tersebut. Perkara ini dikaji dan dinilai melalui tiga parameter utama, iaitu parameter fizikal, parameter kimia, dan parameter biologi [5]. Parameter fizikal ditentukan melalui suhu, warna, bau, rasa, jumlah pepejal terampai, ketelusan atau kekeruhan, jumlah pepejal terlarut, dan kadar kemasinan [6]. Parameter kimia melibatkan oksigen terlarut (DO), permintaan oksigen biokimia (BOD), permintaan oksigen kimia (COD), pengukuran keasidan atau kealkalian larutan akueus (pH), dan nitrogen-ammonia (NH_3-N) [7]. Parameter air yang penting untuk dipantau adalah suhu air, oksigen terlarut dan pH air [4] .

Ikan merupakan haiwan berdarah sejuk dan seandainya sebarang perubahan pada suhu air berlaku ia akan menghalang pertumbuhan ikan [4, 8]. Perubahan suhu air mempengaruhi jumlah oksigen terlarut dalam air dan penggunaan oksigen ikan . Jenis ikan yang berbeza spesisnya, mempunyai keperluan yang juga berbeza mengikut suhu optimum dan had daya ketahanan daripada suhu yang melampau [9]. Secara umumnya, kehidupan ikan perlu mengekalkan pH keasidan dan alkalian air antara 6.5 ke 9. Apabila terlalu berasid dan beralkali akan menyebabkan kesan yang tidak elok, seperti hakisan asid pada tisu insang, rembesan mukus meningkat, kesesakan dan keradangan pada abdomen. Air yang terlalu beralkali , amonium di dalam air bertukar menjadi toksik amonium, yang boleh menyebabkan ikan mati [10]. Sekiranya perubahan parameter air dapat dikesan lebih awal, maka ianya boleh dirawat pada peringkat awal. Satu pendekatan dan inisiatif yang bernas diperlukan untuk mengekalkan kualiti sumber air bagi mengelakkan keterjejasan kualiti air yang mana ianya menjadi penentu utama kualiti manusia dan kehidupan lain di muka bumi [5].

Kebanyakan penyelidik telah menjalankan kajian berkaitan pemantauan dan pengawalan akuakultur. Pengkaji Srinivasarao dan U.Kameswari [2] mencadangkan, sistem pemantauan yang menekankan kepada suhu, pH dan oksigen terlarut dalam sistem pembiakan dan seandainya sistem melebihi daripada yang sepatutnya, paparan akan terpapar pada LCD dan 'alarm' akan berbunyi dan secara automatik motor akan dihidupkan dan seterusnya bila mencapai tahap pengesetan, motor akan dimatikan sendirinya. Projek yang dilakukan dalam [8] membincangkan pengukuran suhu, takat air, dan nilai pH menggunakan pemprosesan signal A/D, melalui 'wi-fi' tanpa wayar dipindahkan ke teminal pelayar. Manakala Matharu et.al [11] pula mengukur parameter suhu, takat air, pengesanan asap dan juga kekeruhan. Penyelidik [2, 8, 11] telah menggunakan sistem berasaskan IOT dengan menggunapakai ARM 7 sebagai kawalan mikro kepada projek yang telah dijalankan.

Penelitian oleh Sabiq dan Budisejati [7], perancangan pemantauan kadar pH, suhu dan warna berasaskan 'Wireless Sensor Network'(WSN) telah dilakukan. Projek ini mempunyai sensor pada

setiap nod dihubungkan ke 'Arduino' sebagai unit pemproses, data yang yang dibaca pula diberikan kepada 'sink node' melalui Xbee. Digunakan pula komputer peribadi sebagai 'database server' dan 'web server'. Manakala hasil dapatan ditampilkan melalui laman web yang telah dibangunkan dalam bentuk jadual. Manakala [12], telah membina satu sistem pemantauan menggunakan Arduino, dimana tiga sensor telah digunapakai iaitu sensor kekeruhan, konduktor dan pH air. Sistem ini juga menggunakan 'GPRS' modul untuk menghantar data tanpa wayar kepada laman web yang telah dibina. 'GPRS' ini menghantar data menggunakan internet. [13] telah merekabentuk satu sistem yang mengukur nilai suhu, pH dan kekeruhan air dengan menggunakan kaedah IOT yang mengandungi dua bahagian, iaitu 'hardware' dan 'software'. Bahagian 'hardware' ini mengandungi sensor-sensor yang memberikan keluarannya kepada kawalan ATmega 328, dan keluarannya dipaparkan pada LCD melalui 'wifi' modul yang menyambungkan antara 'hardware' dan 'software'. Data juga boleh dipaparkan kepada telefon 'android' melalui 'wifi' yang disediakan.

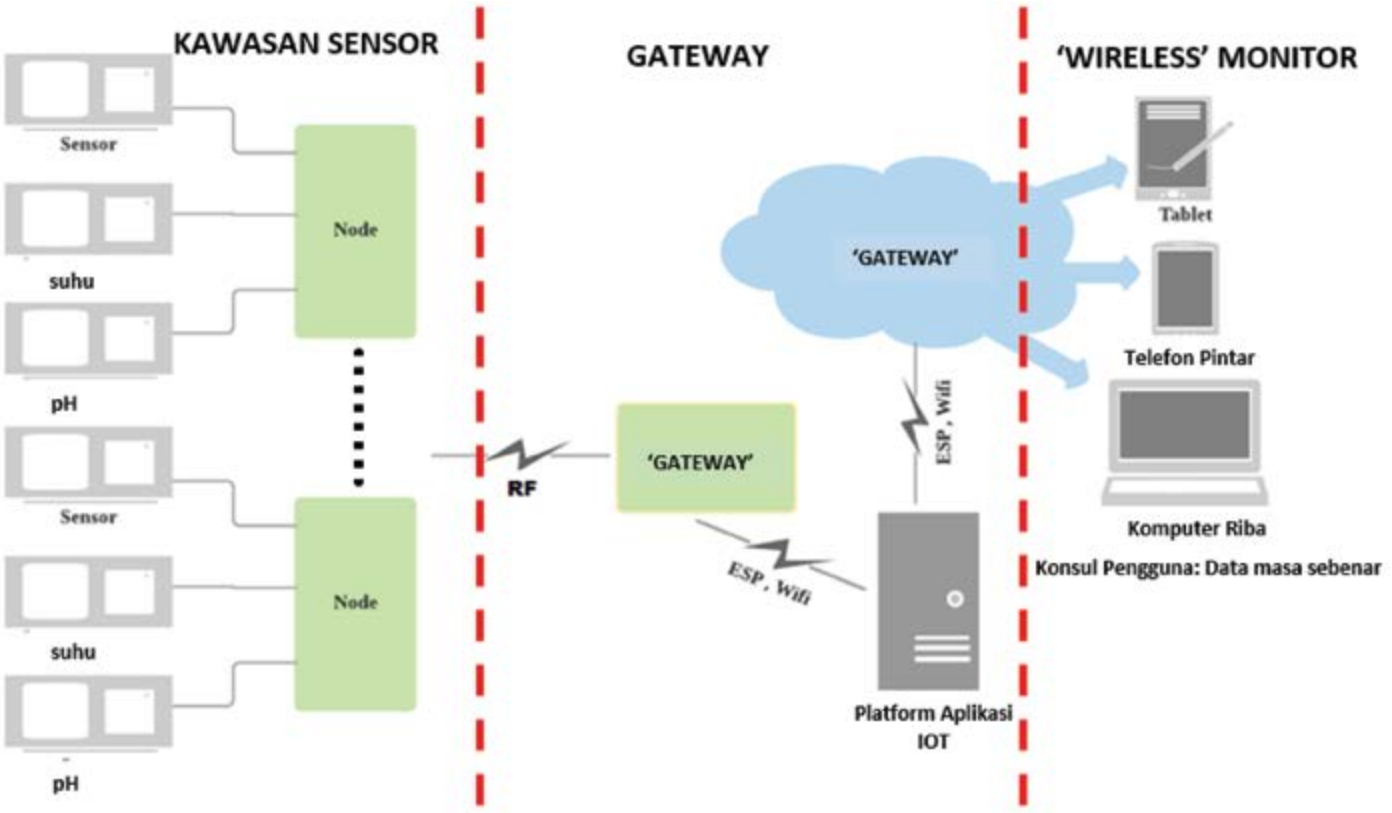
'Internet of Things' (IOT). Berdasarkan kepada pemasalahan yang dinyatakan, kertas ini mencadangkan untuk mereka bentuk dan membangunkan sistem pemantauan akuakultur secara 'real time' berasaskan 'Internet of Things' (IOT) dengan kos yang rendah. Dinyatakan oleh [11], "*Internet of Things' (IOT) boleh ditakrifkan sebagai revolusi terbesar dalam pembuatan industri. Ianya akan memberi kesan kepada gaya hidup, cara penggunaan tenaga dan dalam kegiatan seharian*". IOT ini juga digunapakai sebagai membantu hasrat kerajaan Malaysia yang dinyatakan dalam [14] bahawa misinya adalah untuk mewujudkan ekosistem kebangsaan bagi membolehkan percambahan penggunaan dan perindustrian. IOT ini terdiri daripada saling hubungan objek dan komunikasi dengan objek [15]. Objektif utama IOT adalah pada bila-bila masa, di mana sahaja dan pada sesiapa sahaja [16].

Cadangan sistem ini, akan menggunakan pengesan pH, dan juga pengesan suhu. Pengesan atau 'sensor' ini ditakrifkan sebagai satu alat yang memberi respon terhadap sebarang input sama ada secara fizikal, mekanikal, elektrikal, elektrokimia dan sebagainya dengan mengaktifkan fungsi penderia berkaitan [17]. Teknologi sensor ini juga dinamakan sebagai IOT oleh [17].

Cadangan Sistem

Kertas ini mencadangkan satu rekabentuk dan pembangunkan sistem pemantauan akuakultur melaui pemantauan jarak jauh yang memantau suhu dan pH air. Cadangan ini akan memberikan satu sistem pemantauan jarak jauh melalui apa yang dikenali sebagai 'IOT'. Sistem cadangan ini, adalah sistem yang mudah alih, kos yang rendah, serba boleh dan membolehkan perkongsian maklumat melalui 'cloud' yang boleh digunapakai sebagai salah satu pembangunan dan penambahbaikan kepada aktiviti akuakultur sedia ada. Raj. 1 menunjukkan rekabentuk sistem yang dicadangkan. Pembinaan yang dicadangkan ini terdiri daripada beberapa bilangan nod pengesan yang boleh digunapakai oleh kolam atau kawasan akuakultur berbeza. Nod pengesan ini yang akan mengukur parameter air melalui sensor/pengesan dan menghantar nilai berkaitan ke 'central' pusat iaitu 'gateway'. Dimana, 'gateway' yang akan mengumpul data dan data ini dikelaskan mengikut kepada nod yang masuk, dan seterusnya akan dihantar ke aplikasi 'wireless' monitor melaui 'cloud'. Pemantauan ini dilakukan dari jauh dan ianya dilakukan dengan bantuan

pengesan, modul penerima-pemancar, dan kawalan mikro. Pengesan ini diletakkan pada badan air, yang disambungkan ke kawalan mikro. Data yang dikumpulkan daripada pengesan dihantar daripada pemancar ke penerima,yang kemudiannya disambungkan ke kawalan mikro. Aplikasi 'wireless' monitor akan memaparkan data yang diterima. Aplikasi ini akan memaparkan data 'real time' kesemua pengesan yang ada. Selain itu, dengan bantuan persekitaran IOT ini, cadangan ini diharapkan dapat menyediakan kemudahan untuk mengakses data tanpa wayar oleh konsul pengguna sama ada peranti telefon pintar, komputer riba atau peranti yang lain dari jauh, dan di mana-mana sahaja.



Raj. 1. Senibina keseluruhan sistem yang dicadangkan.

Kebaikan Kepada Sosial. Produk ini akan memberi kebaikan dan manfaat kepada penternak akuakultur dalam skala yang besar, kerana kekurangan pemantauan yang bersifat 'real time'pada masa kini. Dengan ini sebarang kemungkinan perubahan parameter akan dapat diketahui dalam masa yang awal, dan dapat mengelakkan daripada berlaku kehilangan pemantauan pada hasil akuakultur yang sedia ada dan mengelakkan kerugian berlaku. Sistem ini dapat membantu dalam membangunkan hasil biakan yang baik dan membantu perkembangan akuakultur yang sihat dan menguntungkan.

Kebaikan sistem yang dicadangkan. Berikut adalah merupakan antara kebaikan sistem : maklumat disampaikan tepat pada masanya kerana 'real time', menjimatkan campur tangan manual kerana bekerja tanpa tenaga manusia yang banyak,dan mengurangkan kos, mengurangkan masa

dalam pemeriksaan parameter, meningkatkan produktiviti kadar pertumbuhan akuakultur dan seterusnya meningkatkan pendapatan. Selain daripada itu, akses daripada jarak jauh kepada data yang diperolehi, dan mempunyai sistem yang sistem penyelenggaraannya mudah, pemasangan dan kos yang sangat efektif berbanding kepada keupayaannya.

Kesimpulan

Kerja penyelidikan ini menunjukkan pendekatan pemantauan kualiti air untuk akuakultur berasaskan kepada IOT. Sistem yang dicadangkan ini terdiri daripada beberapa sensor yang diletakkan pada satu nod, dimana nod ini dapat membaca data daripada beberapa tempat secara serentak. Sistem pemantauan ini secara 'real time' dan data dapat diakses dan dilihat pada bahagian 'wireless' monitor. Ini seterusnya dapat menjimatkan waktu dan juga tenaga kerja kerana nod pengesan ini boleh memantau pada kawasan ataupun tempat yang berbeza secara serentak. Skop cadangan untuk penambahbaikan akan datang adalah menambah lebih banyak sensor parameter lain dan dapat mengawal parameter itu secara automatik daripada sistem.

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STUDY OF RISK ASSESSMENT RATING ON ERGONOMIC HAZARDS AMONG STAFF OF POLITEKNIK METRO TASEK GELUGOR

NORERIYAWATY BINTI MAT RANI1,a, AFIQ FAHIM BIN MD YUSOF1,b

1Politeknik METrO Tasek Gelugor, Jabatan Pendidikan Politeknik dan Kolej Komuniti, 13300 Tasek Gelugor, Pulau Pinang.

aeriyarani@gmail.com, bafiq.ban@gmail.com

Keywords : ergonomics, ergonomics hazard, risk assessment

ABSTRACT: Politeknik METrO Tasek Gelugor is a government tertiary education institution that caters diploma programs as its main business as well as training courses as its secondary business. The working norms at Politeknik METrO Tasek Gelugor are mainly consist of teaching, supervising, clerical and administrative chores. Ergonomics is closely related to working environment. Thus, at Politeknik METrO Tasek Gelugor, the ergonomics hazards and its risks occur in the working norms of its staff.
A pilot study was conducted where the results of the study found that 90% of respondents agreed that there were ergonomic hazards that might occur when they work in office. The result of early observations also found that the office space and staff work space are causing ergonomic hazards to Polytechnic staff. Additionally, no Health and Safety Officers are appointed to ensure that hazard risks in the Politeknik METrO Tasek Gelugor are monitored, prevented or controlled. Therefore, this study is conducted to identify existing ergonomics hazard, assess the risk rating for the hazard and determine the high risk rating ergonomic hazards that occur. Based on the risk assessment has been made, there are three high-risk ergonomic hazards, namely Passive Posture (PP), Awkward Posture (AP) and Arm-Transport Movement (A-TM) among Politeknik METrO Tasek Gelugor staff.

INTRODUCTION

Politeknik METrO Tasek Gelugor is a government tertiary education institution that caters diploma programs as its main business as well as training courses as its secondary business. The working norms at Politeknik METrO Tasek Gelugor are mainly consist of teaching, supervising, clerical and administrative chores. Ergonomics is closely related to working environment. Thus, at Politeknik METrO Tasek Gelugor, the ergonomics hazards and its risks occur in the working norms of its staff.

As an educational institution, Politeknik METrO Tasek Gelugor consists 38 lecturers and assisted by 16 management staff. On the other hand, there is no specific Safety and Health Committee appointed to monitor activities related to safety and health of the employees. Only 3K Committee (Safety, Cleanliness and Housekeeping) was formed with the help of an appointed Security Guard from the third party.

Politeknik METrO Tasek Gelugor is a renovated two-storey shophouses (Refer to Figure 1). The premise is divided into two sections which are administrative and academic blocks. Administrative

block consists of academic staff space and offices located at the ground floor and administrative offices located at the first floor (refer to Figure 2). The office layout in Politeknik METrO Tasek Gelugor is based on cubical workspace as shown (refer to Figure 3).



Figure 1: The Building of Politeknik METrO Tasek Gelugor



Figure 2: Stairs Connecting the Ground Floor with The Top Floor



Figure 3: POliteknik METrO Tasek Gelugor Workspace

PROBLEM STATEMENT

A pilot study was conducted where the results of the study found that 90% of respondents agreed that there were ergonomic hazards that might occur when they work in office. The result of early observations also found that the office space and staff workspace have the possibility of causing ergonomic hazards to Polytechnic staff. Additionally, no Health and Safety Officers are appointed to ensure that hazard risks in the Politeknik METrO Tasek Gelugor are monitored, prevented or controlled. Therefore, this study is conducted to identify existing hazard ergonomics, assess the risk rating for the hazard and determine the most critical ergonomic hazards that occur.

OBJECTIVES OF RESEARCH

The main objectives of this study are:
1. Identify the ergonomic hazards faced by Politeknik METrO Tasek Gelugor staff.
2. Assess the risk rating for identified ergonomic hazards.
3. Identify the high risk rating ergonomic hazards.

SCOPE OF RESEARCH

This study is to determine the risk levels related to ergonomic hazards without taking into account other out-sourced-hazards that may occur or exist among Politeknik METrO Tasek Gelugor staff. The scope of this study also focuses on management or office work and does not take into account other work scopes such as teaching and learning activities, dispatches, libraries and others.

LITERATURE REVIEW

Origin of the term Ergonomics

The term ergonomics was first used by Wojciech Jastrzebowski (Polish scientist) in 1857. Ergonomics come from two words, an ergon which means work or effort and nomos which means rules. According to International Ergonomics Association (IEA) (2003), ergonomics (or human factors) is the scientific discipline concerned with the understanding of the interactions among human and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance.

Legislations Related to Ergonomics

Third Objects of OSHA (1994): To promote an occupational environment for persons at work which is adapted to their physiological and physiological needs.
Operational Definition for the Potential Ergonomic Hazards
Table 1 provide operational definitions for the 10 ergonomic hazards used in the present analysis. This research has found that exposure to cold temperatures and vibration interact with several ergonomic exposure hazards to enhance the prevalence of ergonomic disorders among a variety of workers compared to reference workers not exposed to these hazards (Hagberg, Morgenstern,

& Kelsh, 1992).

Table 1: Operational Definition for the Potential Ergonomic Hazards

Potential Ergonomic Hazards	Operational Definition
Passive Postures (PP)	Continues pressure exerted on body parts.
Awkward Postures (AP)	Assuming one or more of the following positions performed for prolonged periods: extreme torso flexion, neck tilted, kneeling, semiprone, or extreme deviation of the hips relative to the shoulders.
Lifting Postures (LP)	Frequent bending and unaided lifting involving the waist, lower back, and knees.
Arm-transport Movements (A-TM)	Using the arms to move small or light objects, with arm movements limited to the upper torso.
Shoulder-transport Movements (S-TM)	Movements similar to, but larger and more forceful than arm-transport movements. The upper torso is repeatedly shifted during these movements.
Hand-wrist Manipulations (H-WM)	Manipulations used in: Operating lightweight power and hand tools, turning heavy objects, or assembling and handling medium-sized objects.
Finger Manipulations (FM)	Manipulations performed in: Fine precision work involving pinching actions, writing, pushing keys or picking up small objects.
Machine-paced Work (M-PW)	These exposures involve interactions between workers and machines. Under these conditions, workers typically perform repetitive tasks during intervals regulated by the machine process.
Equiment Monitoring (EM)	Worker must detect malfunctions and emergencies and take corrective action if necessary. These operations involve repetitive inspection tasks with little or no physical activity.
Light Glare (LG)	Adequate lighting must be provided. Where possible offices should have natural lighting. When artificial lighting is used it should be sufficient so as to avoid visual fatigue and prevent glare or reflection into the worker's eyes.

Musculoskeletal Disorders (MSDs)

Musculoskeletal disorders or MSDs are injuries and disorders that affect the movement of the human body or the musculoskeletal system (ie muscle, tendon, ligaments, nerves, discs, blood vessels and others). Other names for MSDs are "recurrent motion injuries", "recurrent stress injuries", "excessive injuries" and more where it refers to the single cause for musculoskeletal system damage - repetition and pressure. When employees are exposed to risk factors for MSDs, they begin to fatigue. When fatigue overcomes their body's recovery system, they experience musculoskeletal imbalance. From time to time, when fatigue continues to worsen and musculoskeletal imbalances persist, musculoskeletal disorders are increasing.

Definitions of Terms Used in The Risk Assessment

Table 2 shows the definitions of terms used in the risk assessment method.

Table 2: Definitions of Terms

Terms	Definitions
Hazard	Potential situations or resources can cause injury or illness to humans, damage to property and the environment.
Risk	The combination of possible occurrence of hazardous events within a certain period or situation and the severity of injury or illness to human health, property, environment or combination of consequences.
Danger	Human's exposure level to hazard.
Risk Assessment	The process of assessing the risks to safety and health caused by hazard at the workplace.

METHODOLOGY OF RESEARCH

This study is a descriptive study which is based on observation and quantitative method via questionnaire which aimed to discover inferences and the causal relationship. This study also provides an action plan to be taken by authorities as its outcome.

Ergonomic Hazard Identification

The following methods are used in identifying ergonomic hazards:
1. Observation - The observation was done by monitoring the ergonomics hazards and its risks based on the condition of office equipment and the employees' postures when engaging with their duties.
2. Document review - Records and reports of accidents and health are also very important in identifying hazards in workplaces such as medical report or employee complaints.
3. Questionnaires - Questionnaire forms are shown in Appendix B. There are three sections in the Questionnaire Form, Part A on Accident Risk, Part B on Ergonomic Hazard questions, while Part C on Musculoskeletal Disorders (MSDs) based on Nordic Musculoskeletal Questionnaire. The questionnaire was distributed to 27 respondents

Risk Assessment

Risk can be presented in variety of ways to communicate the result of analysis to make decision on risk control. For risk analysis that uses likelihood and severity in qualitative method, presenting result in a risk matrix is a very effective way of communicating the distribution of the risk throughout a plant and area in a work place. Risk can be calculated using the following formula: Relative Risk = Likelihood X Severity

1. Determining Likelihood of Occurrence of Hazard

Table 3: Likelihood (Guideline by DOSH)

Likelihood	Description	Rating
Most Likely	The most likely result of the hazard/event being realized	5
Possible	Has a good chance of occurring and is not unusual	4
Conceivable	Might be occuring at sometime in future	3
Remote	Has not been known to occur after many years	2
Inconceivable	Is practically impossible and has never occurred	1

2. Determining Severity

Table 4: Severity (Guideline by DOSH)

Severity	Description	Rating
Catastrophic	Numerous fatalties, irrecoverable property damage and productivity	5
Fatal	Approximately one single fatalty, major property damage if hazard is realized	4
Serious	Non-fatal injury, permanent disability	3
Minor	Disabling but not permanent injury	2
Negligible	Minor abrasions, bruises, cuts, first aid time injury	1

3. Risk Assessment

Table 5: Risk Assessment Matrix

SEVERITY	LIKELIHOOD				
	5	4	3	2	1
5	(25)	(20)	(15)	(10)	(5)
4	(20)	(16)	(12)	(8)	(4)
3	(15)	(12)	(9)	(6)	(3)
2	(10)	(8)	(6)	(4)	(2)
1	(5)	(4)	(3)	(2)	(1)

4. Risk Rating / Risk Level

Table 6: Risk Rating

Relative Risk Value	Risk Rating
15-25	High
5-12	Medium
1-4	Low

RESULTS

Ergonomic Hazard Identification

1. Observation

Observation found that workers often complain due to the pain around the neck, back and waist. This is due to sitting position for a long period of time with incorrect or static body postures as shown in Figure 4. Identified Ergonomic Hazard: Passive Postures (PP), Awkward Postures (AP), Finger Manipulations (FM) and Light Glare (LG).



Figure 4: Overuse, Poor Posture and Poor Lighting

2. Document Review

There are two medical cases that reflect condition caused by ergonomic hazards. Based on those cases, one medical report is produced as in Appendix A and the another is ongoing. Identified Ergonomic Hazard: Passive Postures (PP), Awkward Postures (AP), Hand-wrist Manipulations (H-WM).

3. Questionnaires

The population for this study is all staff of Politeknik METrO Tasek Gelugor with a total of 54 staff members. The sample was randomly selected and consisted of 27 staffs, which were 50% of the total population. This number is considered adequate for this study based on Dalen's suggestion (1979) which states that the minimum percentage for a sample of a study is 10% to 20% only. Of

the total sample, 25.9% had problems with the ergonomic conditions in the workplace. The findings found that 10 out of 27 respondents agreed that their workplace could cause the risk of accidents. They believe that places that can cause the risk of accidents are as shown in Table 7. The riskiest places are in the Workspace (Cubical) and Lecture Room.

Table 7: Places That Can Cause the Risk of Accidents at Politeknik Metro Tasek Gelugor

Places	Percentage
Workspace (Cubical)	40%
Computer lab	30%
Store Room	20%
Lecture Room	40%
Vault	10%
Office Stairs	30%

55.6% of the respondents said that no security-related documents were shown or told to them such as documents that had security measures to ensure that their work could be carried out in a responsible manner; safety-related regulations; help related to pregnancy, disability, work and so on; safety guide at work; specific regulations for carcinogenic substances, risk assessments, and so forth. Identified Ergonomic Hazard as shown in Table 8.

Table 8: Identified Ergonomic Hazard at Politeknik Metro Tasek Gelugor

No.	Identified Ergonomic Hazard	Likelihood
1.	Passive Postures (PP)	7
2.	Awkward Postures (AP)	7
3.	Lifting Postures (LP)	4
4.	Arm-transport Movements (A-TM)	5
5.	Shoulder-transport Movements (S-TM)	3
6.	Hand-wrist Manipulations (H-WM)	2
7.	Finger Manipulations (FM)	7
8.	Machine-paced Work (M-PW)	1
9.	Equipment Monitoring (EM)	2
10.	Light Glare (LG)	6

All respondents responded that their average hours of work in front of the computer ranged from 4 to 8 hours a day where this activity was a major contributor to the ergonomic hazard that occurred.

Risk Assessment

Findings for the relative risk as shown in **Table 9.**

Table 9: Risk Assessment at Politeknik Metro Tasek Gelugor

No.	Identified Ergonomic Hazard	Likelihood X Severity	Relative Risk	Risk Rating
1.	Passive Postures (PP)	3 x 7	21	High
2.	Awkward Postures (AP)	3 x 7	21	High
3.	Lifting Postures (LP)	3 x 4	12	Medium
4.	Arm-transport Movements (A-TM)	3 x 5	15	High
5.	Shoulder-transport Movements (S-TM)	3 x 3	9	Medium
6.	Hand-wrist Manipulations (H-WM)	3 x 2	6	Medium
7.	Finger Manipulations (FM)	1 x 7	7	Medium
8.	Machine-paced Work (M-PW)	1 x 1	1	Low
9.	Equipment Monitoring (EM)	1 x 2	2	Low
10.	Light Glare (LG)	2 x 6	12	Medium

The High Risk Rating Identified Ergonomic Hazard

Based on the risk assessment has been made, there are three high-risk ergonomic hazards, namely Passive Posture (PP), Awkward Posture (AP) and Arm-Transport Movement (A-TM) among Politeknik METrO Tasek Gelugor staff.

DISSCUSSION AND CONCLUSION

Based on the analysis, majority of the respondents responded that they spent most of their time using computers located at their cubical. Thus, the result has identified four prominent Ergonomic Hazards which are Passive Posture (PP), Awkward Posture (AP), Finger Manipulations (FM) and Light Glare (LG). Using the Relative Risk Formula, researchers were able to determine the risk rating of ergonomic hazards. According to the risk assessment rating, 3 ergonomic hazards scored above 15 which are Passive Posture (PP), Awkward Posture (AP) and Arm-transport Movements (A-TM). Passive Posture (PP) was found as one of the highest rating as stated by Bise, C. (2011) a slow injury can occur as the result of sitting or standing with poor posture (slumped forward) for hours, weeks, or years, slowly overstretching or tearing the outer part of a disc. Risk rating enables employer and employees to deploy preventive measures towards chronic illness caused by ergonomic hazards.

Out of the responses gathered, Politeknik METrO Tasek Gelugor has scored 21 out of 25 which is quite an alarming result. Based of the HIRARC Method (Hazard Identification, Risk Assessment and Risk Control) 21 is recorded as a critical level and requires immediate action to control the hazard as detailed in the hierarcy control. Actions taken must be documented on the risk assessment form including date for completion. Suggestions can be made based on the data gathered; to modify workstations for better working efficiency as stated by Kumari, A. (2018) to avoid the extreme postures adopted by respondents, modifications in the workstation were needed so that they could work with ease and the work could fit the worker rather than workers fitting to the work

According to the accumulated data, it shows that ergonomic hazards do exist at Politeknik METrO Tasek Gulugor and needs immediate action to avoid future circumstances. On the other hand, Politeknik METrO Tasek Gelugor should practice Occupational Safety and Health by forming an OSH Committee to ensure the compliance towards Guidelines on Occupational Safety and Health in The Office produced by Department of Occupational Safety and Health Ministry of Human Resources of Malaysia.

Suggestions for Future Studies

- Similar study can be conducted to all polytechnics and educational institutions.
- This study can be extended to other occupancy hazards as listed in Guidelines on Occupational Safety and Health in The Office
- Broader study scope such as towards students and auxiliary staff.

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APPENDIX A
Staff Medical Report

Authorised claims administration representative of AIA Bhd.

AIA Health Insurance Sdn. Bhd. (690491-T)
Menara AIA 99 Jalan Ampang
50450 Kuala Lumpur

T : 603-2057 88
F : 603-2058 01

AIA C 0000

GUARANTEE LETTER *(Individual)*
☐ Co Takaful ☐ Day Procedure

Date: Mar 27 2018

Reference: T0000017903

Hospital: KPJ PENANG SPECIALIST HOSPITAL

Attention: Admission Officer

Person Covered: NURUL LINDA BINTI ABDUL RAHMAN **NRIC/Birth Cert. No:** [redacted]

Certificate No: S1700[redacted]

Product code : APMDL2

Admission Diagnosis 1: De Quervain disease left wrist

Admission Diagnosis 2 :

Admission Diagnosis 3 :

Date of Admission: Mar 27 2018 **Expected date of Discharge:** Mar 28 2018

This is to acknowledge that **AIA Health Services Sdn. Bhd.** undertakes to make payment on behalf of **AIA PUBLIC Takaful Bhd.** for the hospitalization of the above **Person Covered NOT EXCEEDING** the following limits:

Room & Board (for 2 days)	RM	150.00 per day
All Medically Related Bill(s) up to	RM	3500.00

Please Note

1. This Guarantee is valid for hospital admission for the above stated treatment and date specified in this letter.
2. For all additional services, extended length of stay and total bills exceeding this limit, we are to be informed immediately for further review. We will not accept responsibility for excess charges imposed without prior consultation with us.
3. Kindly be advised that this Guarantee Letter does not include the following charges:
   - Telecommunication, newspapers & postage
   - Vitamins & food supplements
   - Admission pack
   - Medical Report fee
   - Extra food & beverage
   - Extra daily room & board charges
   - Special aids/braces & appliances equipment

   As such, kindly collect the above charges from the patient directly prior to discharge.

Thank You

Case Coordinator : MOHAMAD RIDZUAN DI BIN BAHRUM
Date/Time : Mar 27 2018 2:35PM
Cc: SR FATIMAH BINTI KAMARUDIN , BMI POSSIBLE SAFIYYA 55
< FINAL GL>

APPENDIX B

Questionnaire based on *Nordic Musculoskeletal Questionnaire*

Soal Selidik: Penilaian Hazard Ergonomik di Tempat Kerja
(Tandakan [/] pada kotak yang berkenaan)

Sila isi borang soal selidik penilaian tempat kerja ini untuk semua fungsi kerja anda sama ada di pejabat, makmal komputer, bilik kuliah, bilik mesyuarat, perpustakaan, stor dan sebagainya. Rujuk Lampiran untuk memahami definisi operasi bagi hazard ergonomik yang dinyatakan. Soal selidik harus diisi secara individu.

BAHAGIAN A – RISIKO KEMALANGAN

1. Adakah TEMPAT KERJA anda boleh menyebabkan berlakunya RISIKO KEMALANGAN?

   ☐ Tidak

   ☐ Ya

2. Di manakah tempat yang boleh menyebabkan risiko kemalangan berlaku :
   (jawapan boleh lebih dari satu)

   ☐ Di ruang kerja (cubicel)

   ☐ Di dalam Makmal Komputer

   ☐ Di Stor Penyimpanan

   ☐ Di Bilik Kuliah

   ☐ Lain-lain. Sila Nyatakan : _____

3. Adakah seberang dokumen berkaitan keselamatan ditunjukkan atau diberitahu kepada anda seperti dokumen yang mempunyai langkah keselamatan bagi memastikan bahawa kerja anda dapat dilaksanakan dengan cara yang bertanggungjawab; peraturan yang berkaitan keselamatan; pertolongan yang berkaitan dengan kehamilan, kecacatan, kerja dan sebagainya; panduan keselamatan di tempat kerja; peraturan khusus untuk bahan karsinogenik, penilaian risiko, dan sebagainya.

   ☐ Tidak

   ☐ Ya

BAHAGIAN B – HAZARD ERGONOMIK

1. Adakah anda mempunyai sebarang masalah dengan KEADAAN ERGONOMIK di tempat kerja anda?

   ☐ Ya

   ☐ Tidak

2. Adakah masalah anda berkaitan dengan hazard ergonomik disebabkan oleh :
   (jawapan boleh lebih dari satu)

   ☐ Postur Badan Pasif (PP)

   ☐ Postur Badan yang Janggal (AP)

   ☐ Postur Mengangkat (LP)

   ☐ Pergerakan Melibatkan Tangan (A-TM)

   ☐ Pergerakan Melibatkan Bahu (S-TM)

   ☐ Manipulasi Pergelangan Tangan (H-WM)

   ☐ Manipulasi Jari (FM)

   ☐ Kerja Menggunakan Mesin (M-PW)

   ☐ Pemantauan Peralatan (EM)

   ☐ Kurang Sumber Cahaya (DL)

3. Sekiranya anda bekerja di hadapan komputer, purata berapa lama sehari anda berbuat demikian?

   ☐ 1 – 3 jam

   ☐ 4 – 8 jam

   ☐ Lain-lain, Sila Nyatakan : _____

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Compact X Ray Film Developer

S.B Mustapa[1, a], A.S Muhamad[2,b] and M.S Abdul Latib[3,c]

[1,2,3]Department of Aircraft Maintenance, Politeknik Banting Selangor

Persiaran Ilmu, Jalan Sultan Abdul Samad, 42700 Banting. Selangor, MALAYSIA

[a]shazana@polibanting.edu.my, [b]amaluddin@polibanting.edu.my, [c]suffian@polibanting.edu.my

Keywords: Non-destructive testing; radiographic testing; x-ray film developer; aerospace NDT

Abstract. Compact X ray Film Developer is primarily design for the Non-Destructive Testing (NDT) personnel working in line maintenance or remote area where immediate results are needed when performing radiography testing. Due to its mobility, it is also use to demo film processing to students. This product is portable and easy to use at the maintenance site to process the film after performing radiography testing. Therefore, the NDT personnel can save time where conventional way to process film require the personnel to find a dark room to do film processing.

The Compact X-ray Film Developer is portable and can be carried anywhere by maintenance NDT personnel and design to be used by mainly in aerospace industries and oil & gas industries. It is designed to be use on site as it is easier compared to using the conventional darkroom. For conventional way of x-ray film processing, the NDT personnel are required to take a shot and develop the film to confirm whether the image quality is acceptable. If it is unacceptable, another shot is required until it is satisfactory. Most of sites that require radiography testing does not have dark room to process the film. This is where; The Compact X-ray Film Developer came in handy.

The limitation of this product is it is design to be small for portability thus, large film cannot be processed. Since the product is compact, processing x-ray film would be difficult compared to using conventional darkroom. Processing film using this product will also cause wastage, as the chemical used can only be use one time only.

This product currently used as teaching aid for PBS students. It is also currently be upgraded to comply with BS EN ISO 11699-2:2011 Non-destructive testing – Industrial radiographic films – Part 2: Control of film processing by means of reference values. Overall, this product increase the productivity rate and minimize the requirement for work force.

Introduction

The x-ray films for general consists of an emulsion-gelatin containing radiation sensitive silver halide crystals, such as silver bromide or silver chloride which make the x ray films sensitive to light. Typically, this x ray films process are manual processing begins with darkroom that are located at the specific place and sometime far away from the exposure area and will create problem especially when the process to get the result from the x ray films need to be done in-situ .This conventional darkroom method still use by industry such as AIROD, TUDM, and SAE.

In current situation, the maintenance crew on site have problem to find a standard darkroom

to process the X ray films that are located in a central location and or nearest distance from the exposure area. The maintenance crew at the site has to bring the x ray films to the darkroom that are sometime located far away from the exposure area and will damaging the x ray film before reach the darkroom. It will use a lot of space to create the darkroom at the site that are near to exposure area and long-time taken to create that room will make this project take longer time to finish.

This is parts of the reason this product is develop. It is vital to process an X-ray film after it has been exposed, in order to have a visibly permanent radiographic image that can be kept for years without deterioration. Processing forms a visible image from a latent image. Processing incorporates countless procedures to form a permanent image, such as developing, rinsing, fixing, washing and drying procedures. By using Compact X-ray Film Developer, all of these processes can be performed right at the site without jeopardizing the quality of the film.

Methodology

Film handling

X-ray film should always be handled carefully to avoid physical strains, such as pressure, creasing, buckling, friction, etc. Whenever films are loaded in semi-flexible holders and external clamping devices are used, care should be taken to be sure pressure is uniform. If a film holder bears against a few high spots, such as on an un-ground weld, the pressure may be great enough to produce desensitized areas in the radiograph. This precaution is particularly important when using envelope-packed films.

Important precaution is to avoid drawing film rapidly from cartons, exposure holders, or cassettes. Such care will help to eliminate circular or treelike black markings in the radiograph that sometimes result due to static electric discharges. The film should never be bent. When carrying, the film should only be handled at the edges to avert abrasions and finger prints

Processing quality control

To ensure good quality of X-ray film is produced, there are may variable need to be control such as temperature of the solution, ambience temperature, chemical activity, and exposure time of film to the processing chemical.

One of the most important in processing quality control is to set up the correct film processing condition. This may include temperature, time replenishment rates and type of chemicals use. Normally, a recommended processing conditions is supplied by the manufacturer.

A good processed film should not be under processing or over processing. It should always be processed in a precise condition. Under processing and over processing can interfere with the x-ray film sensitivity.

During the development of the product, several test film is processed using this compact x-ray

film processor to detect changes during the process. All film are exposed to a fixed amount of light which is achieved by using sensitometer. It is crucial to ensure the quality of the film is at par with the quality used in industry.all the film is checked for its density by using densitometer. The value obtained then recorded in process control chart.

By taking both film handling and processing quality control into account, this product is design by ensuring no physical strain are put on the film except for the clip to attach the film to the processing frame. The product itself is made from pitch black acrylic and sealed at every attachment to avoid any white light from entering the processing box.

Operation of compact NDT x-ray film processor

This is product is operated fully manual and there have no any automated machine has installed to it. The x-ray film should always be handled carefully to avoid physical strains, such as pressure, creasing, buckling, friction, etc. Whenever films are loaded in semi-flexible holders and external clamping devices are used, care should be taken to be sure pressure is uniform. To process the film are using 5 chemical solution such as developer, stop bath, fixer, procure and water.

Procedure of processing the x-ray film:

1. Firstly, take out the film from the envelope. Then, clipped the film to the hanger at the edge of the film.
2. Put the chemical solution (developer) into the tray. Immerse the film into the developer solution in 4-5 minutes at 20 degree Celsius and shake the film. X-ray film, which is controlled by the mobile holder that can move up and down, left, and right. Make sure no light can through into the box.
3. After 5 minutes, take out the x-ray film from the tray while push up the holder. Therefore, the film are moves up of the box.
4. Then, change the solution and repeated the step 2. Immerse the film in the fixer solution in 8 minutes at 20 degree Celsius and shake the film.
5. After that, take out the film from the tray and wash it using the water.
6. Lastly, let the x-ray film dry by itself.

Result and discussion

Currently, the Compact X Ray Film Developer is use in classroom at Politeknik Banting Selangor as a teaching tool to demonstrate the x-ray film processing without using conventional darkroom that is costly and required extra space and time to be developed.

Below are the results after processing x-ray film using developed product and an example of film developed using non-standard processing area.



Figure 1: non-exposed film developed in standard industrial dark room



Figure 2: non-exposed film developed using Compact X Ray Film Developer



Figure 3: Exposed film developed in non-standard processing area

Normal non-exposed film will become clear and transparent with a hue of greyish when process. Figure 2 shows the example of standard non-exposed film developed in a standard industrial dark

room. As comparison, figure 3 show the same standard non-exposed film but processed in the Compact X Ray Film Developer. The quality is the same, which shows that the product is reliable to match the industry standard.

In figure 4 shows the exposed film developed in non-standard processing area. The film become pitch black due to exposure to ambient light which converting silver ions on the film into metallic silver, which causes each processed grain to become black. This exposed silver compound will not wash away during developing process. No image produce due to blackened exposed silver compound does not washed away during development process.

While in figure 5, same standard, and exposed film used in figure 4 is processed in the Compact X Ray Film Developer. Different image produced as unexposed silver compound on the film is washed away during developing, leaving the clear areas through which light passes.

CONCLUSION

This product will benefit the industry in term of helping in reducing work hours. It will also benefit the students as instructor may demonstrate in classroom instead of using conventional darkroom, which is sometime can be difficult to be found on training school.

For future study, more feedback from the industry player will be taken and the product itself is to be design to be more mobile with acceptable weight to carry around. To make it foldable will be an advantage.

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A Review of Single Bubble Dynamics during Pool Boiling of Nanofluid

S.N. Deraman[1,a], M.Z.A. Rehim [2,b] and M.R.M. Nawi[2,c]

1Politeknik Sultan Salahuddin Abdul Aziz Shah, 40150 Shah Alam, Selangor, Malaysia

2Universiti Teknologi Mara (UiTM), 40150 Shah Alam, Selangor, Malaysia

asyarifahnoor@psa.edu.my; bkubair_91@yahoo.com; cmuhad@salam.uitm.edu.my

Keywords: Bubble dynamic; Pool boiling; Nanofluid; Critical Heat Flux.

Abstract. This paper review the development of boiling in nanofluids research from the year of 2003 until present. There is bulk of occasion's potential for bubble dynamic of nanofluid to become nanotechnology in cooling system such as in electronic device, automotive and etc. There are still many conflict of fundamental knowledge about this field area understanding such as Critical Heat Flux (CHF), Heat Transfer Coefficient (HTC), Thermal conductivities, Deposition Concentration and etc. This paper also focusing on pool boiling only since many research is done in pool boiling. The definition of nanofluid is concisely given and heat transfer performance factor explained in specifics. Overall it can be concluded that the consumption of nanofluid can improve thermal conductivity, bubble disengagement or even critical heat flux.

Introduction

Bubble can be defined in many contexts but in general, bubble is a spherical shaped containing any gas acted as a gap in the liquid, produced from heat energy due to temperature difference in two different materials, for example a hot steel dipped into cold water [1,2,3,4]. When the two materials with the temperature difference are in contact, the cold fluid is vaporized. From the process, bubble is produced and it is called boiling phenomenon [5].

$$\Delta T = T_H - T_{sat} . \quad (1)$$

The difference in temperature is called heat flux, q', where heat energy is transferred to achieve equilibrium state, i.e. the condition where the temperature between the two materials are the same. Equation (1) is the formula used to calculate the difference between temperatures which is used to calculate the heat flux, which usually used in boiling process.

There are 3 stages in boiling process, which is nucleation, growth and disengagement from heater surface. Boiling process also categorizes into two situation process. First situation is pool boiling, where the boiling process happen in natural situation without any external force to catalyst the heat transfer performance. Secondly is forced convection or flow boiling where the boiling process happen in pipe or any kind of flow situation. There is pump or external force to boost the heat transfer process. Bubble in boiling process can merge or coalescence into each other, it is called bubble interaction [5].

Nanofluid. Nanofluid is a fluid that consist nanometer-sized particles called nanoparticles. In medical term, the nanoparticle is tiny matter that act as overall units from its movement and characterize [6]. The size of nano particle can be range from 1nm to 100nm. Nano particles can be made from the metallic parent material such as copper, magnesium, gold, alganite and silver

[7]. Nano particles in gasses form characterised of matter from liquid to gasses which involved the process of condensation or evaporation. Nanofluids can also be distributed as splash into the air by pressurized the nano liquids that later can transform into nanogasses [8,9].

Combination of boiling process and nano technology predicted to increase the performance of heat transfer process or cooling system in many application such as electronic cooling system. Studies are done to acquire more information about nanofluids as working fluid in boiling process like metallic powder [10,11], non-metallic [12], and magnetic [13]. Mix refrigerant or HFE7000 refrigerant is used as working fluid in boiling process. High speed camera is used to get the heat transfer performance by capturing physical images and infrared camera to get heat distribution in boiling process [14]. The factor that involve in nanofluids in boiling process is deposition [15], heat flux [16], critical heat flux [17], nanoparticle size [18] and heater material and heat transfer coefficient [19].

Thermal conductivity of nanoparticles. Thermal conductivity is the essential property of the material. It is an approach that disguises the fundamental processes responsible for the dissemination of heat [20]. The heat transfer capability of nanoparticles is higher than base material, due to the properties of nano particles. If the volume fraction of nano fluid increase, the thermal conductivity performance also increased. The presence of nanoparticles boosted up heat transfer resulting from the oscillation motion of nano particles in the working fluid [21]. Comparison made between alumina nanofluid and silica nanofluid, as an example, shows that the alumina nano fluid boosted up the thermal performance but the silica nanofluid is degenerated [22]. The parameters effect the thermal performance of nanoparticles is volume fraction, surface area, temperature, thermal conductivity of nano particles and base fluid and shape of nanoparticles [20]. Table 1.0 below summarize the improvement of performance of nanofluid with the presence of nano particles in pool boiling.

Table 1.0: Summary of boiling experiment during pool boiling of nanofluid.

Author	Heater material	Nanofluid and Concentration	Nanoparti c-le margin	Analysis method	Deterioration	Improvement
Das, 2003	Stainless steel	Water-Al_2O_3 and 1%,2%and 4%	10-100 nm	High speed / infrared camera analysis	Concentration high make low boiling performance	Heat transfer with smaller diameter tube
Das et al., 2003	Cylindrical cartridge heater	Pure water- Al_2O_3 and 1%,2% and 4%	nanometer	Systematic error, regression analysis.	Increase heat flux	Thermal conductivity, convective process via particle distribution
Golubovic et al., 2009	NiCr resistance wire	Al_2O_3 – Nano Dur, Al_2O_3 – Nano Arc, Bismuth Oxide and concentration change due to CHF increasing	46nm, 22.6nm, 38nm	Experimental about concentration, size and type on critical heat flux experimentally	Static surface contact angle	Critical Heat Flux (CHF).
Fei Duan, 2009	Guard heaters	Water - Al_2O_3 and 1%,2%,3%,4% and 5%	25nm	THW (Transient Hot Wire)	Viscosity	Thermal conductivity, Concentration
Harish, et al., 2011	Aluminum disk, NiCr wire	Distilled water - Al_2O_3 and 0.5%,1%,2%	Less than 50nm	Optical roughness measurement, Uncertainty analysis	Boiling heat transfer	Boiling heat transfer
H Amirifar et al., 2012		Silica/water, Al_2O_3/water and concentration <1%		Stimulation and experimental comparison data		Alumina more good than silica result
Kole & Dey, 2012	Wire heater	Ethylene glycol (EG)-ZnO-nano- fluids and 1%, 2%, 3%, 3.75%	(ZnO: 0.0375, graphene oxide 0.04) volume fraction	THW(Transient Hot Wire) method	Viscosity independent	Thermal conductivity and heat transfer coefficient
Sheikhbah ai et al., 2012	Ni-Cr wire	Fe_3O_4/ethylene glycol water and 0.1%	50nm	Experimental on electric field	Heat transfer coefficient	Critical heat flux
Xu & Xu, 2012	Platinum film, gold pad, Pyrex glass, silicon wafer	de-ionized water - AQO3 and 0.2%	40 nm	Micro channel testing in flow boiling	Pressure drop	Heat transfer
Abedini, et al. 2013		Water – Al_2O_3 and 1% to 2%, and 4%	30nm	Numerical investigation	Inlet mass flow rate	Heat transfer coefficient
(Diana, 2013)	Horizontal wire heater	HFE7000 - Al_2O_3 and 0.1%, 0.5%, 1%	27nm	Boiling in different gravity levels	Nucleate boiling heat transfer	Heat transfer coefficient
Ganapathy & Sajith, 2013	rough and smooth	Distilled water - Al_2O_3 and 0.5%,1%,2%	50nm	Semi-analytical model	Boiling heat transfer in nanofluid	Boiling heat transfer in base fluid with nanoparticle-coated
S. W. Lee, et al 2013	Pre heater and heater	Water - graphene oxide (GO) and 0.01%	1nm	Macroscopic and SEM / TEM observation and contact angle measurement	Liquid film thickness	Critical heat flux
T. Lee et al., 2013	Pre heater	Pure water - Fe_3O_4 (magnetic nanoparticle) and 1ppm	25nm	Characteristic magnetic nanofluid	Deposition	Critical heat flux
Mourgues, et al, 2013	SS-304 sample	Pure water – ZnO and 0.01%		DIW(de-ionized water), Nanofluid, nanofluid coating	Base fluid (Pure water)	Critical heat flux
Reza et al., 2013	Copper block	Alumina – water - ethylene glycol and 0.05%, 0.1%, 0.25%, 0.5%, 0.75%, 1%	20-30nm	Investigation experimentally	Deposition	Heat transfer coefficient, optimum volume concentration
Seon & Hwan, 2013	Plain copper heater	Water – Alumina		Visualization, High speed imaging	Film boiling	Critical heat flux
Shahmora di, et al, 2013	Copper bar	Distilled water - Al_2O_3 and 0.1, 0.05, 0.02, 0.002, 0.001%	40nm	Atomic Force Microscopic (AFM) and SEM (Scanning Electron Microscope)	Heat transfer coefficient	Critical heat transfer (CHF)

Discussion

Critical heat flux. Heat flux can be defined as the rate of heat energy that has been transferred from one medium to another medium such as metal to metal. CHF is boosted when the concentration of nanoparticle is increase. The presence and the type of nanoparticle, the deposition of nanoparticle and evaporation (vapor generation decline) are factors affecting the CHF value [12,23,24,25]. There are two kind of nanofluids, which is covalent and non-covalent. In the covalent nanofluids, the major causes of CHF boosted is declination of heat resistance. But in non-covalent nanofluids, little of deposition on heater surface causes the increment of CHF value. It also state that, increasing of nanoparticle size create a reduction of CHF value [26].

Deposition, concentration, nanoparticle size, wettability and roughness surface. All factors such as concentration, deposition, nanoparticles diameter size, surface roughness, average surface roughness, number of activation nucleation cavity area, and performance of heat transfer coefficient are interrelated with other. The presence of nanoparticle (concentration) in nanofluids can make the effect at the heater surface and implicit of nanofluids. When concentration of nanofluids increased, the boiling performance is declined. The concentration at 5% can make viscosity increase up to 63% with the condition room temperature [27,28,30,31,32]. The relationship of concentration nanofluid is directly propotional with flow resistance. Nanofluids concentration can causes the bubble disengagement frequency and bubble disengagement size increase [33].

During disengagement, the frequency of bubble is declined but the size of the bubble is incline at higher nanofluid concentration. Those factors changes however, not affected by the nanoparticle size. Nucleation site density also effect by concentration, experiment study said that from the 0.025 vol% concentration, the value of nucleation site density is slowly incline along the escalation of concentration. Surface wettability also effect at 0.025vol% greater. The factor of surface wettability, concentration and nanoparticle size is directly proportional. When the concentration increased, the size nanoparticle also increase and causes the surface wettability to increase [34,35].

Conclusion

In conclusion, CHF in nanofluids is about boiling process. The factor of increment or deterioration of CHF are depending on condition of situation, nanoparticle size, concentration, surface criteria, roughness, wettability, and etc. Many researchers focus on heat transfer performance of boiling process but there are many things researchers to explore and creating new fundamental in bubble dynamic.

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The Effect of Pack Carburizing on Different Shape of Mild Steel

M. J. Nor Shaufina[1, a] and M. M Soffi[2,b]

[1,2]Polytechnic Sultan Haji Ahmad Shah, Kuantan, Malaysia.

ashaufina@polisas.edu.my, bsoffi@polisas.edu.my

Keywords : mild steel; carburizing; different shape; surface; hardness.

Abstract. This paper evaluated the effect of heat treatment through carburizing process, acknowledged the improving of hardness property on mild steel. The previous study on the carburizing of mild steel is focusing on effect of carburizing temperature, soaking time and quenching media used during the heat treatment in order to investigate the hardness of mild steel. Meanwhile, this study investigate the relation of hardness and geometry of the mild steel specimen after heat treatment. This study demonstrate how the parameters of various shape of low carbon steel specimen affected by the hardness after being heat treated by carburizing process. For the above purpose, mild steel was prepared by machining into three different shape. Then, carburizing take place at carburizing temperature of 950 °C with soaking time of 30 minute. After that, the carburized specimen were quenched in oil medium. The specimen then was tempered at tempering temperature of 550 °C and allow to cool at room temperature. Carburizing is well-known as the process of producing the mild steel that having a hard outer case surface and tough inner core. Thus, the effect of hardness on mild steel surface was only measured on the case of specimen. The hardness testing is performed using the Brinell hardness test with the ball indenter. The results reveals that the hardening process through carburizing is greatly affected the properties like hardness on mild steel. The hardness of mild steel is increase after it was subjected to carburizing. Mild steel with edges and irregular corner has higher hardness reading than the regular round shape specimen. As the hardness properties is improves according to the results, other properties may also be investigates by continuations of study in this topic.

Introduction

Low carbon steel is widely used in manufacturing industry, mainly in metal components fabrication. The rapid development in the low carbon steel production is because of its properties which is soft and easy to be processed to the desired shape. Metal processing can be classified as joining, machining, casting and forming. From these four types of metal processing method, low carbon steel is compatible with three of them except casting. Low carbon steel is easily welded, machined and formed because of its lower carbon content which result in low hardness, more ductile and malleable metal. Therefore, most of metal component material applications uses low carbon steel in the early stage of manufacturing and fabrication process. However, before the metal component that has been fabricated from low carbon steel can be effectively allowed to perform its service, it has to be adequately hardened or treated to improve its properties.

In Department of Mechanical Engineering (DME), POLISAS, all of the raw steel supplied for

the purpose of student workshop practice consumption are low carbon steel with less than 0.25% Carbon. Workshop practice involve all of metal processing work such as machining, joining and casting while for the purpose of mechanical final project fabrication, forming are also widely used by the students. On these practices, student produce metal parts from low carbon steel and most of the produced parts are not practically and commercially valuable because one final step of low carbon steel parts fabrication are not being introduced which is hardening process. Because it is a low carbon steel with less than 0.25% carbon, conventional heating, quenching and tempering will surely not capable to produce an improved, practical and commercially valuable final parts because of the incapability to form martensite upon quenching. Therefore the finished low carbon steel parts must be carburized before quenching and tempering.

With all of the parameter required for carburizing, there are various equipment and asset that can be used or modified to heat treat low carbon steel with 727-1400^{0}C requirement , tempered low carbon steel with 400 – 723^{0}C or even melt the steel with approximately 1493 - 1538^{0}C in DME, POLISAS . Among them are induction furnace with 1100^{0}C capacity in metallurgy laboratory, Diesel flame furnace with 800^{0}C capacity and portable propane gas blower furnace with 900^{0}C capacity in foundry workshop and various welding process that can be used to melt the steels such as arc welding and oxy-acetylene gas equipment in welding workshop. Student metal parts fabrications on workshop practice session are vary in sizes and shapes. Those metal parts are luckily not a large scaled parts such as crankshaft or engine casing but smaller parts such as plug and body, screws, bolts and nuts, plates joint, casting products, chess pieces, motor couplings and so on including final project parts and components fabrication. According to equipment availability, pack carburizing are suitable since it only require charcoal powder, a ceramic or steel sealed container and an induction furnace. To examine the capability to improve properties of various size and shape of low carbon steel parts and components, a testing and experiment should be performed to observed and analyzed the effect of pack carburizing process to the hardness of different shape of low carbon steel or mild steel.

Problem Statement

Product of low carbon steel is used to produce various mechanical component such as shaft, gear, spindle, and camshaft. The component produced is machined and shaped first because low carbon steel in the actual state exhibit soft and ductile properties. Then the machined and shaped component will undergo the heat treatment process so that the surface is hardened and permits good durability performance during in service. Mechanical component failure is usually occur on the cutting and forming tools rather than any other component. The failures occur at critical part such as corner and between gaps of component. The other factor that is contribute to the component failure is loading applied to the component during in service. In engineering, similar materials are required to possess very strange combination of properties whey they are subjected to different conditions of working. They may have to be subjected to twisting, impact loading, as well as to withstand various stresses like tensile, compressive and shear in different places of their utility [3]. Excessive loading in long term condition affect the tools to be fatigue and decrease its performance thus tools is expose to the wear and crack. Regarding to this, the needs to study the hardness profile at the critical area of component is crucial in order to investigate the reason and relation of hardness and other properties to the failure of critical part of the component. Since the various shapes of specimen is treated to the heat treatment for hardening purpose, it is necessity to study how heat

treatment mainly the carburizing affect the various shape of specimen. The controlled heating and cooling processes used to change the structure of a material and alter its physical and mechanical properties [6, 7].

Objectives

The objective of this study is to determine the effect of carburizing process to the mild steel specimen which is comes in different shape. Shape that has been choose in this study is round, equilateral triangle and square. Heat treated with carburizing is proved to have the ability in alter and improve the properties of mild steel. The effect of carburizing will be is assessed based on the hardness profile on the cross sectional area of specimen.

Literature Review

The general hardening process for ferrous metal and its alloy are by conventional heating and quenching followed by tempering process. The main element in ferrous metal or alloy composition that allowed the hardness improvement is carbon. Carbon plays an important role to improve hardness properties of ferrous metal or alloys by creating an interstitial reinforcement compound in intermetallic state of Iron Carbide (Fe_3C) to the crystal structure of the metals. This reinforcement prevents crystal slip or dislocation inside the metal structure which is the main cause of low strength in metal. The arrangement of this reinforcement may be further improved by producing diffusionless transformation of carbon inside ferrous metal structure through heating and quenching followed by tempering process. During heating process, a ferrous metal must be recrystallized by heating to above upper critical temperature so that the austenite microstructure will start to form on the grain boundary of room temperature ferrite, pearlite or cementite microstructure. In the formation of austenite, the FCC crystal structure formation open more space for carbon atom to interstitially enter the system either diffused from BCC pearlite or cementite or some of free graphite states during its room temperature condition or from outside of the system such as in carburizing process. Then, after the diffusion of carbon is given some time to completely diffused, the high temperature austenite with saturated carbon atoms concentration in its large space or voids of FCC lattice is rapidly cooled or quenched to produce diffusionless transformation. Diffusionless transformation are expected to prevent the carbon atoms from getting out of the austenite microstructure into newly formed stable microstructure of pearlite or cementite. The carbon are then trapped in iron carbide compound inside new microstructure called martensite which is austenite that doesn't have enough time to transform into ferrite, pearlite or cementite. Martensite however does not retain FCC crystal structure of austenite and also does not rearrange to form BCC crystal structure of ferrite, pearlite or cementite but its formed new distort structure called Body-centered tetragonal (BCT) crystal structure.

BCT are formed by the reorientation of atoms at the face of adjacent FCC crystal structure to produce new crystal lattice which is smaller in size and appear as a distort BCC crystal structure. It is different than BCC or FCC that has a cubic shaped structure where all of the three axis are similar in size, BCT has a reduced size of tetragonal shaped where it has square cross section on one side and rectangular cross section on another side. BCT retain austenite composition at

room temperature by the reorientation of FCC and are then called martensite, an unstable, hard and brittle structure. To reduce the brittleness, the carbon trapped inside BCT martensite must be reheated and it will gradually decomposed into pearlite which make the microstructure less brittle. The final microstructure of completely heated, quenched and tempered low carbon steel are then called tempered martensite because they still retain BCT microstructure.

The main element that promotes the formation of martensite in steel hardening process are carbons. Unfortunately, for low carbon steel with less than 0.25% carbon, most of the situations, martensite formation are not likely to occur except for some of very small steel parts such as steel wire. The reason is that, upon heating of low carbon steel, BCC alpha ferrite and pearlite are transform into austenite and there was inadequate amount of carbon in pearlite to diffused into austenite lattice and therefore the austenite condition is then far from saturated carbon condition that is actually required. The lack of carbon make it unable to promotes reorientation of FCC austenite into BCT martensite after it is been rapidly cooled, instead, the microstructure of ferrite and pearlite will reappear as before the hardening process begin. That is why, for low carbon steel, the best heat treatment is carburizing process which involves diffusing carbon into low carbon steel allow the low carbon steel to form a high carbon steel surface[12]. Low carbon steel will absorb carbon from out of the system into its high temperature austenite microstructure. After carburized, the steel must be harden by quenching and tempering to produce a uniformly hard surface together with adequately ductile core for tougher condition that is desired for final steel parts properties.

Carburizing, also referred to as case hardening, is actually a heat treatment process that produces a surface which is hard, resistant to wear, while maintaining toughness and strength of the core. Carburizing is one of the most widely used surface hardening [12]. This treatment is commonly applied to low carbon steel parts after machining, forming or joining, as well as high alloy steel bearings, gears, and other components. There are generally five methods of carburizing which are conventional or traditional carburizing, packed carburizing, gas carburizing, vacuum carburizing and liquid carburizing. In an oldest, traditional and conventional carburizing process, low carbon steel parts is heated in fire produced from woods and charcoals which is rich in combustion product of carbon dioxide, CO_2 and carbon monoxide, CO which will become a surface hardening agent by entering the austenitic structure of low carbon steel part surface. It is then quenched to trap the carbon inside the low carbon steel surface in BCT structure of martensite. In pack carburizing, low carbon steel parts are put in a sealed ceramic or steel container covering with powdered coke, hardwood charcoal, or graphite so that the part does not touch the container wall. Carbon monoxide is given off by coke, hardwood charcoal or graphite powder and will be forced into the low carbon steel parts surface inside the sealed container and after being heated inside an induction furnace. It is then remove from furnace and let to cool inside the container to room temperature. After that, the low carbon steel parts with rich saturated carbon on its surface must be further heating and quenching followed by tempering process to obtain improved final properties. In gas carburizing, pit furnace or sealed atmospheric furnace must be used. These furnaces have an inlet to channel in carbon containing gas during heating of the low carbon steel parts inside it. Most of the gas uses in gas carburizing are CO_2 and methane, CH_4. Other than that propane C_3H_3, and butane, C_4H_{10} may also be used as the sources of carbon. Gas carburizing is one of the most successful and popular carburizing technique used when large quantities of parts are required.

In vacuum carburizing process, air inside the furnace is vacuumed out so that the low pressure environment inside the furnace will be oxygen-free. A single component environment containing uncomplicated gaseous hydrocarbon like methane is used. Since the environment used for heating is oxygen free, the carburizing temperatures can be considerably increased without surface oxidation. The higher temperatures increase the carbon solubility and the diffusion rate. Thus, the

time necessary for case depth is minimized. In liquid carburizing, the low carbon steel parts are submerged in a liquefied carbon rich environment. The main component in such baths is cyanide. However, safety issues have led to baths that are non-toxic that accomplish similar results. The components are held in a molten salt that introduces carbon into the metal. Carbon is diffused inwards producing a hardened case by rapid quenching. The case produced by carbon diffusion is similar to that produced by gas carburizing. Cases formed by liquid carburizing have low nitrogen and high carbon content.

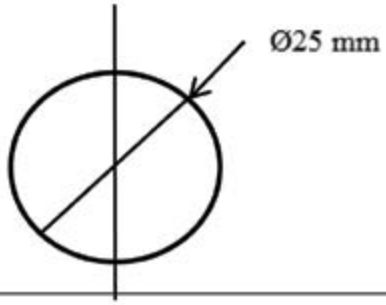
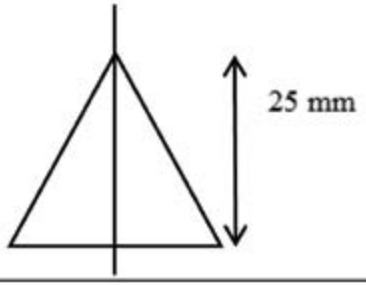
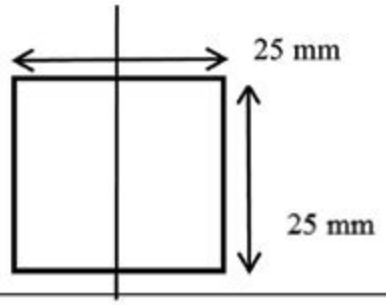
Methodology

Materials Selection. The material used for this study are mild steel AISI 1020. The chemical composition of mild steel is depicted in the Table 1. Mild steel AISI 1020 was sourced from Department of Mechanical Engineering machining workshop in POLISAS.

Element	C	Mn	P	S	Fe
Wt %	0.2	0.35	0.04	0.05	99.0

Material Preparation. The objective of the study was to investigate the effect of heat treatment to the mild steel samples. Thus, the mild steel samples for carburizing process were prepared as in Table 2.2. There are three different geometries of specimen were prepared with the same specimen thickness of 10 mm. The geometries are round solid bar with diameter of 25 mm and 10 mm thickness, square solid bar with dimension of 25 x 25 x 10 mm^3 and equilateral triangle with symmetry axis length of 25 mm and 10 mm thickness. Specimen with different geometries were produced by machining process of lathe and milling. All of them were washed thoroughly in acetone and dried. This steps were taken to remove any impurities from the mild steel samples and prevent unequal carburization [9]. All of the specimen requirement are based on ASTM specification on standard of material specimen preparation for hardness and heat treatment.

Table 2 : Specimen's cross-sectional view.

Specimen's Shape	Specimen's Cross-section and Thickness
Round	
Equilateral Triangle	
Square	

Pack Carburizing Process. It is proposed to compare the effect on hardness to three different geometries of mild steel samples which was heat treated first. The heat treatment used was pack carburizing using charcoal. Each specimen with three different geometries were embedded in thick layer of carburizer which is ground charcoal in the steel pot. The steel pot was tightly seal with clay to avoid carbon release and air leaking and prevent unwanted gas to enter the steel pot. The furnace temperature was set to the required temperature range. The furnace was heated first to ensure the uniformity of temperature in the furnace. Then the loaded and sealed steel pot were placed in the furnace. When the furnace reached the carburizing temperature of 950°C, it was soaked in the carburizing temperature for 30 minutes. This was followed by quenching the specimen in oil. The oil was initially at room temperature. Hardened mild steel is often harder after this process. Severe internal stresses were produced during hardening. It is too brittle for the practical use [10]. To reduce the brittleness and release the internal stress, the hardened specimen then is tempered at temperature of 550°C After that, the steel pot was removed from furnace. The parameters was set up for carburizing on mild steel specimen and this will results in hardening of the specimen surface.

Preparation of Test Specimen. Mild steel specimen were cut and machined according to the geometries in Table 2.2. Then it was prepared and polished for hardness measurement. Hardness

measurement was taken using Rockwell Hardness tester by Mitutoyo ATK-F1000. The machine had a maximum test load of 3000 kgf with dwell time of 10 to 15 s. Indentation were made using hardened steel ball indentor on the cross-section surface of specimen. On the specimen surface, seven hardness reading was taken according to schematic location depicted in Figure 2.1.

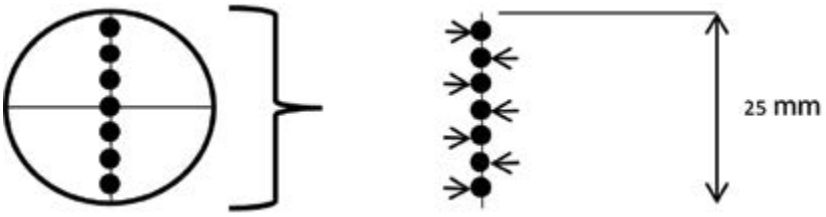


Fig. 1: Schematic location of hardness measurement taken on mild steel specimen. Noted that the distance along the cross-section of specimen is in unit mm.

Indentation were made starting on 3 mm from the edge end, at the interval of 0.3 mm to a distance of 22 mm towards the along the center line of specimen surface, and was repeated or three different geometries of specimen. The hardness profile was determine at the symmetrical center line of specimen cross-section surface. From the hardness values obtained for each geometries of specimen, hardness profile were plotted to see the carburizing effect to the hardness of different geometries of specimen.

Result and Discussion

Hardness.The distribution of hardness profile is depicted in Table 3.1. According to the results in Table 3.1, The hardness range for mild steel specimen is 270 - 505 HRB. Hardness reading in equilateral triangle shape gives the higher reading of hardness. Equilateral triangle has the shape consist of 3 equal sharp edges which is hardened more than any other geometries. Carbon enrichment in the carburized samples of equilateral triangle is higher and denser. However, the hardness profile shows some decreases of reading as the distance location of hardness measured is increase from outer diameter [4]. The quenching process harden the surface of specimen but soften the center of specimen [4]. This happens because of the self locking of carbon particles in the hardened specimen [3]. This is typical of all carburized steels [13]. Overall, a higher hardness reading on the specimen can be achieved. The surface-to-volume ratio of specimen with edges and irregular corner is bigger than regular round specimen [8]. Thus, the edges with irregular corner can be harden rapidly in a same carburizing soaking time. However, the presence of sharp and irregular edges may result in formation of crack and warpage. [8].

Table 3 : Reading of Brinell hardness profile on various shape of specimen surface.

Specimen Shape	Hardness Profile (location distance in mm)						
	3mm	6mm	9mm	13mm	16mm	19mm	22mm
Round	504.4	399.7	314.3	271.1	342.4	389	513.7
Round (Untreated)	124.3	125.0	124.7	123.9	125.0	125.4	124.5
Equilateral Triangle	507.6	397.0	319.2	283.8	343.7	391.2	514.8
Triangle (Untreated)	123.3	125.1	124.5	124.0	124.8	125.3	123.5
Square	505.2	398.4	315.5	275.3	344.5	391.3	513.2
Square (Untreated)	124.4	125.0	124.3	124.1	125.3	125.4	124.3

Conclusions

The objective of this study is to analyse the effect of heat treatment to the hardness of mild steel specimen with different shape. Analysis was made by the hardness results based on the hardening process of carburizing to the different shape of specimen. Shape that has been used in this study is round, equilateral triangle and square. Each of the specimen were hardened using same parameter of carburizing temperature 950°C, soaking time 30 minutes, quenching medium oil, and tempering temperature of 550°C. It can be concluded that the mechanical properties (hardness) were found to be strongly affected by the process of carburization, carburizing temperature and soaking time [5]. The properties of mild steel seems have been improved after it was treated by carburizing process. There was actually carbon enrichment in the carburized samples [11]. Specimen with shape of sharp corner affected by hardening better than the round and curved shape. According to the results, that specimen with the sharp edges depicted high hardness reading than the curved specimen. This happen because mild steel with sharp edges can easily absorb and trapped carbon from charcoal in the outer surface of thus form martensite structure surrounded by ferrite. Cooling rate of hardening samples is also depends on the specimen's geometries; size and shape. In other words, geometry of specimen is affected the hardness properties thus affected the other mechanical properties that is related to hardness.

Acknowledgement

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APLIKASI PEMBELAJARAN BERPUSATKAN PELAJAR BAGI SUBJEK KEKUATAN BAHAN DALAM PELAKSANAAN AMALI TERHADAP KEKUATAN DAN KELIATAN KAYU BAKAU

Irinah Binti Abdullah1a, Liana Fairuz Binti Zakaria2b

1,Politeknik Ibrahim Sultan, Johor, Malaysia

2,Politeknik Kota Kinabalu , Kota Kinabalu, Malaysia

airinah@pis.edu.my,

blianafairuz@polikk.edu.my

Katakunci: Katakunci 1 ; Kekuatan; Katakunci 2; Kayu Bakau; Katakunci 3; Penyerap gelombang ombak

ABSTRAK : Pelajar Politeknik Malaysia semester tiga wajib berdaftar subjek DJJ3103 Kekuatan Bahan dan merupakan mata pelajaran teras yang merangkumi teori serta amali, namum kecenderungan setiap pelajar untuk melibatkan diri secara aktif ketika pelaksanaan amali tidak begitu memberangsangkan. Kesan daripada itu, aplikasi teori yang dipelajari ketika kuliah tidak dapat dipraktikan sepenuhnya ketika praktikal amali di dalam makmal. Bagi mengurangkan jurang antara pelajar aktif dan pasif ketika pelaksanaan amali ini, kaedah baru pelaksanaan amali dibuat dengan menggunakan bahan sebenar dan menjadikan kayu bakau sebagai subjek utama. Pelajar diberi taklimat oleh pensyarah teori bagaimana pelaksanaan amali tersebut dan beberapa prosedur penting sahaja yang menjadi panduan agar data yang diperolehi tidak diragui. Pelajar tidak dibekalkan dengan helaian prosedur amali yang lengkap, ini bertujuan untuk menggilap daya pemikiran setiap pelajar agar berfikir secara kreatif dan kritis. Selain itu pelajar juga perlu membuktikan kekuatan dan keliatan kayu bakau secara teknikal dan menyokong lagi bahawa pokok bakau adalah penahan gelombang ombak atau tsunami terbaik semulajadi . Daripada konsep amali yang dilaksanakan ini, pelajar juga dapat mengaplikasikan teori dan praktikal dengan lebih jelas, serta menggalakkan pelajar untuk menentukan objektif pembelajaran mereka secara berkumpulan dan hala tuju amali tersebut dilaksanakan. Dapat dirumuskan dapatan dari aplikasi pembelajaran berpusatkan pelajar ini dapat meningkatkan daya pemikiran kritis pelajar lantaran memberi impak serampang dua mata kepada pelajar perkaitan kekuatan dan keliatan kayu bakau dan peranannya memperlahankan gelombang ombak serta tsunami semulajadi dalam ekologi hutan paya bakau.

PENGENALAN

Sebagai sebuah negara membangun menghadapi cabaran besar dalam menghadapi persaingan. Malaysia berazam untuk menjadi sebuah negara yang maju dan berdaya saing. Justeru itu bagi melahirkan pelajar yang berdaya saing dan mampan, pembelajaran secara praktikal perlu

dipelbagaikan bagi memberi peluang kepada pelajar membuat perkaitan logik antara teori dan praktikal. Manakala amali yang dilaksanakan ini merupakan pendekatan terbaik lantaran menyokong kepada nilai ekologi hutan paya bakau. Sifat pokok bakau yang mempunyai akar berceranggah menjadikan ia pokok yang kuat dan kukuh untuk menahan mendapan pasir, tanah dan lumpuh serta menjadi benteng kuat dari berlaku hakisan dipersisiran pantai. Hutan bakau yang tebal dan subur juga terbukti dapat menyerap gelombang ombak atau tsunami sebelum menghempas darat. Selepas bencana tsunami melanda Malaysia pada tahun 2004 di bahagian utara semenanjung, kerajaan telah mengambil langkah berjaga-jaga dengan penanaman semula pokok bakau secara sistematik selain memberi kesedaran kepada semua pihak akan kepentingan hutan bakau disekitar persisir pantai selain mengeluarkan Akta hutan terpelihara oleh Jabatan Perhutanan Malaysia[1].

Latar Belakang Masalah

Pelaksanaan amali di makmal memudah cara kepada setiap pelajar, namun sikap sambil lewa pelajar menyebabkan objektif pembelajaran yang ingin dicapai tidak ke tahap optimum, bagi menangani masalah ini pelaksanaan amali secara sebenar dijalankan bagi membolehkan setiap pelajar memainkan peranan masing-masing untuk mencapai objektifnya. Kajian terhadap dahan bakau menjadi subjek utama dalam pembelajaran ini kerana umum mengetahui pokok bakau merupakan benteng utama dalam menyerap gelombang tsunami kerana kekuatan dahanya serta akarnya yang berceranggah. Kajian hutan bakau banyak tertumpu dari segi sistem ekologi dan sangat sedikit kajian secara teknikal khususnya, namun penggunaa dahan bakau dalam sektor pembalakan sangat tinggi. Peranan kayu bakau dalam sektor pembangunan juga memberi impak yang tinggi dimana penggunaannya sebagai tiang penyokong utama sesuatu pembangunan.

Pernyataan Masalah

Bagi meningkatkan tahap pemikiran serta daya saing pelajar telah diberi tugas untuk mengkaji lebih mendalam, pendedahan ini memberi peluang kepada setiap pelajar untuk mengkaji sesuatu secara mendalam dan berfikir secara kreatif dan kritis bagaimana kesinambungan teori dan praktikal dan perkaitan kekuatan serta keliatan dahan bakau itu saling berhubungan. Lantaran itu, pendekatan OBE(Outcome Base Education) digunakan agar konsep teori yang diajar diaplikasi secara praktikal pada dahan kayu bakau bagi membuktikan bahawa kekuatan dahan bakau itu dapat menjadi benteng tahanan tsunami.

Objektif melaksanakan amali berpusatkan pelajar ini adalah:

1.3.1 Memberi peluang kepada pelajar cara mengaplikasi pembelajaran teori dan praktikal sejajar merangsang kreativiti dan pemikiran pelajar secara OBE.
1.3.2 Memberi peluang kepada pelajar menentukan Modulus Young kayu bakau.
1.3.3 Memberi peluang kepada pelajar untuk membuktikan kekuatan dan keliatan dahan bakau secara teknikal dan perkaitan dahan bakau sebagai benteng tsunami terbaik.

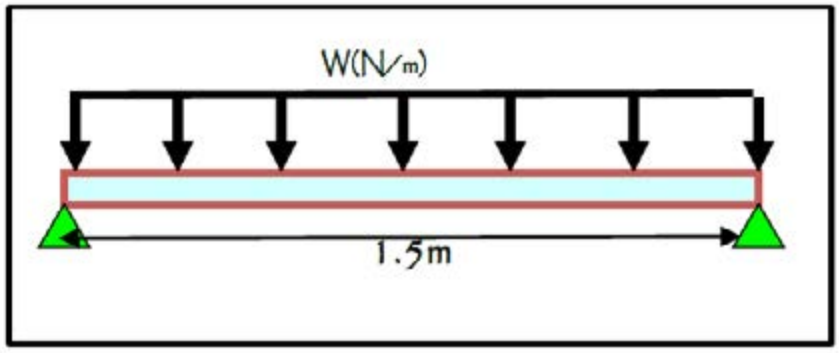
Persoalan kajian adalah seperti berikut:

1.4.1 Adakah kaedah amali ini dapat meningkatkan tahap pengetahuan dan hubungkait teori dan

praktikal
1.4.2 Adakah benar kekuatan kayu bakau dapat menahan gelombang ombak tsunami
1.4.3 Apakah data yang digunakan dapat membuktikan kebenaran kekuatan serta keliatan kayu bakau.

Kepentingan Kajian

Di sini pengkaji ingin menjelaskan bahawa kajian yang dibuat ini adalah untuk memupuk daya pemikiran pelajar bagaimana hubungkait pembelajaran teori dan praktikal itu penting dalam membuktikan sesuatu teori yang dipelajari. Pengkaji meletakkan harapan yang tinggi semoga hasil kajian yang akan diperolehi nanti akan memberi faedah yang besar kepada pihak-pihak yang berkenaan terutamanya masyarakat serta Institusi Pengajian Tinggi. Kajian ini adalah terhad kepada pelajar semester tiga yang berdaftar dibawah subjek Kekuatan Bahan DJJ3103. Sebanyak 4 batang kayu bakau digunkan dengan ukur lilit 5 – 7cm dan panjang 1.5m. Rajah 1.5 menunjukkan jenis rasuk yang akan digunakan.



Rajah 1.5 menunjukkan jenis rasuk yang akan digunakan
konsep amali yang dilaksanakan adalah rasuk disanggah mudah dengan beban teragih seragam[2].

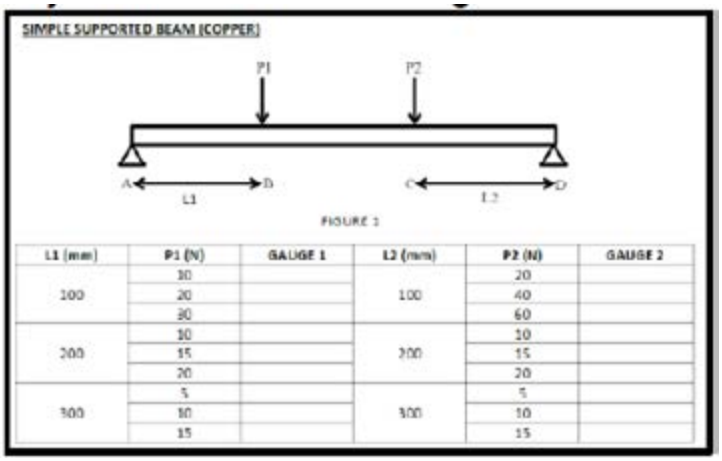
KAJIAN LITERATUR

Pada asasnya pelajar semester tiga akan menjalani amali Kekuatan Bahan di makmal yang telah disediakan dengan peralatan amali yang mudah untuk dicapai, pelajar hanya perlu memuat turun prosedur amali yang telah disediakan dan menjalankan ujikaji lenturan pada rasuk-rasuk yang disediakan. Berdasarkan pada data yang diperolehi pelajar akan membuat kiraan secara teknikal kelenturan rasuk berkenaan yang telah diketahui Modulus Young. Pelajar hanya perlu menggunakan rumus yang telah dipelajari dari kelas teori dan aplikasi pada sesi amali yang dijalankan. Rajah 2.0 dibawah menunjukkan set lengkap amali lenturan sesuatu rasuk yang dijalankan.



Rajah 2.0 Set lengkap amali lenturan sesuatu rasuk yang dijalankan di makmal

Rajah 2.0 menunjukkan rasuk dalam kedudukan terjulur dan terdapat beban dihujung yang tidakdisokong, manakala Rajah 2.1 menunjukkan rasuk disokong mudah.


SIMPLE SUPPORTED BEAM (COPPER)

P1 P2

A B C D

L1 L2

FIGURE 1

L1 (mm)	P1 (N)	GAUGE 1	L2 (mm)	P2 (N)	GAUGE 2
100	10		100	20	
	20			40	
	30			60	
200	10		200	10	
	15			15	
	20			20	
300	5		300	5	
	10			10	
	15			15	

Rajah 2.1 menunjukkan rasuk disokong mudah dan data yang perlu dilengkapkan berdasarkan bacaan pada tolok seperti Rajah 2.0

Amali yang dilaksanakan di makmal ini lebih mudah dan aplikasi teori terhadap praktikal hanya bergantung kepada beberapa rasuk logam yang telah disediakan. Situasi amali begini memberi impak positif kepada segelintir pelajar yang aktif dan tidak pada pelajar yang pasif. Pelajar pasif lebih cenderung untuk menyalin data yang telah diperolehi berbanding melakukan amali itu secara individu.

Berdasarkan amali yang sedia ada di makmal, tidak semua pelajar cenderung untuk bertindak secara aktif, pendekatan terbaru adalah dengan melaksanakan amali secara aplikasi sebenar yang melibatkan alam semujadi dan segala peralatan amali perlu disediakan oleh pelajar itu sendiri, hal ini memberi peluang kepada semua pelajar untuk merancang, berfikir secra kreatif dan kritis bagaimana untuk malaksanakan amali tersebut secara berkesan serta memberi impak terhadap teori yang dipelajari. Rajah 2.2 menunjukkan set amali yang melibatkan kayu bakau.

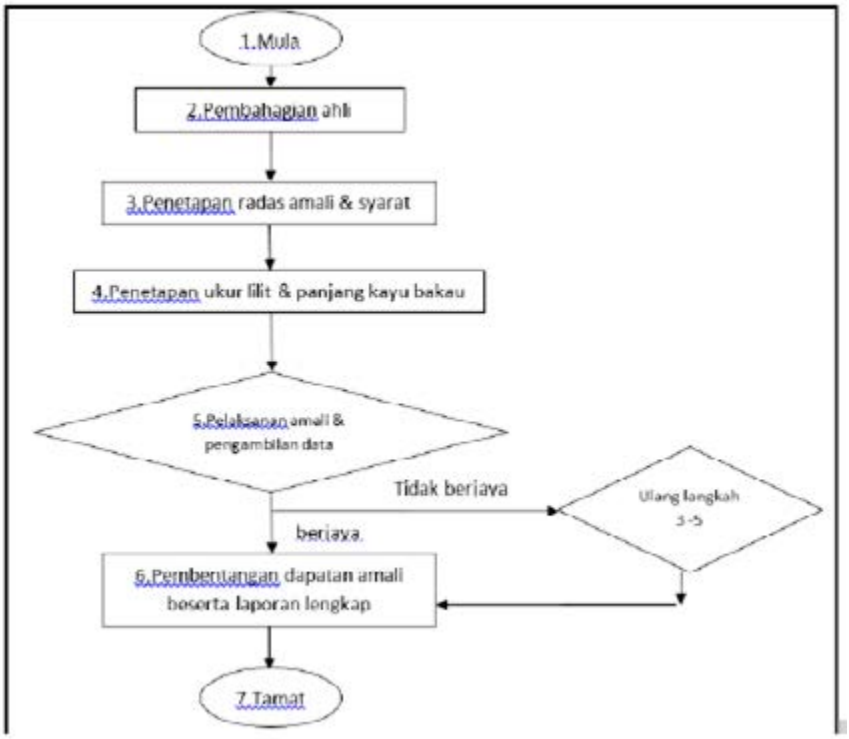


Rajah 2.2 menunjukkan set amali yang melibatkan kayu bakau.

Secara tidak langsung setiap ahli kumpulan perlu memberi kerjasama secara optimum serta memberi peluang untuk berfikir sendiri bagi pelaksanaan amali tersebut.

3.0 METODOLOGI KAJIAN

Pada peringkat awal, pelajar akan melalui kuliah Kekuatan Bahan mengikut perancangan Pengajaran dan Pembelajar seterusnya pelajar akan dibahagikan kepada beberapa kumpulan untuk melaksanakan amali yang dikehendaki, Rajah 3.0 berikut adalah carta alir pelaksanaan amali yang melibatkan kajian terhadap kekuatan kayu bakau.



Rajah 3.0 menunjukkan carta alir pelaksanaan amali kayu bakau

Pelaksanaan amali kayu bakau akan dikendalikan sepenuhnya oleh pelajar dan dipantau oleh pensyarah yang mengajar teori Kekuatan Bahan, sebelum amali dilaksanakan pelajar akan diberi taklimat agar data amali yang diperolehi tidak diragui. Rajah 3.1 dibawah adalah bukti pembabitan setiap pelajar ketika pelaksanaan amali kayu bakau ini. Dalam pelaksanaan amali ini radas-radas perlu disediakan oleh para pelajar sepenuhnya dengan menggunakan bahan alam semulajadi, pelajar perlu menentukan lenturan maksimum bagi membuktikan kekutan kayu bakau tersebut.



Rajah 3.1 bukti pembabitan setiap pelajar ketika pelaksanaan amali kayu bakau

Berikut adalah prosedur kerja amali yang perlu disempurnakan oleh pelajar dari penyediaan bahan amali, pelaksanaan amali serta mengambil data dari kelenturan kayu bakau tersebut.

4.0 ANALISIS DAN KEPUTUSAN

Bagi mengukuhkan lagi kajian amali ini, data telah dikumpul dari tahun 2011 sehingga 2016, metodologi kajian yang diamalkan adalah sama dan tidak berubah seperti yang dinyatakan. Berikut menunjukkan data yang diperolehi daripada pelaksanaan amali berpusatkan pelajar.

Jadual 4.1 Menunjukkan data dari tahun 2011 hingga 2016

DATA TAHUN 2011 ± ⌀ 5.5cm		DATA TAHUN 2013 ± ⌀ 5cm		DATA TAHUN 2015 ± ⌀ 5cm		DATA TAHUN 2016 ± ⌀ 4.5cm	
BEBAN (kg)	LENTURAN (cm)	BEBAN (kg)	LENTURAN (cm)	BEBAN (kg)	LENTURAN (cm)	BEBAN (kg)	LENTURAN (cm)
150	2	130	2.2	100	0.5	100	1.2
300	4	260	3.1	150	1.0	150	1.5
450	5.5	390	4.2	200	1.5	200	1.8
600	5.9	520	5.1	250	2.0	250	2.1
750	7	650	6	300	2.5	300	2.5
900	8	780	7.2	350	3.0	350	4.0
1050	8.5	910	8.1	400	3.5	400	4.5
1200	9	1040	GAGAL	450	4.0	450	4.5
1350	GAGAL			500	4.5	500	4.8
				550	5.0	550	5.3
				600	5.5	600	5.9
				650	6.0	650	6.4
				700	6.5	700	7.0
				750	7.0	750	7.5
				800	7.0	800	7.5
				900	8.0	950	9.0
				1000	8.5	1100	10
				1050	GAGAL	1150	GAGAL
E=179G Pa		E =153GPa		E =158GPa		E =135GPa	

Berdasarkan jadual berikut ia merupakan pengambilan data oleh empat kumpulan pelajar yang berbeza semester dan tahun namum metodologi amali yang diaplikasi adalah sama bagi setiap semester. Ukur lilit kayu bakau yang ditetapkan adalah diantara 5cm – 7cm dan data yang diperolehi hampir sekata dari tahun ke tahun, perbezaan yang kecil ini adalah faktor kayu bakau itu mempunyai ukur lilit yang berbeza dari akar ke ranting. Daripada data berikut, dapat disimpulkan bahawa, semakin besar ukur lilit kayu bakau semakin kuat dahan tersebut. Berikut adalah langkah-langkah pengiraan Modulus Young.

$$I = \frac{\pi r^4}{4}$$

$$I - \frac{\pi \times 0.025^4}{4} - 3.068 \times 10^{-7} m^4$$

menggunakan 4 batang kayu bakau,maka $I = 1.23 \times 10^{-6} m^4$

Pengiraan Modulus Young:

$$P = 1200 \times 9.81 \times 1.5$$

$$P - 17658N$$

Maka diperolehi,

$$E - \frac{Pl^3}{3If}$$

$$E = \frac{17658 \times 1.5^3}{3(1.23 \times 10^{-6})(0.09)}$$

$$Modulus\ Young, E = 179G \frac{N}{m^2}$$

Dapat diperhatikan daripada data berikut, ukur lilit berkadar terus dengan kekuatannya justeru itu, dapat disimpulkan bahawa kayu bakau juga adalah sejenis kayu yang mempunyai keliatan yang sangat tinggi, sifat keliatan yang tinggi berdasarkan Modulus Young (E) [3] ini lah yang membuktikan pohon bakau dapat menahan gelombang ombak yang kuat dan berterusan seperti bencana tsunami lantaran ciri-ciri akar pohon bakau itu yang berseranggah.

5.0 KESIMPULAN

Secara keseluruhannya, setiap pelajar memberikan komitment tinggi ketika melaksanakan amali ini dan semua pelajar juga memainkan peranan masing-masing serta aplikasi pembelajaran berpusatkan pelajar juga tercapai. Berdasarkan data yang dikumpul, pelajar dapat membuktikan kekutan serta keliatan kayu bakau tersebut berdasarkan pengiraan Modulus Young yang diaplikasi daripada pembelajaran teori justeru itu mengukuhkan lagi fakta mengenai hutan bakau sebagai penyerap gelombang ombak yang tinggi dan menghalang dari pesisir pantai dari hakisan[4].

6.0 RUJUKAN

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Effect of Relative Density to Liquefiable Sand Reinforced by Palm Fiber

Yelvi[1], Handi Sudardja[2], Eko Wiyono[3]

Civil Engineering Department, State Polytechnic of Jakarta, Indonesia

1E-mail: yelvich@gmail.com

2E-mail: handi_sudardja@yahoo.co.id

3E-mail: ww_eko@yahoo.co.id

Keywords: Liquefaction, Palm fiber, Reinforced, Sand, Relative density

Abstract. One of the disasters arising from the earthquake is the phenomenon of liquefaction. Liquefaction can cause damage to buildings, roads and other infrastructure facilities. In general, damage occurs in areas formed by water-saturated granular sediments with low relative density. Liquefaction is also prone to occur in reclamation areas whose material is formed from loose sand deposits. The relative density of the soil and the magnitude of the earthquake load is one of the factors causing the liquefaction in addition to the gradation of soil. One effort to reduce liquefaction is to provide reinforcement on the soil. This paper presents and discusses the test results of palm fiber-reinforced sand with a relative density of 20%, 30%, 40%, 50%, and 60% under the dynamic load. Dynamic loads were applied using the maximum earthquake acceleration (a_{max}) = 0.4 g, and the frequency was kept constant at 2 Hz. Excess pore water pressure is measured to determine the occurrence of liquefaction. The liquefaction analysis is carried out by comparing the increase of pore water pressure due to dynamic loading (Δu) to the soil effective pressure (σ_v ') which is initialized with r_u. The test results stated that the test results show that with increasing relative density will reduce the potential for liquefaction.

Introduction

Several major earthquakes that occurred in Indonesia, such as the Nias (2005), Yogya (2006), Padang (2009) resulted in liquefaction events which caused various types of structures to be damaged. The liquefaction event occurs when the water saturated soil layer decreases in strength due to the loss of shear resistance by increasing the soil pore water pressure that occurs during the earthquake so that the soil experiences behavior changes to become like liquid. The Liquefaction has been the concern of several researchers to conduct research on the vulnerability of this liquefaction.[1]–[5]

This liquefaction is also prone to occur in reclamation areas because the landfill material used is loose sand. Istijono, B. and Hakam, A. [6], conducted a case analysis of the reclamation study and concluded that the specification of the relative density is needed to prevent liquefaction by providing additional requirements that must be included in the reclamation work process to achieve the specified the relative density. Besides that, Hakam, A. [7], states that there is a limit value of

the relative density of soil to grain size which is related to liquefaction resistance. Sand soil used in reclamation areas can be planned the relative density in accordance with the maximum acceleration that has occurred in the area. In this research, reclamation case studies have been analyzed and concluded that the relative density specifications are needed to prevent liquefaction by providing additional requirements that must be included in the reclamation work process to achieve the specified relative density. The recommended minimum relative density level for real conditions in the field in this study is 60%.

Pathak [8] conducted research using shaking tables with earthquake simulations adjusted to earthquake conditions in a place and compared the test results with the results of other researchers on the same soil. Twelve tests were carried out with a relative density of 62%, 67%, 69%, 70%, 72% and 74% at frequencies of 2 Hz and 3 Hz. The soil model is made a square with dimensions of 40 cm x 40 cm x 40 cm mounted above the shaking table. The pore water pressure gauge is connected to the shaking table. Cyclic loads are given until the excess pore water pressure decreases or constant. The results showed that pore water pressure increased from the initial time. After reaching the peak value, the pore water pressure decreases or remains constant. This phenomenon shows signs of liquefaction. This study also looked at the effect of relative density and maximum acceleration. Pathak concludes that there are unique criteria when liquefaction occurs from the pore pressure ratio. The results showed that for soil with low to moderate density with a maximum acceleration of 0.32 g, the excess pore pressure ratio was less than or equal to one. For higher maximum acceleration and greater relative density (denser soil), the pore pressure ratio is greater than one.

The effect of using fiber as reinforcement on the soil in reducing the potential for liquefaction is not so much found in the literature. One of the studies conducted by Maheshwari, et. Al [9] uses a geogrid sheet, geosynthetic fiber, and natural coir fiber. The results stated that the addition of synthetic fibers and coconut fiber can increase resistance to liquefaction 88% and 91% respectively with 0.75% fiber content.

In this paper, the results of the tests that have been carried out for palm-reinforced sand with 0.5% content and 40 mm fiber length with a relative density of 20 %, 30%, 40%, 50%, and 60%. The potential for liquefaction on palm-reinforced palm fibers with moderate to solid density was investigated using a pore pressure ratio.

Research Method

A.Materials of Research

Soil Sample

The soil used in this study is disturbed sample with a classification of clean sand soil with uniform gradation. The sand used in this test is Lampung sand. Several tests have been carried out so that it falls into the criteria of land which has the potential to cause liquefaction as given by Tsuchida [10] which can be seen in Figure 1. The relative density of the soil tested is 20%, 30%, 40%, 50%, and 60%.

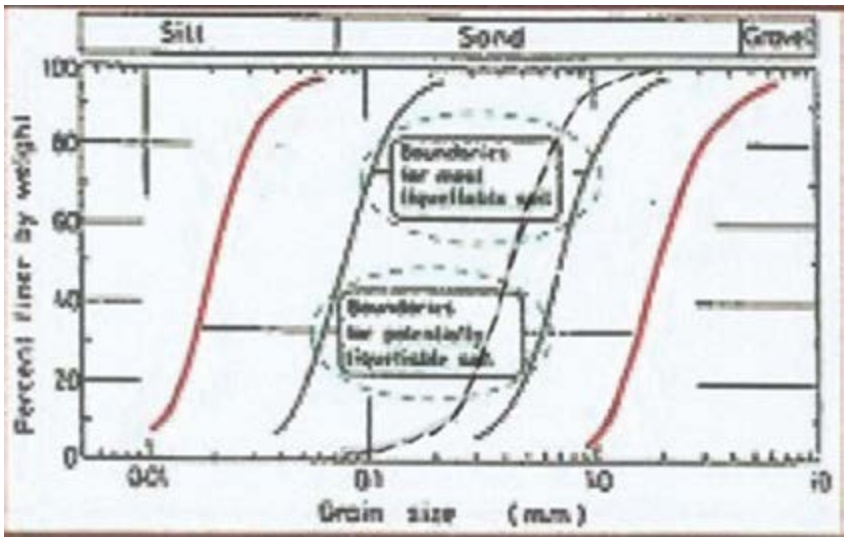

Fig.1. Graph of gradations of Lampung sands granules

Based on the graph of Lampung sands after adjusted and classified using the unified classification system, the sands used include poorly graded sand soils (SP). The sands tested specific gravity and the relative density of 40% determined so that the index obtained properties of the soil as shown in Table 1.

Table 1. Index of Soil Properties

Parameter of Sand	Unit	Value
Gs	-	2.65
$\gamma_{d\,max}$	kN/m^3	16.95
$\gamma_{d\,min}$	kN/m^3	14.22
e_{max}	-	0.864
e_{min}	-	0.563
D_{50}	mm	0.4
D10	mm	0.23
D60	mm	0.45
D30	mm	0.2
Cu	-	1.96
Cc	-	0.39

The Palm Fibers

The palm Fibers used in this study is the fiber derived from the sap of palm trees. That has been packed and usually marketed in the material store of diameter size 0.15 mm - 0.65 mm. Based on the results of the research of Yelvi, et al [11], the optimum fiber length and levels of Palm fiber is 40 mm and 0.5%.

B. Experimental Set Up

The dry weight of sand is prepared at a relative density of 20%, 30%, 40%, 50%, and 60%. The weight of palm fiber is taken 0.5% of the soil dry weight for each the relative density. The sand and palm fiber are mixed and poured into a sample box. The sample box is made of an acrylic material with the internal dimension 400 x 400 x 400 mm. The sides glued together properly, allowing the researcher to see the situation that occurred in the sample at the time of testing and after testing. The sample box wall on one side is perforated for pore water pressure transducers.

Samples of sand-reinforced by palm fiber are made in saturated conditions. Put water into the sample box until the water surface is the same as the sand surface.

C.Test Procedure

The Shaking table is made in such a way that is equipped with a sample box and motor as a driving force in providing horizontal direction cyclic load. The magnitude of the amplitude and frequency is set in the shaking table according to the maximum acceleration of 0.4 g and the frequency of 2 Hz. The pore water pressure transmitter and its display are connected to the sample box. The pore pressure transmitter display shows excess pore water pressure every second.

Sand is inserted first according to the specified weight. Water is added until the surface of sand and sand is saturated. Testing is ready to be carried out. Excess pore water pressure is recorded second by second to 40 seconds when the dynamic load increases and decreases The test results in the form of an excess pore water pressure reading which is a function of the time plotted in a graph so that liquefaction can be evaluated. After testing is complete, sand soil and water are removed from the sample box and dried.

Test Results

Tests were carried out for every 5 variations of relative density, namely 20%, 30%, 40%, 50%, and 60% at a frequency of 2 Hz and maximum acceleration at 0.4 g. Each test is carried out for 40 seconds. Digital transmitters are placed at the top, middle and bottom levels of the sample box to read the excess press pore water. The test results are plotted in a graph of the relationship between the increase in pore water pressure with the number of cycles in 40 seconds for each relative density

of sand. In this paper, the graph of the relationship of an increase in pore water pressure and the number of cycles is presented only for a relative density of 20% as shown in Figure 2. For other relative densities, graph shapes tend to be the same. The number of vibration cycles that occur in 40 seconds is 80 times

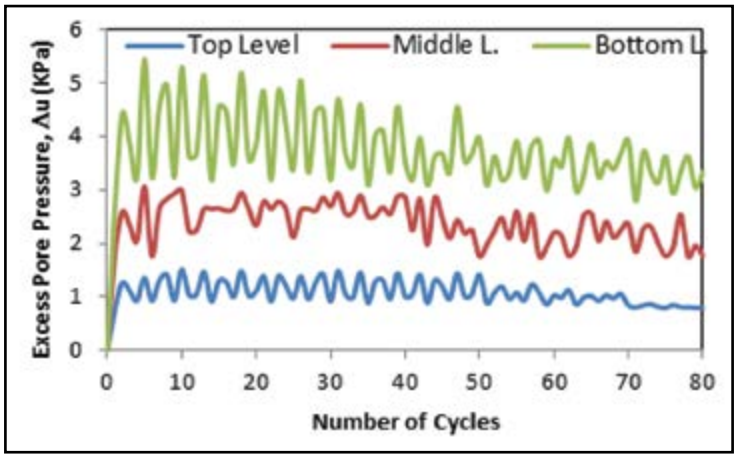

Fig. 2. Relation of Cycle Amount and Increased Pore Water Pressure (□u), Dr = 20%

Figure 2 shows that the excess pore water pressure for each level of observation increases up to the 5th cycle. This states that the initial time occurs at second and third seconds, then decreases after reaching its peak. For other relative density levels, the average initial time occurs in the 6th and 7th cycles or in the 3rd and 4th seconds. So it can be concluded that for each level of relative density, the average initial liquefaction time occurs at 2 to 4 seconds. This result is similar to the results of research conducted by Pathak [8], Maheshwari [9].

Also, it is noticed that the excess pore water pressure at the lower level is always higher than the middle and upper level. This shows that the development of an excess pore water pressure occurs at the top, then the middle and bottom. This conclusion is also in accordance with Maheswari [9].

The excess pore water pressure is measured from each test compared to effective overburden pressure to determine the liquefaction potential [12]. The pore pressure ratio (ru) if it is more or equal than 1 (ru ≥ 1), then there is the potential for liquefaction. Whereas if the value of ru <1 is not potentially liquidated. The correlation of the relative density and ration pore pressure for each level of relative density can be seen in Table 2.

Table 2. Correlation of The Relative Density and Ratio Pore Pressure (ru)

Relative Density, Dr(%)	Max. Pore Pressure Ratio, r_u			
	Top	Middle	Bottom	$r_{u(avg)}$
20 %	1,784	1,635	1,822	1,747
30 %	1,212	1,083	1,123	1,139
40 %	0,851	0,837	0,886	0,858
50 %	0,845	0,825	0,885	0,852
60 %	0,741	0,732	0,752	0,741

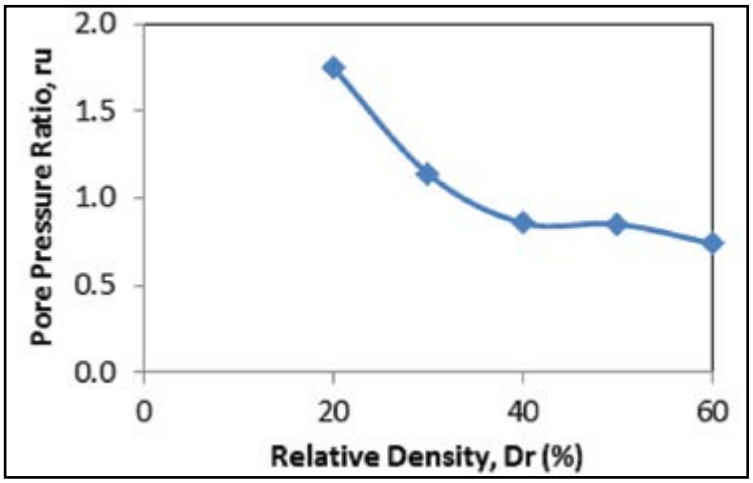

Fig. 3. Relative Density (Dr %) Vs Pore Pressure Ratio (ru)

Table 2 and Figure 3 show that the relative density is 20% and 30% of the ru value is more than one. According to Gupta if the ru value is more or equal to one, liquefaction will occur. While at a relative density of 40%, 50%, and 60% of the value of a small ru of one, there is no liquefaction. The results of this study indicate that the relative density affects the occurrence of liquefaction. The higher the relative density of the soil deposit, the potential for liquefaction decreases. The relative density of 40% for palm fiber-reinforced sand has a ru value of 0.858, meaning that no liquefaction

has occurred. When compared with the results of Hakam's research, for non-reinforced soil the level of relative density is recommended at least 60%. But it should be noted that the soil used in this test is not the same. If the soil deposit is to be used as a landfill material and will be given reinforcement, it still needs to be tested again.

Acknowledgment

The authors thankful to the Head of the P3M Politeknik Negeri Jakarta (PNJ) through the DIPA PNJ funding to provide support so that this research can be carried out. We also thankful to the Head of the Laboratory of the Civil Engineering Department PNJ for giving permission for the use of laboratory facilities. We really appreciate this support.

Conclusion

Based on the results of testing this research, several important conclusions can be drawn, including the following:

1. The excess pore water pressure for all relative density levels tested, initially increases with the time, constant and then decreases. Initiation of Liquefaction occurs when the value of excess pore pressure reaches its peak.

2. At all the transmitting points placed in the sample box, the excess pore pressure is always higher than the middle and bottom. This shows that the excess upper pore water pressure first develops.

3. The results show that a relative density of at least 40% in the palm-reinforced sand has no potential to be liquefied. Relative density shows soil density. The higher the relative density, the denser the soil.

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The Fractured Failures on Nozzle Neck Pressure Safety Valve: A Case Study at Water Tube Boiler

Norlini Husshin1,a, Nur Aziah Hamzah2,b, C.M.Nizam3,c

1,2 Department of Mechanical Engineering

Politeknik Ibrahim Sultan,

81700 Pasir Gudang, Johor, Malaysia.

a norlini@pis.edu.my bhaszmyah8283@gmail.com

3 Department of Occupational Safety and Health

Pahang, Malaysia.

cchenizam@mohr.gov.my

steam capacity of 60 ton/hr, was fabricated from oversea and has obtained design approval from the Industrial Safety Division, DOSH. Steam boiler has also passed a series of hydrostatic testing in manufacturing plant and on site before it was installed at the end of 2011 and early 2013. There are two safety valves installed on the boiler with steam release pressure was set at 55bar (5.5MPa) and 56.65bar (5.665MPa) for Valves B and A, respectively. The pressure difference on both valves is 3%. According to ASME Sec 1 Boiler and Pressure Vessel Code, re-seat pressure must not greater than 4% of the set pressure [2]. After a while, the valve A has some problem facing with the valve re-seat is greater than 4% and work adjustment for valves A, which began in early 2014. On February 19, 2015, a valve adjustment was sequentially performed at a pressure of 47 bar, 53 bar and 60 bar and, 6 times the steam release was performed respectively at a pressure of 58 bar, 57 bar, 52 bar, 56.7 bar and 54 bar. During the stage, there's material fracture occurs when steam released throught the nozzle at a pressure of 56.7 bar from valve A. On top of that, this research study was executed to suggest prevention method to avoid future fracture failures for same material as valve reacted with high temperature stand.

The most important safety measure for welded and joint material in pressure vessel and boilers system is the prevention of cleavage cracks and fracture [1]. The concept of crack can be thought of in many ways. A material scientist or metallurgist may look at cracks on a molecular level. An engineer will probably look at the applied mechanics or macro aspect of cracks. In real material, there will be more than one clump of material that share the same crystal orientation. This forms the concept of grains. A grain is a collection of atoms that have the same crystallographic structure and orientation. Each grain will have its own cleavage plane where the crack prefers to propagate. As the crack crosses the boundary between two grains it must turn or change direction to align iwith the cleavage plane of the new grain. The more turn the crack has to make the more energy it will take to make the crack propagates. Therefore, the material with small grain or material with crack propagating transverse to the grain will be able to absorb more loading energy before the

crack start to propagate [3] (Figure 1 and Figure 2).

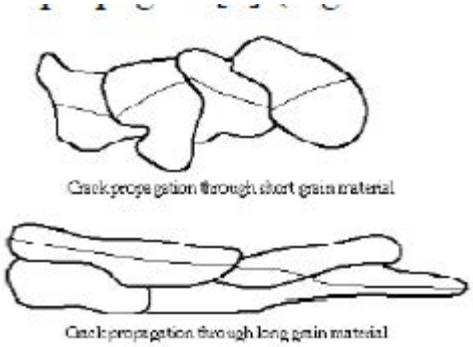

Figure 1. Crack propagation across grain boundaries.

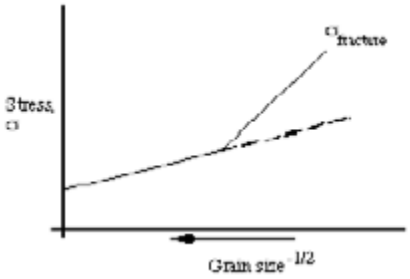

Figure 2. Correlation of fracture stress with the grain size.

In-Situ Observation

A site visit was carried out brought to the discovery of an outlet pipe for the two safety valves (valves A and B being connected to a common pipe, which enabled the steam to be released into the air. Since observation done, the main causes from the physical inspection is the installation does not meet the requirements of Regulation 12 (1) (iii), Regulations (Boiler and Pressure Vessel Vessel) Factories and Machinery, 1970 and use of common pipe used generated back pressure of the steam. Further investigation was carried out and it was revealed also that the modifications were not carried out based on a good engineering practice and unfollow design calculation as well as the drawings stated. These are shown in figures 3a, 3b and 3c. Modifications were made at the discharge pipe of steam into the air outlet safety valve: (a) the initial design of the discharge pipe safety valve outlet connected to steam header; (b) the design after modifications have been made showed relief of outlet pipe safety valve connected directly; and (c) steam released from the valve directly into the air. Condensate trap was seen in (a), which is installed to prevent water hammer.



Figure 3(a), (b), (c): The actual condition upon hydrostatic and steam test performed

There are some significant differences between the original design and the design after the modifications. Among the differences are: (i) A significant increase in the length of pipe on design modifications; (ii) No increase in pipe support design modifications, to support the weight of the pipe adequately. The modification also did not consider the length of the pipe that had no back pressure as recommended by the manufacturer and the tendency of steam load during operation. It was also discovered that the additional weight of pipe did not have any withstand support when steam was transferred to the nozzle and created much vibration to pipe during steam release. Modification of the outlet steam pipe did not comply with the pressure safety valve manufacturer. Nose fracture occurred during steam test at a pressure of 56.7 bar through the pressure safety valve outlet. Pipe emissions fell towards heavier and discouragement nozzle occurred on the opposite side (Figure 4). The broken nozzle was made of materials SA 105M. The design of the nozzle is shown in Figure 5. The main aim for this research is to determine and study on how material can failure with the stand pressure of nozzle neck provided the existing parameter measurement.



Figure 4: The fracture occurs at PSV nozzle neck



Figure 5 : The design of nozzle neck established by manufacturer

Materials Analysis Measurements And Visual Observations

Samples received are parts of the pipe connecting steam drum and flange. Hole for each screw on

the flange is marked from 1 to 8 (Figure 6). Figure 7 shows that the pipe slightly bends towards hole marked 4 where the fracture surface looks bright colored as final fracture surface indicated. The physical condition of the bend pipe shows the effects of external forces acting on the pipe leading to the mark 4 as well as there is steam pressure continuously react with it. Therefore, the area between 1-8 marks is an area where the prevailing strain and stress concentration cracks began in the fracture surface (Figure 7).



Figure 6. Sample marked by numbering 1-8.

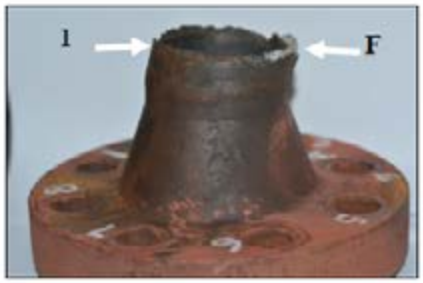

Figure 7. Nozzle bent towards to mark 4

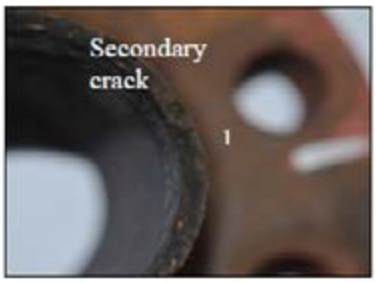

Figure 8. Secondary cracks on the outer surface

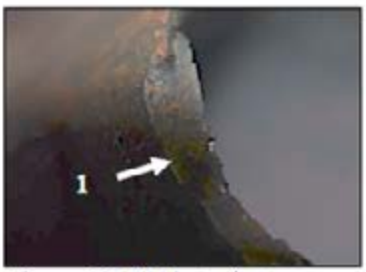

Figure 9. Mark 1 fracture surface on the enlarged.

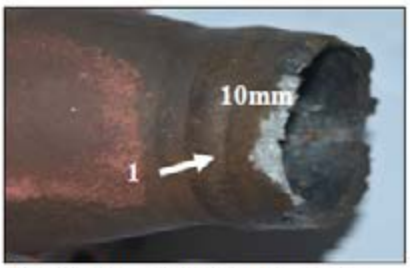

Figure 10. Distance between weldment and fracture area .



Figure 11. Distance between weldment and fracture area .

Fracture surface on mark 1 indicates that the direction of these cracks start from the inner surface of the pipe. It can be observed that there is a sharper impression on the surface of the outer diameter than the inner diameter while there is secondary cracks presented on the outer surface of nozzle pipe (Figure 8 and 9). The fracture surface position of the welding at the end of the crack. The distance of the two surfaces are almost the same, namely 10 mm from the welding area. Crack appear along the circumference of the pipe cross section. Figure 10 and 11 has presented the distance between weldment and fracture area.

Pipe Thickness Measurement

Thickness measurement should be carried out to determine the maximum results of strain and their effects of overloading the steam pressure outside. The most high steam pressure is on the smallest surface area. Figure 12 and Table 1 shows marking position of flange holes and the thickness measurement of the necking pipe. The difference in thickness is between position 4 and 6 as shown in Figure 12. This indicates that the maximum strain by a combination of stresses on the pipe occurred in the area between 1-8.

Table 1. The thickness of the metal at several positions

Position	1	2	3	4	5	6	7	8
Thickness (mm)	3.36	3.98	5.11	5.45	4.93	4.28	3.73	3.72

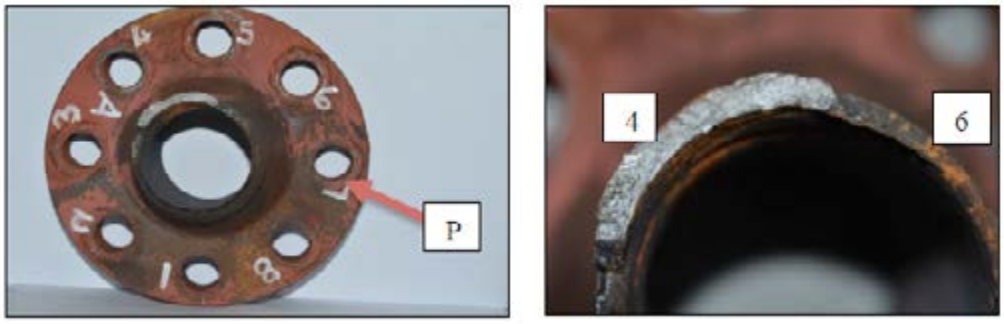

Figure 12. The difference in thickness between 4 and 6 positions.

Macrofractography

According to figure 13 and 14 has show the fracture surface at the beginning and the end of the cracks. Both figures show cracks in thick layer of oxide on pipe surface due to the pipe strain caused by the steam pressure and external force. Groove cracks are also visible on the surface of a crack pipe with oxide layer. Cracks presented in the thick oxide layer of the inner surface of the pipe is due to the nozzle strain caused by the steam pressure and external load. The thick layers shows that the corrosion phenomena has been happening for quite in the surface of the pipe (Figure 15).



Figure 13. Surface on initial stage of fracture

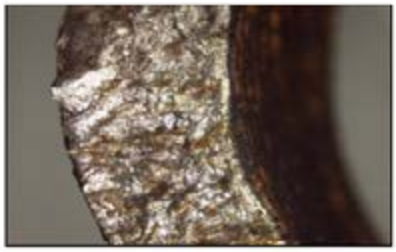

Figure 14. Surface on end stage of fracture

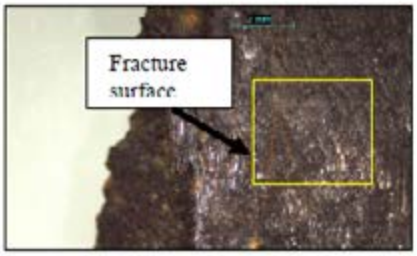

Figure 15. The surface of internal diameter pipe near the fracture surface, X8.

Result and Discussion

Based on the test result performed on the nozzle pipe microstructure observation, it was found that the material involved have experienced something like the following: (1) The thickness of the nozzle size has been reduced in areas with a maximum rigidity and almost unchanged until fracture occurs. (2) The original thickness of the pipe, due to external forces, becomes thinner and

results to the shape of the nozzle pipes bending (3) The structure of the grains in the material has been stretched due to excess of power that occurs at high temperatures (4) The surface of fracture have demonstrated a change in the structure of the so-called 'dimple' where it shows elastic fracture has occurred (5) Cracks occur when there are many MnS inclusions in the material (6) A thick oxide layer on the surface of the pipe shows that the corrosion of pipes occurs as it has not been used since it was not used for about two years after the hydrostatic test was performed. The excess power supplied by steam pressure and other external load at high temperature causes the material to corrode while the inclusions are unable to withstand the force of stress given. Operating at high temperature also contribute to the material becoming ductile and reducing its strength. Excess shear forces at high temperature causes the pipe to elongate and bend as well as subsequently fracture.

Conclusion and Suggestion

Modifications to the safety valve outlet pipe have been made without good engineering practice. Among the overlooked actions are the lack of design calculation and design drawings for that particular modification. Furthermore, fracture occurred during steam release via steam nozzle and exerts a significant dynamics force on the nozzle including the static forces of the flange, the discharge pipe and the condensate trap. The combination of static and dynamic loads can generate high shear rate at the wall of the nozzle. Mechanical failure begins with corrosion on the surface of the nozzle. Then, the plastic deformation of the nozzle through necking during steam tests takes place and fracture occurs when a broad cross-section of the nozzle is no longer able to accommodate the stresses imposed. Mod fracture is due to shear stress which is known as ductile
fracture. It is highly recommended that, to prevent future occurance of the same incident, any material used in high pressure and temperature must be of good quality especially in reference to zero inclusions and impurities such as MNS. It is also recommended that the material used should withstand normal behavior in any circumstances.

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Cutting Tool Wear Assessment Using Novel Z – Statistical Rotation Analysis

N. A. Kasim[1], M. G. Mohamed[2], M. Rizal[3], M. Z. Nuawi[1], J. A. Ghani[1]

[1]Department of Mechanical & Materials Engineering, Faculty of Engineering and Built Environment,

Universiti Kebangsaan Malaysia, 43000 Bangi, Selangor, Malaysia.
[2]Department of Mechanical,

Politeknik Nilai, 43000 Bangi, Selangor, Malaysia
[3]Department of Mechanical Engineering, Faculty of Engineering, Syiah Kuala University (UNSYIAH), Darussalam, Banda Aceh 23111, Indonesia

Mohd.ghafran@polinilai.edu.my

Abstract: The new statistical analysis was developed to investigate tool wear progression from the cutting force signal. *Z*-rotation method is a kurtosis-based that calculates the index (^{R}Z) out of measured signal for cutting force components. The input data generated from dynamo-meter utilised strain gauge signal that during machining process which was in the time domain. Cutting force signals measured as a tool of sensing element to study wear on the cutting tool edge at the various parameters. The monitored flank wear progression by the value of the ^{R}Z index, which then outlined in the model data pattern concerning wear. The resulting trend of a ^{R}Z index in the flank wear rate was useful in observing the flank wear progression. Throughout the experimental data, the index corresponds a high correlation over wear evolution with the highest correlation coefficient of R^2 = 0.9006. The index could become a parameter for monitoring tool wear by using threshold values on particular cutting condition. The Z - rotation provides a modest and robust method through which it decides the tool wear trend in a random signal fluctuation and resistance to 'noise'. Also, as an alternative reference to support experimental findings in the tool wear study to visualise any changes in the signals.

Keywords: Statistical analysis, tool wear, Z-rotation method

Introduction

The statistical analysis in wear detection using skewness and kurtosis was vastly prominent. Based on kurtosis, I-kaz method developed by Nuawi [1] provides a three-dimensional graphical representation of the measured signal frequency distribution. Some researcher applied skewness and kurtosis for force distribution [2], flank wear progression [3], analysis of tool failure catastrophic, etc. The most frequently discussed wear modes are flank wear and crater wear. Flank wear is easier to measure compared to crater wear which receives much more attention

Tool wear analysis using statistical analysis becomes more favourable among researchers recently, and it pairs with cutting force analysis. Researchers [4]–[8] using the analysis and prediction of cutting forces produce a crucial role in thermal analysis, tool wear estimation, chatter prediction, chip form categorisation, surface roughness prediction, monitoring of tool condition and others. One of the most convincing techniques for tool wear detection and breakage involves the measurement of cutting forces. It acts as a robust indicator for online tool condition monitoring as a tool wear

indicator in reference for indirect measurement and monitoring of tool wear. Wear mechanism may occur simultaneously [9], or one of them may dominate the process. These mechanisms can lead to several types of wear. However, two types of them which called crater and flank wear are most distinguished. This development is not intended to study the wear mechanism, but only to track the wear progression index using new developed statistical analysis.

Experimental

An innovative, integrated rotating dynamometer was designed and constructed by Rizal [10] to measure the cutting force in a wireless environment system. The sensor system used for tool wear monitoring in milling P20+Ni tool steel using end-milling cutting tool insert was tungsten carbide with multi-layer PVD TiAlN/AlCrN grade ACP200 (Code: AXMT170504PEER-G). Eight sets of milling experiment were conducted based on a 2^3 full factorial design with various combinations of cutting speed (200 and 373 m/min), feed rate (0.10 and 0.20 mm/tooth), radial depth of cut (0.4 and 0.6 mm) and axial depth of cut is kept constant at 1mm [11]. The cutting test started with a new cutting tool, and the machining process stopped at certain intervals of cutting length to measure the width of flank wear.

Z-rotation Method

Machine monitoring is usually a difficult, problematic and challenging task that are often using statistical techniques for fast detection capabilities [12]. The modelling techniques in monitoring applications should have such qualities as adaptable, accurate, easy to understand, universal, tolerant to noise and extrapolated for purposes of forecasting. However, signal classification only based on mean and variance are not adequate as the scattered points could be far, from the group will cause a significant displacement to the respective real values [13]. The model-based approach uses mathematical models developed based on a collective of homogenous distribution which the data are scattering around its centroid.

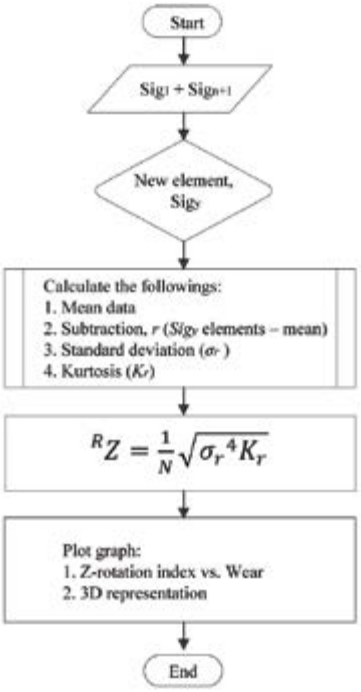

Fig. 1. Flowchart of the *Z*-rotation method

Fig. 1 shows the tracking method using ^{R}Z index as an indicator employs the previous feature extraction (mean, standard deviation and Kurtosis) to analyse the extracted feature over the entire lifetime. It exhibits data pattern in defining the randomness of data features over the whole lifetime to diagnose inferences. These interpretations are beneficial for prediction and decision making in machine learning adaptation. The inspiration of *Z*-rotation analysis is via the kurtosis characteristic where the high-degree of peakedness kurtosis > 0 in the frequency-distribution curve [14]. The high degree of kurtosis leptokurtic is favourable in monitoring machine fault analysis. It is expected to show a strong relationship over the wear evolution.

Results & Discussion

The new developed statistical method is deployed to interpret the cutting force signal (F_c, F_t F_c, F_t and F_{cn}) F_{cn}) for tool wear progression detection. The study indicates a good correlation between the cutting forces and flank wear in milling operations. Fig. 2 illustrates the tool condition began with initial wear (V_B = 0.012mm) until tool reached failure state (V_B = 0.311mm). All cutting forces increase with the increase of flank wear. As flank wear width increases, the contact area between the tooltip and the workpiece increases. Therefore friction force increases so do the cutting force [15]. The results of wear progression vs cutting force are parallel to the previous investigation [16] on the cutting forces, the tool wear and the surface finish obtained in high-speed diamond turning and milling of several materials.

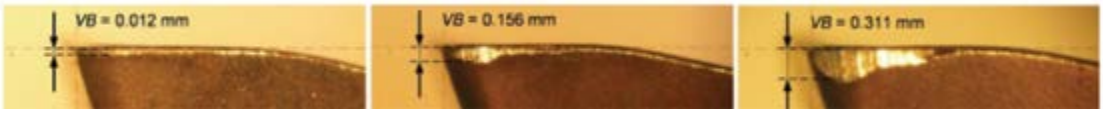

Fig. 2. flank wear (V_B) progression during the milling process

Graph Plots

As the purpose of the study is to apply tracking analysis of the signal that is generated by the developed statistical analysis, thus there is a substantial interest throughout the wear evolution progress.

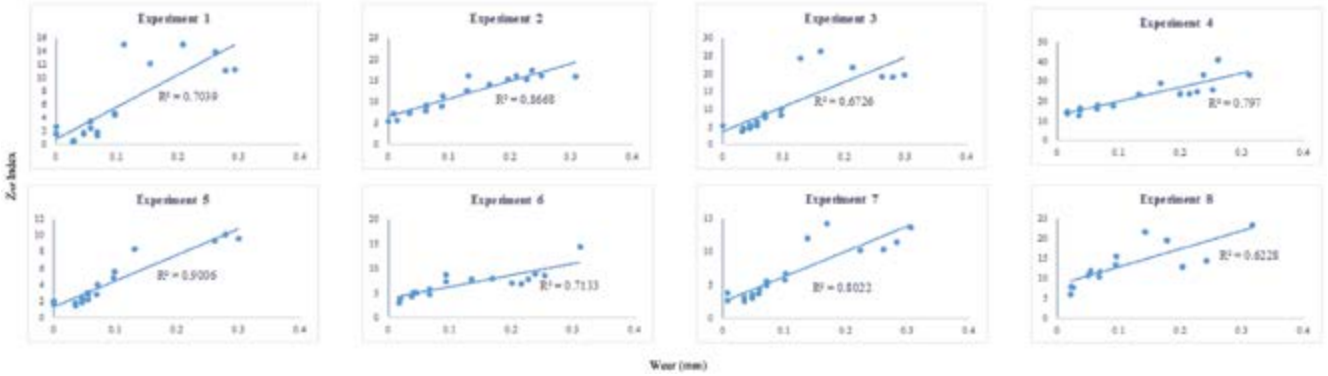

Fig. 3. Wear vs ^{R}Z index.

The line of best fit in the Fig. 3 shows, it is positively sloped which means it is moving higher as it

moves from left to right where there is a positive correlation between the wear and ^{R}Z index. The data points are very close to the line of best fit showing that there is a strong correlation between the variables. According to the study conducted by [17], the effective process of selecting a signal is through a relationship between the change of signal amplitude and flank wear of the cutting tool. Points should be near to the linear line in the scatter plot where the correlation coefficient can range in value from -1 to +1. Correlation coefficients having $R^2 > 0.6$ values is selected as an effective signal feature for the monitoring process. From the average correlation coefficient between flank wear (*VB*) and ^{R}Z index is $R^2 = 0.7599$, with the highest correlation coefficient of $R^2 = 0.9006$ obtained from experiment set 5. The healthy positive correlations among the two variables indicate that ^{R}Z is a variable feature that has a strong relationship and affects the development of monitoring the flank wear progression. As a comparison of statistical analysis used in the different process like turning to project good correlation between cutting force and wear agreed in the previous studies [2]. They used the method of skewness and kurtosis of the distribution of force within a fixed frequency band.

^{R}Z 3D Graphic Representation

The *Z*-rotation method is used to characterise the cutting force that absorbed from both dynamometers. The method can correspondingly generate data distribution in the 3D dimension display representing the scatter-degree of data distribution.

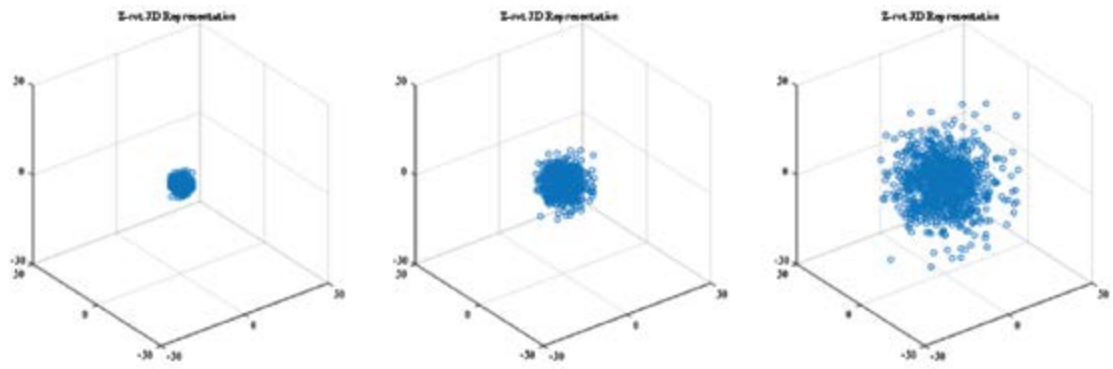

Fig. 4. ^{R}Z 3D representation for initial, intermediate and last run throughout experimental 1 (v_c = 200 m/min, f = 0.1 mm, d = 0.4 mm)

Fig. 4 exhibits the 3D representation of ^{R}Z index for the sharp cutting tool (V_B = 0 mm) with an index value of 1.8877. The width of flank wear is expanding throughout machining as the index value increased to 4.7968. The machining process under given parameters proceed until the tool failure (V_B > 0.3 mm) that recorded the last index value of 11.3142 for experimental set 1. The 3D graphics display a spread transformation from small (initial run) to bigger (last run) sphere distribution. The spherical like distribution indicates the revolution of the ^{R}Z index and regress the progression of wear. All experimental sets demonstrate the same occurrence pattern distribution during the machining process under different settings of machining condition verify the helpfulness of *Z*-rotation analysis as a wear progression tracking method.

Conclusion

Throughout the experimental studies, the *Z*-rotation analysis method shows a sturdy correlation over wear evolution with the highest correlation coefficient of $R^2 = 0.9006$ and average is R^2 =

0.7599. The ^{R}Z index for wear progression can be utilised to be the parameters for the monitoring of tool wear by using threshold values on certain cutting condition. It can support experimental findings in the tool wear study, and it is suitable to visualise any changes in the signals. Statistical analysis of random signals proved to be universal and tolerant to noise and extrapolated for purposes of forecasting. Nevertheless, resultant force analysis by *Z*-rotation method has successfully determined the abnormality existed in the signal data force.

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Characterisation of dry sliding behaviour of cast Al-Si-Mg

Maheran Sulaiman1,a, Mazyan Yahaya1,b, Seri Nian Akmad1,c, and Mariyam Jameelah Ghazali2
1Department of Mechanical Engineering, Politeknik Nilai, Negeri Sembilan, Malaysia.

2Department of Mechanical & Material Engineering, University Kebangsaan Malaysia,43600 Bangi, Selangor, Malaysia.

1amaheran@polinilai.edu.my, 1bmazyan@polinilai.edu.my, 1cseri_nian@polinilai.edu.my, 2mariyam@ukm.edu.my

Abstract: This paper will focus on characterisation on work hardening behaviour of dry sliding wear of cast Al-Si-Mg alloys. Cast alloy of aluminium silicone magnesium type 357.0 is one of the widely used alloy in automotive industry such as producing master cylinder brake for the automobile industry which undergo wear during its operation. Alloy pin will undergo sliding wear against steel disc using a pin-on-disc machine in a dry condition, at ambient temperature and at 1 m/s speed with normal load between 10 N – 50 N. From experiment, specific wear rate K' is in range 0.571165 x 10-5 mm3/Nm - 2.97999 x 10-5 mm3/Nm which can be categories as moderate wear. As expected, the moderate wear was found to increase with applied load and sliding distance. After 2 hours of sliding wear the pin was cut in longitudinal section and microstructure deformation on subsurface and wear surface was observed under FESEM and EDX analysis for chemical composition on the MML. The same work hardening behaviour is shown by all samples as in the literature.

Keyword: Work hardening, dry sliding wear, plastic deformation, sub-surface microstructure.

Introduction

Aluminium base alloy has many mechanical properties due to different strength mechanism and heat treatment that enable lots of improvement to the alloy. The sliding effect and exceeding stress of elasticity contribute to plane slip and plastic deformation as the result of dislocation motion. Sub-surface deformation including deformation of microstructure and work hardening of plastic deformation through compression force and shear force on the sliding surface [1].

Sliding wear lead to plastic deformation and consequently being work hardened. Work hardening also known as strain hardening or cold work that improve the strength of metal by plastic deformation. As a result those metal components need high wear resistivity known as tribo layer that reduce the overall wear rate [2]. Tribology is the science and technology of interacting surfaces in relative motion [3]. The wear resistant of these alloys significantly depends on their hardness, tensile strength, brittleness, microstructures [4,11]. The aim of this study is to characterize the work hardening behaviour of dry sliding wear of cast Al-Si-Mg alloys.

Experimental setup

Experiment was carried out using computerized pin-on-disc machine model DUCOM TR-20LE. The research material was cast Al-Si-Mg type 357 alloy pin in 20 mm height and diameter 10 mm. The pin wear surface was polish until 0.1 Ra surface roughness. Dry sliding wear tests were performed against a hardened carbon steel (Fe-2.3%Cr-0.9%C) using a pin-on-disc configuration with fixed sliding speed of 1 m/s and a range of load 10 N, 30 N and 50 N at room temperature (25oC) [5]. The density of alloy was investigated using micro density equipment. A pin on disc experiment was carried out and weight loss was recorded for every 30 minutes for total period of 2 hours. Weight loss and Specific Wear rate, K' was analyse and compared for different sliding distance and load.

Subsurface wear was observed from longitudinal cross section parallel to sliding direction and then etched using Keller Reagent and observed under field emission scanning electron microscope (FESEM) type ZEISS SUPRA 55VP. Alloy composition analysis was performed using Energy-dispersive X-ray spectroscopy EDX in order to identify composition of mechanical mixed layer.

Result And Discussion

Sliding Wear

The sliding wear analysis shows that initially volume loss increase with sliding distance for each applied load due to substantial ploughing developing groove and indentation. Instead wear rate decrease with time as in Table 1. Obviously show that volume loss increased when sliding distance also increased between the contact surface and in agreed to Archard's wear law [6]

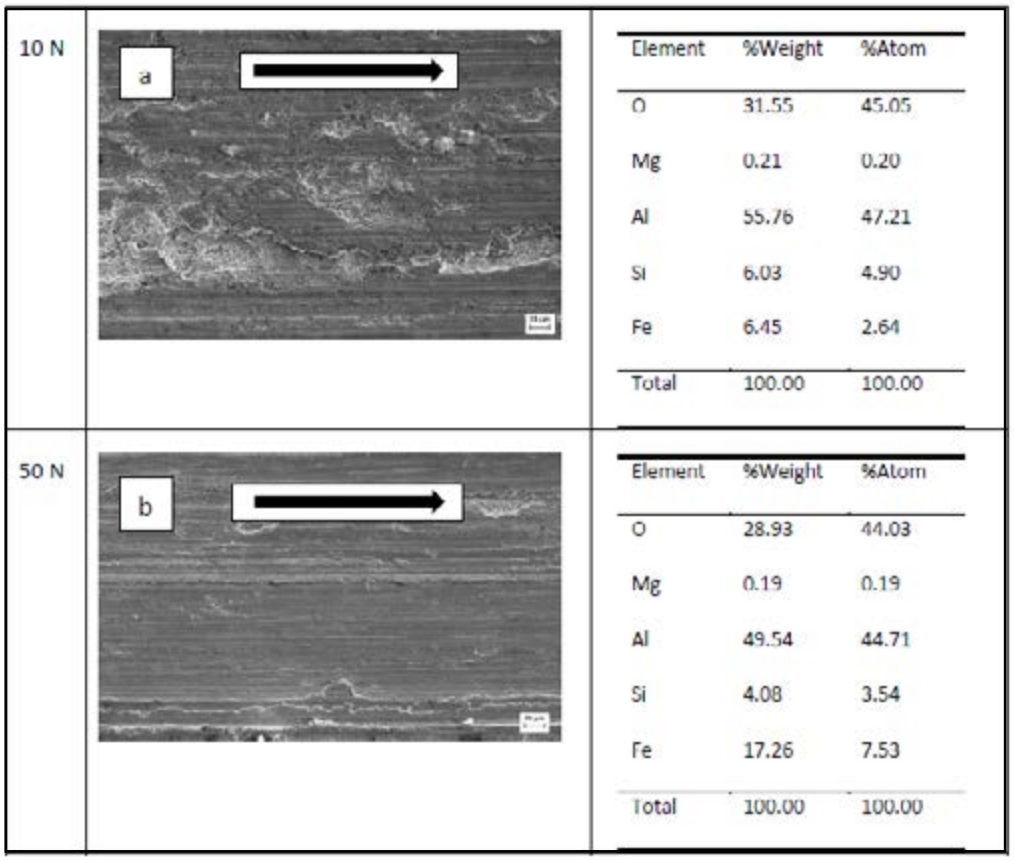
Table 1: Comparison of Al-Si-Mg volume loss at different applied load

Sliding distance (m)	Volume loss (mm^3)		
	10 N	30 N	50 N
1800	0.5364 ± 0.0383	1.3282 ± 0.0585	1.2388 ± 0.0221
3600	0.7280 ± 0.0383	1.6858 ± 0.0383	2.1711 ± 0.0585
5400	0.6769 ± 0.0221	1.7369 ± 0.0442	2.6181 ± 0.0798
7200	0.8046 ± 0.0766	1.6347 ± 0.0585	2.0562 ± 0.0585

Volume loss and specific wear rate, K' are found to be relatively low at a high sliding distance due to work hardening effect on the sliding surface [7]. This can be explained by the heat generation phenomenon on the smooth surface due to sliding and friction that generate adhesion wear particle softer and loosen. The delicate particle switch each position between the two surface finally it become mechanical mixed layer (MML) relative on the smooth side which is the alloy surface [4]. This layer is mostly considered to be protective layer and provides excellent wear resistance during wear test [8].

Worn Surface Morphology

Optical micrographs in figure 1 was produced on 20 µm scale and enlargement 250 X. Sample with 10 N load in figure 1(a) shows oxide layer and thin layer of discontinuous micro grooves and scoring marks through the surface due to surface sliding worn against hard asperities on the steel discs surface. Sample with 50 N load in figure 1 (b) shows that worn surfaces formed continuous grooves through the surface with micro grooves become more obvious and wider compared to sample with small load. Therefore higher load make wider surface contact and higher traction force between asperities [1,14]. The results revealed that wear parameters; such as applied load, sliding velocity, sliding distance, temperature, and counterface hardness can influence the wear and tribology behaviours of Al-composites in dry sliding wear tests [9].



Element	%Weight	%Atom
O	31.55	45.05
Mg	0.21	0.20
Al	55.76	47.21
Si	6.03	4.90
Fe	6.45	2.64
Total	100.00	100.00

Element	%Weight	%Atom
O	28.93	44.03
Mg	0.19	0.19
Al	49.54	44.71
Si	4.08	3.54
Fe	17.26	7.53
Total	100.00	100.00

Figure 1: Optical micrograph of sliding worn surface

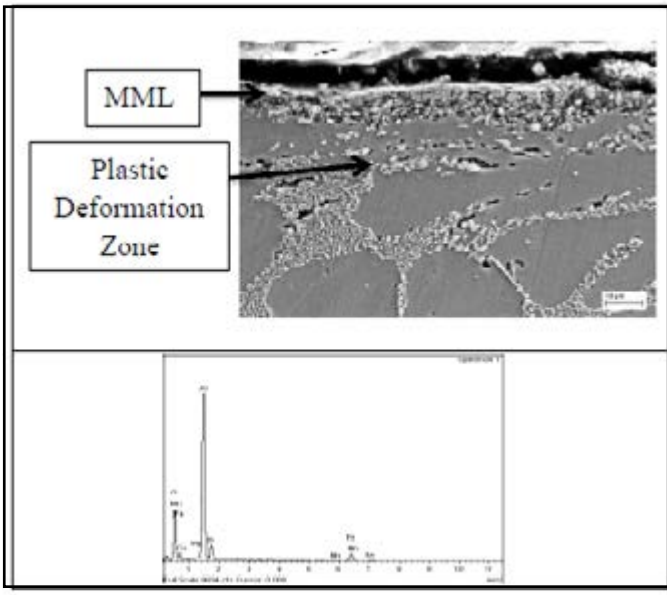
Energy-dispersive X-ray spectroscopy EDX analysis shows that wear surface was oxidised and contain Fe element due to sliding against relatively harder steel disc for all samples. Mechanical mixed layer was formed and content O2, Mg and rich in Al, Si and Fe. These elements were transfer between contact surface while sliding and continuously formed wear particles. Fe was transfer from the steel disc [10]. While O2 was oxidised layer of the atmosphere.

Subsurface Wear Morphology and Characterisation

Investigation shows that subsurface worn formed three different layer which is mechanical mixed layer zone, plastic deformation and not deformed based material as in Figure 2. Plastic

deformation zone consists of rotated and elongated primary grains towards the sliding direction. The rotated flow lines were found to be approximately parallel to the worn surface due to the increasing strain, when angle was nearly 900. The plastic deformation is the result of shear stress acting along the sliding direction [6].

Figure 2 shows optical micrographs deformation of 3 zone which is mechanical mixed layer zone, plastic deformation zone and not deformed based material respectively. EDX analysis shows that MML consist element of O, Al, Si, Fe from adhesion wear process. This result consistent with others study where work hardenability is the phenomenon where by a ductile metal becomes harder and stronger as it is plastically deformed.



Element	%Weight	%Atom
O	31.28	46.95
Mg	0.27	0.27
Al	45.35	40.35
Si	5.95	5.09
Mn	0.11	0.05
Fe	16.56	7.12
Cu	0.47	0.18
Total	100.00	100.00

Figure 2: Microstructure and MML EDX sample analysis under 50 N load

Plastic deformation only occurred from the depth of 100 µm to 200 µm from the wear surface [1]. The deformation was observed under the field emission scanning electron microscope and the data exhibit that the deformation depth increased with the increased of applied load [12]. The greater the work hardenability the greater the number of cycles that can be tolerated. Work hardenability can effectively hinder the fracture and localized fracture and consequently can improve the wear behaviour of samples [13].

4.0 Conclusion

Based on the pin on disc experiment and analysis for Al-Si-Mg alloy, it can be concluded that wear rate for Al-Si-Mg alloy increased proportionally with the sliding distance. The same work hardening behaviour is shown by samples tested on live load of 10 N, 30 N and 50 N. Resistance of wear rate increased with the applied load and this exhibit low specific wear rate K' value as the effect of work hardening. Sliding cause material undergoes plastic deformation when subjected to compressive forces and thus the mechanism of work hardening increases the strength of the

material.

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Failure Analysis on Leaf Spring for Light Truck

M.F. Abdullah[1, a], M.S. Ahmad [2, b] and S. Sahidin@Salehudin[3, c]

[1]Politeknik Sultan Salahuddin Abdul Aziz Shah, 40150 Shah Alam, Selangor, Malaysia

[2]Politeknik Nilai, 40450 Nilai, Malaysia

[3]Politeknik Sultan Salahuddin Abdul Aziz Shah, 40150 Shah Alam, Selangor, Malaysia

amfaiz@psa.edu.my; bmsanie77@gmail.com; csalhana@psa.edu.my

Keywords: Leaf Spring; failure analysis; corrosion; fatigue life

Abstract. This paper shows some of the general study on the analysis of leaf spring. Leaf springs are one of the popular suspension components they are frequently used, especially in commercial vehicles. The main function of leaf spring is not only to support vertical load but also to isolate road induced vibrations. It needs to have excellent fatigue life. As a general rule, the leaf spring must be regarded as a safety component as failure could lead to severe accidents. The present work attempts to find the failure of the leaf spring. A typical leaf spring configuration of Mitsubishi Triton Quest 2.5L light truck is chosen for study. Experimental method has been carried out to determine the failure of the leaf spring. Experimental test of this analysis method shows the major contribution to failure cause by corrosion and fatigue life.

Introduction

Leaf springs are widely used in suspension system of cars, railway carriages and other automobiles. Leaf springs are mainly used in suspension systems to absorb load shocks in automobiles like light motor vehicles, heavy duty trucks and in rail systems. The main function of leaf spring assembly as suspension elements is not only to support vertical loads, but also to isolate road-induced vibrations. The performance of leaf spring is complicated due to its clamping effects and inter-leaf contact etc. It carries lateral loads, brake torque in addition to shock absorb. Springs are crucial suspension elements on cars, necessary to decrease the vertical vibrations, impacts and bumps due to road irregularities and create a comfortable ride.

Several papers were devoted to the applications of materials for automobiles. Leaf springs are mainly used in suspension systems to absorb shock loads in automobiles like light motor vehicles, heavy duty trucks and in rail systems. The main function of leaf spring assembly as suspension elements is not only to support vertical load, but also to isolate road-induced vibrations. The behaviour of leaf spring is complicated because of its clamping effects and inter-leaf contact etc. It carries lateral loads, brake torque, driving torque in addition to shock absorb. Springs are crucial suspension elements on car, necessary to minimize the vertical vibration, impacts and bumps due to road irregularities and create a comfortable ride.. The introduction of composites helps in designing the better suspension system with better ride qualities if it can be achieve without much increase in

cost and decrease in qualities and reliabilities. In the design of springs, strain energy becomes the major factor. In the present scenario the main focus of automobile manufacturer is weight reduction of the automobile. Weight reduction can be achieved mainly by introducing the better material, design optimization and best manufacturing processes.

Literature Review

In this sections research papers of different Authors are discussed related to the present work. Also Published papers are highlighted in this section.

Rupture of the leaf spring is considered as a failure due to corrosion induced fatigue. Corrosion fatigue caused simultaneous action of corrosion, due to damaged protective layer, and cyclic loading. From one of the corrosion induced indentations, crack propagated through the material and led to the final rupture of the spring [1]. Leaf springs absorb the vehicle vibrations, shocks and bump loads (induced due to road irregularities) by means of spring deflections, so that the potential energy is stored in the leaf spring and then relieved slowly [2]. These will give the cyclic loading and bending stress (tension and compression) to the spring that causes the spring to rupture or broken.

AKSA Karim [3] presented work on design, analysis and optimization of leaf spring. The aim of this review paper was steel leaf spring was replaced with an optimized composite one. Main objective of this paper was to obtain a spring with minimum weight that is capable of carrying given static external forces without failure. Here the work is carried out of a four-leaf steel spring which used in the rear suspension system of light vehicles & heavy duty vehicles. The four-leaf steel spring is analyzed by using ANSYS V5.4 software. The FEM results showing stress and deflection verified the existing analytical and experimental solutions. Using the result of the steel leaf spring, a composite one made from fiberglass with epoxy resin is designed and optimize using ANSYS. Main consideration is given to the optimizations of the spring geometry. n this study stress and displacements were used as design constraint. The experimental results are verified with the analytical data and the finite element solutions for the same dimensions. Result shows that stresses in the composite leaf spring are much lower than that of the steel leaf spring. Compared to the steel leaf spring the optimized composite leaf spring without eye unit weights nearly about 80% less than the steel spring. The natural frequencies of composite leaf spring are higher than that of the steel leaf spring and is far enough from the road frequency to avoid the resonance.

Baviskar A.C etc. [4] presented work on light composite elliptic springs for vehicle suspension. They worked on based study marries between the elliptical configuration and woven roving composites. In this paper, the influence of ellipticity ratios on performance of woven roving wrapped composites elliptical springs has been investigated both experimentally and numerically. A series of experiment was conducted for composite elliptical springs with ellipticity ratios (a/b) ranging from one to two. Here they were also presented history of their failure mechanism. Both spring rate (K) and maximum failure increase with increasing wall thickness. In general, this present investigation demonstrated that composite elliptical spring can be used for light as well as heavy trucks and meet the requirement, together with substantial weight saving. The result showed that the ellipticity ratio is significantly influenced the spring rate and failure loads. Composite elliptic spring with ellipticity ratio of a/b 2.0 displayed the highest spring rate.

Methodology

The selected component for this case study is a leaf spring of Mitsubishi Triton Quest 2.5L light truck. Leaf spring or laminated springs consist of a number of plates (known as leaves) of varying lengths. The leaves are held together by means of two U-bolts and a center clip. Rebound clips are provided to keep the leaves in alignment and prevent lateral shifting of the plates during the operation. The longest leaf, called the master leaf, is bent at both ends to form the spring eye. At the center, the spring is fixed to the axle of the car. Multi- leaf springs are provided with one or two extra full length leaves in addition to the master leaf. These extra full-length leaves are stacked between the master leaf and the graduated-length leaves. The extra full-length are provided to support the transverse shear force. Figure 1 show the lift spring that use in automobile. The function of leaf spring is to support the weight of the vehicle, cushions bumps and holes in the road and maintain traction between the tyres and the road.'



Figure 1 show the lift spring that use in automobile.



(a) (b)

Figure 2 Multi-leaf spring at failure region

The material used for leaf springs is usually a high carbon steel having 0.9 to 1.0% carbon. The leaves are heat treated after the forming process. The heat treatment of spring steel produces greater load capacity, greater range of deflection and better fatigue properties. According to Indian

Standards, the recommended materials are 50 Cr, 50 Cr V 23, and 55 Si2 Mn 90 all used in hardened and tempered state [5]. The physical properties of some of these materials are given in Table 1. All values are for oil quenched condition and for single heat only.

Table 1: Physical properties of materials commonly used for leaf spring

Material	Condition	Ultimate tensile strength (MPa)	Tensile yield strength (MPa)	Brinell hardness number
50 Cr		1680-2200	1540-1750	461-601
50 Cr V 23	Hardened and	1900 - 2200	1680 - 1890	534 - 601
55 Si2 Mn 90	Tempered	1820-2060	1680 - 1920	534 - 601

The experimental method approach that has been carried out on the failure leaf spring is as below :

1. Fracture surface analysis
2. Hardness testing
3. Metallographic examination

Result and Discussion

Fracture Surface Analysis

A leaf spring of Mitsubishi Triton Quest 2.5L light truck has been ruptured during car operation. The surface of a spring was protected against corrosion with a layer of paint. Around the fracture surface, there are general corrosion and severe pitting. In this area, spring has long been exposed to corrosion attack and the surface heavily corroded and winkle as shown in figure 3 and figure 4.



Figure 3: Damage leaf spring



Figure 4: Fracture surface due to fatigue and corrosion

Base on result, rupture of the coil spring is considered as a failure due to corrosion induced fatigue. Corrosion fatigue caused simultaneous action of corrosion, due to damaged protective layer, and cyclic loading [6,7,8] From one of the corrosion induced indentations, crack propagated through the material and led to the final rupture of the spring [9,10, 11]

Hardness Measurement

Results of micro hardness measurements in the central zone and near the fracture are shown in Table 2. As shown in Table 1, the hardness measurements were similar in both zones

Table 2: Hardness Measurement

Zone of Indentation	Hardness (HRC)	Standard Deviation
Near fracture zone	429	455
Central Zone	430	455

A sample was cut from the shaft fracture zone. This sample was metallographically prepared and observed in an optical microscope, in unetched and etched conditions. The microstructure, without etching, revealed high quantity of defects such as micropores and non-metallic inclusions, as shown in figure 5.

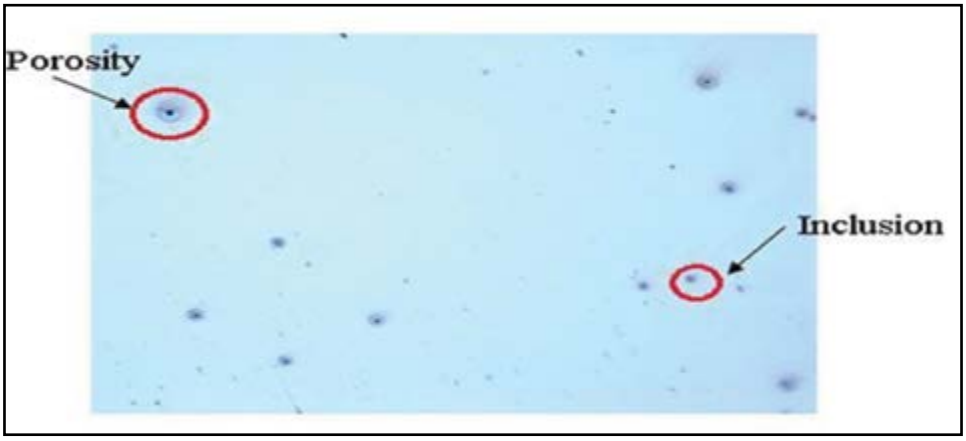

Figure 5: Optical microstructure before etching

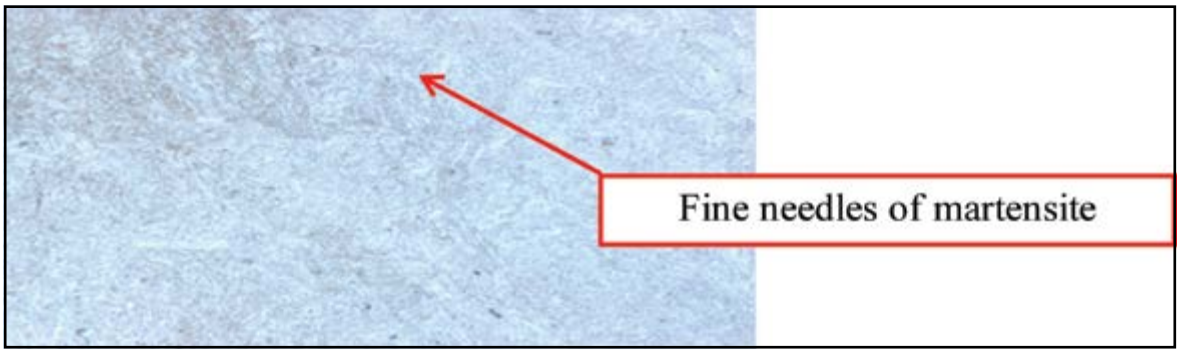

Figure 6: Optical microstructure after etching

Other than that, the metallographic examination shows that the microstructure, without etching, revealed high quantity of defects such as porosity and inclusions[7, 11], as shown in figure 4. These inclusions microscopically affect stress distribution and favor crack nucleation of the leaf spring. The microstructure shown in figure 6 revealed tempered martensite that could be related to high tempered temperature or a long period of tempering

Suggestions To Prevent Occurrence Of Similar Failures

There are a few suggestions to prevent this failure to occur. Firstly, in order that the surface of springs be protected from corrosion, it is recommended that, the spring be sprayed with cadmium or zinc metal at this installation before assembly. This procedure would protect the surface of the springs against corrosion more efficiently than lubricants and other coating. Before metal spraying it is essential that the paint on the spring be removed by abrasive blast cleaning. Secondly, it is recommended after used the vehicle (SUV or heavy vehicle) on the roads that the users wash the vehicle especially on the underbody of the vehicle. Thirdly, use adequate materials (guarantee the chemical composition and microstructure). Finally, in the procurement of leaf springs, it is

recommended that such springs be furnished by the manufacturer free from all types of scales, such as hot mill scale or scale resulting from heat treatment which may be removed by shot-blasting or shot-peening.

Conclusion

Among them spring is one of major suspension parts of the vehicle which gives ride comfort in laden and unladen condition. Since suspension system of the vehicle directly influenced to ride and handling, suspension parts should have enough endurance during its lifetime to protect the vehicle system. To secure reliability, Satisfying required performance during design life of the vehicle, durability of the vehicle components should be generated firstly. Therefore, Vehicle's durability gives priority to analysis and assessment of its endurance under the various environments and loading conditions. In this regards suspension system of the vehicle is very important. The vehicle's suspension system is to protect the passenger and body from the shocks by the vehicle moving over the irregular roads. In this regards suspension system of the vehicle is very important. The major contributing of leaf spring failure is due to the corrosion attack and fatigue load. Other than that the effect of material defect like porosity and inclusion also can initiate the crack. The cyclic loading experienced by the leaf spring is the load that contributes to failure.

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FLOOD RISK MAPPING USING GIS (CASE STUDY: KUANTAN, MALAYSIA)

R. Zainal1,a, N.Karim2,b and H. Hashim3,c

1Politeknik Sultan Haji Ahmad Shah, Kuantan, Pahang

2Politeknik Sultan Haji Ahmad Shah, Kuantan, Pahang

3Politeknik Sultan Haji Ahmad Shah, Kuantan, Pahang

arozallienny@polisas.edu.my, bikarim@polisas.edu.my,
cdinna_8081@polisas.edu.my

Keywords: Flood Mapping; Geographical Information System; Analytical Hierarchy Process

Abstract: The heavy flood in Kuantan has showed an increasing flood disaster over a year. The previous flood mapping is carried out based on flood occurrence. However there is a lack research done in mapping flood prone area using physical factors. Therefore, this study aims to develop flood mapping based on land use, slope, rainfall and soil. Geographical Information System (GIS) is integrated with Analytical Hierarchy Process (AHP) to evaluate the potential flood risk area. Using AHP, the percentage derived from the parameters were land use 41.55%, slope 28.95%, rainfall 16.93% and soil 12.58%. The result shows that, land use development, slope degree, rainfall intensity and soil type have significant influences on the flood mapping. The urban growth along low-lying coastal has significance effect to flooding.

1.0 Introduction

Flood is natural event expected to become more frequent in recent tears especially in urbanization area. According to the Department of Drainage and Irrigation (DID), approximately 29, 800 km2 in Malaysia covered by flood every year. Kuantan experiences heavy flood in 1971, 2011 and 2013 due to prolonged rainfall and land use development [1]. Deforestation to illegal logging, agriculture and resettlements also cause a magnitude flood is larger and the occurrence has increased over year. The heavy rainfall in November and December 2013 forced evacuation of 37,100 peoples in certain areas of Pahang, Terengganu and Johor [2]. Flooding is a very common environmental hazard, because of low laying coasts and the development in floodplain [3,4]. The high-density populated area increases the likelihood to flooding by increasing the urban expansion to flood plain area and increase a capacity of drainage system.

GIS analysis and visual features often used in recent years for prediction flood prone areas and flood maps [5]. Department of Irrigation and Drainage (DID) has generated a flood map at Sarawak using InfoWorks River Simulation and LiDAR systems but the cost is higher due to time and labour cost to surveying a cross-section of river [6]. Digital Elevation Model (DEM) is the most feasible method that retrieved from EarthExplorer website which is open access provided from USGS [7]. GIS is integrated with Multicriteria Decisions Analysis (MCDA) to estimate the of flood risk area. The spatial multicriteria analysis was uses to score and show probability of flood risk area, while Analytical Hierarchy Process (AHP) was uses to calculate the priority weights of each factor

[8,9].

The continuous study by researches as well as governmental and private sector todetermine the flood factors and to reduce or eliminate the risk [10]. The recent research shows the factors are land use degradation, heavy rainfall and poor drainage system [1]. As such, the settlements located along the river and low slope
contributing the high risk to flooding also have potential for increasing surface runoff and flash flood [11]. The increasing land use and soil type can lead to higher flood peaks [12]. Although there is still lack of comprehensive study, the contribution of these factors at the risk of flooding. This paper aims to predict the potential flood risk areas using spatial analysis ArcGIS tools, which is Intersection Overlay and Analytical Hierarchy Process. This method is recommended for large areas, for identifying areas with high susceptibility to flooding. There are physical factors which are rainfall, slope, soil and land cover was used to generate flood prone areas [13].

2.0 Materials and Test Methods

In order to produce flood map in Kuantan, four parameters are used; land use, slope, rainfall intensity and soil texture. Flood map was develop by applying data Digital Elevation Model (DEM) and Landsat 8 download from United States Geological Survey (USGS) to generate the slope map and land use map. Soil type map was
obtained from Department of Survey and Mapping (JUPEM) and rainfall intensity data from Department of Irrigation and Drainage (DID).The potential of flood prone areas were determined using AHP. The basic concept of AHP is the use of matrix pairwise comparison to generate weight values between parameters [14]. The higher the effect on the flood, the higher the score will be. These factors were combines with the weighted overlay method to determine flood risk area. Overlay is the process of combining four flood parameters from land use, slope, rainfall and soil map by using Analysis Tools Intersection in ArcGIS to produce flood risk map. The flood risk value is determined from the total sum of scores of four parameters influencing the flood.

3.0 Result and Discussion

Land use, slope, rainfall and slope map were generated with weighted ranking shows the significance impact to flood risk. According to Figure 1 colour scales shows red area that are more likely to flood, yellow area is moderate and green area is low risk.

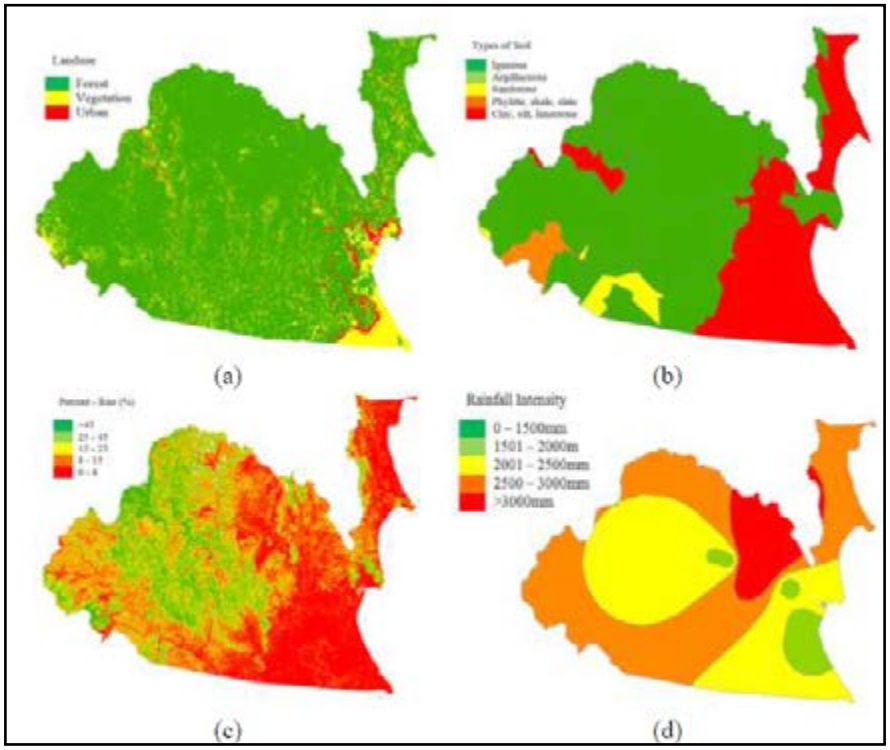

Fig. 1. (a) Land use (b) Soil Type (c) Slope (d) Rainfall

Figure 2 show the urban area and coastal area at risk of flooding. These area includes residential area, town, agricultural land and coastal line.

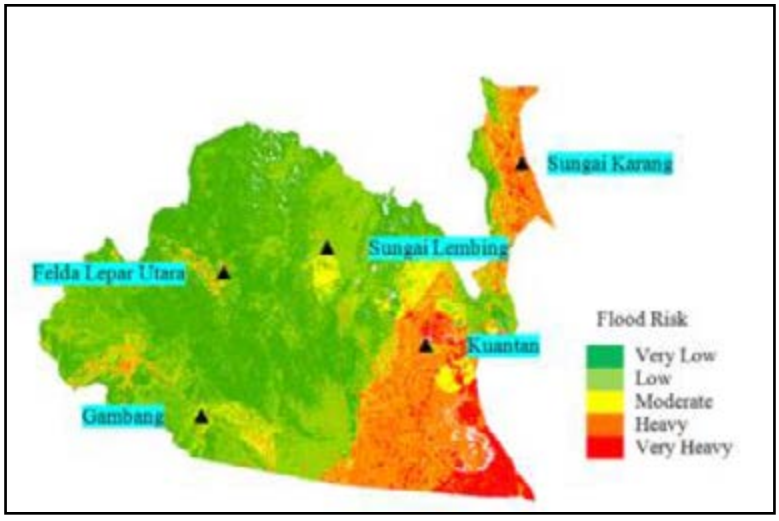

Fig. 2. Flood Risk Map at Kuantan

4.0 Conclusions

The results obtained and the observation made in this study draw some conclusions. These are:

1. Based on the Analysis Hierarchy Process, land use (41.55%) becomes the most influential in determining the risk of flooding, followed by slope (28.95%), rainfall (16.93%) and soil (12.58%) parameter.

2. Coastal urbanization areas (Kuantan town - Tanjung Lumpur) are vulnerable at increasing risk to flooding. Coastal area having a slope below than 8o is flood prone area.

3. The changes in land use associated with urban development affect flooding pattern. This areas have a high population density and the residential area stretching from Kuantan town to Tanjung Lumpur.

4. High intensity rainfall can cause flooding when the city drainage could not retain the amounts of rain.

5. Impermeable soil (clay and silt) increase the risk to flooding. Impermeable soils such as clay and shale do not allow water to infiltrate, this forces water to run-off reducing river lag times and increasing flood risk.

6. The further study, developed spatial modeling will be utilized with other parameters such as river flow accumulation, elevation on earth surface, buffer zone and the flood frequency history.

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KEBERKESANAN PENGGUNAAN BRAINY BOARD DALAM PROSES PENGAJARAN DAN PEMBELAJARAN DI KOLEJ KOMUNITI SELANDAR, MELAKA.

Nor Hidayah Ahmad Mustafa[1], Nurhidayati binti Mad Noh[2], Nur Azlin Binti Azhari[3]

Kolej Komuniti Selandar, Melaka, Malaysia.

dayah_mlk@yahoo.com, nurhidayatikksl@gmail.com, azlinazhari87@gmail.com

Kata Kunci : Brainy Board ABM dalam Pengajaran dan Pembelajaran

ABSTRAK: Penggunaan alat bantu mengajar di dalam kelas dapat meningkatkan kefahaman pelajar terhadap topik yang dipelajari. Alat bantu mengajar diperlukan bagi sebagai satu alat pemudahcara dalam mencapai objektif sesuatu subjek. Oleh itu penghasilan Brainy Board dikaji tentang keberkesanan penggunaannya ke atas para pelajar Kolej Komuniti Selandar. Tinjauan awal mendapati terdapat beberapa perkara yang mendorong kepada berlakunya penurunan gred dan kehadiran pelajar ke kelas antaranya pelajar bosan dengan kaedah pembelajaran formal. Oleh itu, seramai 31 orang pelajar Kolej Komuniti Selandar telah dipilih sebagai sampel bagi kajian ini. Kajian ini dilakukan terhadap 22 pelajar Sijil Pengoperasian Perniagaan,dan 13 orang pelajar dari Sijil Penyejukkan Dan Penyamanan Udara. Analisis statistik dengan menggunakan perisian Statical Package for Social Science (SPSS) versi 23.0 digunakan. Dapatan kajian menunjukkan impak positif terhadap pelajar Kolej Komuniti Selandar setelah menggunakan Brainy Board. Keseluruhannya, penggunaan Brainy Board mampu menjadikan proses PdP lebih menarik dan mudah difahami. Cadangan penambahbaikan pada masa akan datang adalah diperluaskan penggunaannya bukan hanya dalam proses PdP.

1.0 PENGENALAN

Kajian ini dilakukan bagi mengkaji keberkesanan penggunaan alat bantu yang dibangunkan bagi memudahkan proses pengajaran dan pembelajaran di adakan di Kolej Komuniti Selandar. Kaedah pembelajaran di kolej komuniti adalah lebih berpusatkan kepada pelajar dan lebih kepada *hands on*. Di Kolej Komuniti Selandar, pelbagai usaha telah dilakukan oleh para pensyarah bagi memastikan tahap kefahaman dan kemahiran pelajar sentiasa meningkat. Oleh itu pelbagai produk inovasi khususnya untuk digunakan di dalam proses pengajaran dan pembelajaran telah dihasilkan dan salah satu daripadanya adalah Brainy Board.

Brainy Board adalah merupakan alat bantu mengajar yang dicipta dengan elemen mesra pengguna kerana ianya mudah untuk digunakan dan dikendalikan mengikut semua subjek terutamanyapembelajaran yang melibatkan perbincangan dan penyelesaian masalah berkumpulan.

1.2 Objektif Kajian

Kajian ini mengandungi objektif yang hendak dicapai seperti berikut:

i.Mengukur tahap penggunaan dan kefahaman pensyarah

menggendalikan Brainy Board dalam pengajaran dan pembelajaran .

ii.Mengenal pasti penerimaan dan persepsi pelajar Kolej Komuniti Selandar sebelum dan selepas penggunaan Brainy Board dalam pengajaran dan pembelajaran

iii.Mengenal pasti kesan penggunaan Brainy Board dalam pengajaran dan pembelajaran kepada pelajar.

2. METODOLOGI KAJIAN

2.1 Sampel Kajian

Kajian ini dijalankan di Kolej Komuniti Selandar. Kumpulan sasaran adalah terdiri daripada pelajar-pelajar Sijil Pengoperasian Perniagaan yang mewakili program bukan teknikal dan Sijil Teknologi Penyejukkan Dan Penyamanan Udara bagi program teknikal. Dalam kajian ini jumlah sampel ialah seramai 35 orang pelajar yang terdiri daripada pelajar semester 2 hingga semester 4.

2.2 Instrumen Kajian

Instrumen kajian yang digunakan dalam proses pengumpulan data adalah set borang soal selidik. Kajian ini menggunapakai instrumen kajian lepas yang telah dijalankan. Namun pengkaji telah membuat sedikit pengubahsuaian beberapa item soal selidik agar ia bertepatan dengan objektif kajian yang dikehendaki. Ini menunjukkan indeks kebolehpercayaan berada pada tahap tinggi dan setiap item boleh diterima (Musliha Salma, 2010).

Skala Likert digunakan dalam kajian ini yang mana ianya mempunyai tahap kebolehpercayaan yang sangat tinggi iaitu sehingga 85 peratus (Mohd Majid, 1994). Skala Likert jenis lima mata digunakan dalam kajian ini seperti dalam jadual 1.

Jadual 1: Tafsiran Skala Likert

Skala	Sangat Tidak Setuju (STS)	Tidak Setuju (TS)	Tidak Pasti (TP)	Setuju (S)	Sangat Setuju (SS)
Skor	1	2	3	4	5

Data dianalisis menggunakan perisian Statistical Packages for Social Science (SPSS) versi 23.0. Interprestasi min yang digunakan dalam analisis deskriptif ini adalah merujuk kepada cadangan Creswell melalui penulisan dalam Educational Research-Planning, Conducting and Evaluating Quantitative and Qualitative Research. Ianya boleh dirujuk pada seperti jadual 2. Analisis deskriptif memberikan gambaran kepada kajian yang dijalankan dan membuat kesimpulan terhadap data yang dikumpulkan. Data yang diperolehi telah mendapat kesahihan dengan mendapat 0.891 Cronbach's Alpha, dan ini jelas menunjukkan data yang diperolehi adalah data yang boleh digunapakai. Ini menunjukkan indeks kebolehpercayaan berada pada tahap tinggi dan setiap item boleh diterima (Musliha Salma, 2010).

Jadual 2: Interpretasi Min

Julat Skor Min	Interpretasi Min
1.00 – 1.80	Sangat tidak memuaskan
1.81 – 2.60	Tidak memuaskan
2.61 – 3.40	Sederhana
3.41 – 4.20	Memuaskan
4.21 – 5.00	Sangat memuaskan

3. ANALISIS DAN KEPUTUSAN

3.4 Rumusan Keseluruhan Analisis Data

Bil	Persoalan Kajian	Purata Min	Tahap
1.	Apakah pensyarah mempunyai pengetahuan dan kemahiran dalam menggunakan Brainy Board dalam pengajaran dan pembelajaran?	4.06	Memuaskan
2.	Apakah tahap penerimaan dan persepsi pelajar Kolej Komuniti Selandar sebelum dan selepas penggunaan Brainy BoardT) dalam pengajaran dan pembelajaran?	4.10	Memuaskan
3.	Apakah kesan penggunaan Brainy Board dalam pengajaran dan pembelajaran kepada pelajar?	4.15	Memuaskan

Jadual 6 : Taburan Peratusan Responden Secara Keseluruhan Persoalan Kajian

Secara keseluruhannya, berdasarkan kepada kiraan purata min keseluruhan bagi ketiga-tiga persoalan yang dikaji berada pada tahap memuaskan. Impak penggunaan Brainy Board dalam proses pengajaran dan pembelajaran kepada pelajar mencatatkan min yang paling tinggi iaitu 4.15. Seterusnya diikuti oleh tahap penerimaan dan persepsi pelajar sebelum dan selepas penggunaan Brainy Board dalam proses pengajaran dan pembelajaran iaitu 4.10. Manakala pensyarah menggunakan serta mempunyai pengetahuan dan kemahiran dalam menggunakan Brainy Board dalam proses pengajaran dan pembelajaran mencatatkan nilai min yang terendah iaitu 4.03.

4. KESIMPULAN

Secara keseluruhannya penggunaan Brainy Board telah dapat dibuktikan memberikan kesan positif kepada pihak pensyarah dan juga kepada pihak pelajar. Namun begitu masih terdapat beberpa perkara yang perlu ditambah baik seperti kemahiran penggunaan alat bantuan ini perlu ditingkatkan oleh keda-dua pihak, dan ianya perlu sentiasa ditambah nilai kerana perancangan pada masa hadapan alat bantuan sokongan ini bukan hanya akan digunapakai pada proses pengajaran dan pembelajaran tetapi juga akan diketengahkan kepada pihak pengurusan untuk digunakan bagi tujuan perbincangan seperti di dalam mesyuarat dan taklimat.

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Innovative Travel Iron using ADXL335 and PIR sensor

N.M Rizuan 1,a,Z. Faizah2, b, M.N Nor'Ashikin3,c,
1Electrical Engineering, Politeknik Ibrahim Sultan
2 Electrical Engineering, Politeknik Ibrahim Sultan
3 Electrical Engineering, Politeknik Ibrahim Sultan

am_rizuan@pis.edu.my, bnorfaizah@pis.edu.my, cn_shikin@pis.edu.my

Keywords: Arduino, iron, ADXL335, PIR sensor, Piezoelectric buzzer

ABSTRACT: This paper is for publication in ICO-ASCNITECH 2018. Innovative Travel Iron using ADXL335 and PIR sensor is a project undertaken to solve the problem for ironing when out on vacation, camping and other outdoor activities, especially when the is no source of electricity. The development of this innovation involved the integration communication between Arduino Uno, ADXL335 and PIR sensor to activate piezoelectric buzzer. The inverter is used to change Direct Current (DC) to Alternating Current (AC) which is connected to rechargeable battery. The tests to identify the sustainability of this product; testing on whole project operation are functioning well. The integration between ADXL335 and PIR sensor make the perfect creation of the product. PIR sensor will operate when the iron has no movement in 10 seconds and activated when iron lying on the ironing board. By placing the ADXL335 sensor on the iron will allow axis X,Y and Z to be set. The buzzer will on when iron landed on the right or left side. Once the iron stand, it will switch on and operate as usual.

Introduction.

Nowadays, cloth iron was difficult to bring because of their weight is quiet heavy it also bigger in size that will need more space to keeps the iron. Then, these iron need to use power supply to switch it on. If there is no supply it cannot be used. Next, the regular iron usually had no sensor to switch off the iron when user forgot to lift iron so that will bring caution to your cloth and house. Therefore, this innovative iron is easy for user to use and bring it to anywhere. This innovative travel iron has motion sensor and ADXL335 sensor that can detect when there is no movement while iron lying on the ironing board in 10 seconds it will automatic off and buzzer will on. The temperature control is put to adjust the temperature for suitable fabric. The limit temperature for this iron is only 150˚.

A design of modern irons commonly allows the iron to be set down, usually standing on its end, without the hot soleplate touching anything that could be damaged. A thermostat ensures maintenance of a constant temperature. A temperature control dial allowing the user to select the operating temperatures that usually marked with types of cloth such as silk, wool, cotton and linen.

Block Diagram And Working. In this project, develope prototype for travel iron. It uses Arduino Uno to controls the sensor. There are two basic designs for producing household plug-in voltage from a lower-voltage DC source, the first of which uses a switching boost converter to produce a higher-voltage DC and then converts to AC[5]. The voltage of travel battery can be driven

by a 12 volt battery, and current measurements show us that battery life. The Arduino Board is programmed using the Arduino IDE software[4]. Figure

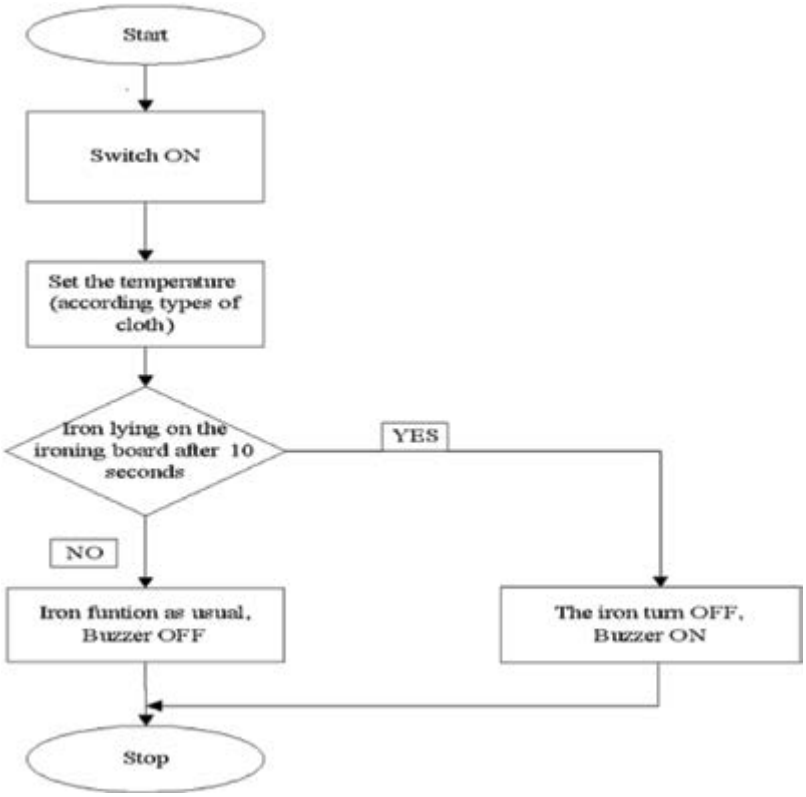


Figure 1: Innovative Travel Iron using ADXL335 and PIR sensor flow chart

Based on the Figure 2, innovative travel iron connected to the inverter to convert from AC to DC then connected to SPST relay that function to cut off the circuit [2]. The rechargeable battery supply voltage to arduino for controlling the iron. For good battery condition the LED will light up. If the battery is empty, the LED will turn OFF. To recharge the battery, used adapter and the battery will full in 1 hour. PIR sensor will sense whether there is any movement in 10 seconds while ADXL335 will detect when the iron lying on the ironing board. The buzzer will on and the iron will automatically off.

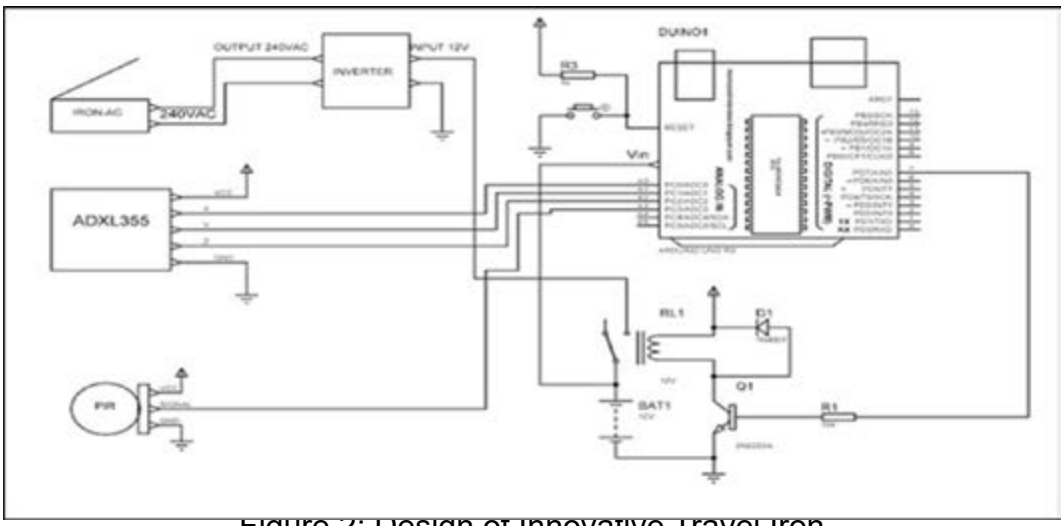


Figure 2: Design of Innovative Travel Iron

Components

ADXL335

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of ±3 g [1]. This board has the 3 axis ADXL335 from Analog Devices. This is the latest in a long, proven line of analog sensors - the holy grail of accelerometers. The ADXL335 is a triple axis accelerometer with extremely low noise and power consumption. There is no on-board regulation, provided power should be between 1.8 and 3.6VDC. Board comes fully assembled and tested with external components installed. The included 0.1uF capacitors set the bandwidth of each axis to 50Hz [1].

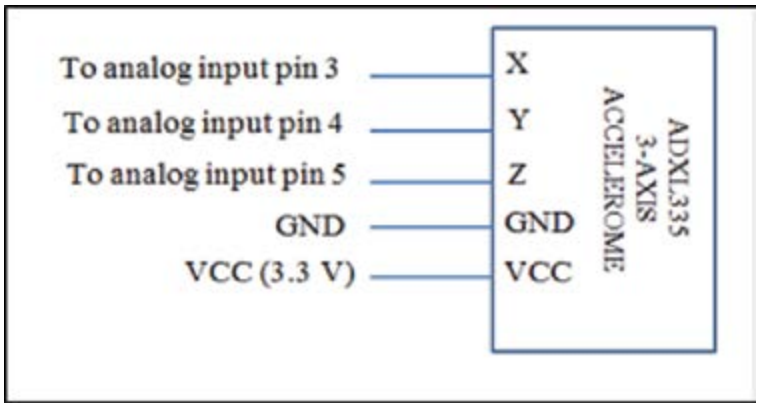
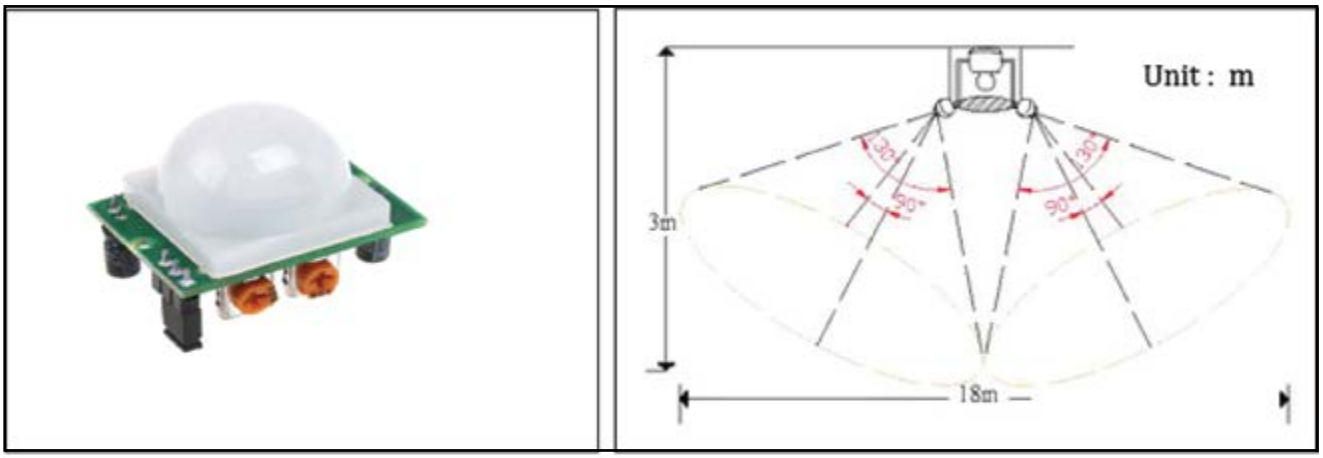


Figure 3: ADXL335

PIR sensor

The PIR sensor were choose for the project because it is suitable for heat source movement[3]. It is good source of saving energy. Can make use of these detectors in equipments as well as appliances.



a[3] b[3]

Figure 4 : PIR sensor (a) on the left and detecting area of PIR Sensor (b) on the right

Buzzer

The main indicator of this design is buzzer which is tripped when the circuit is completed. The piezoelectric element may be driven by an oscillating electronic circuit or other audio signal source, driven with a piezoelectric audio amplifier [5]. Sounds commonly used to indicate that a button has been pressed are a click, a ring or a beep.

Inverter

A power inverter, or inverter, is an electronic device or circuitry that changes direct current (DC) to alternating current (AC) The input voltage, output voltage and frequency, and overall power handling depend on the design of the specific device or circuitry. The inverter does not produce any power; the power is provided by the DC source [2]. A power inverter can be entirely electronic or may be a combination of mechanical effects (such as a rotary apparatus) and electronic circuitry. Static inverters do not use moving parts in the conversion process.

Result and Discussion

Result 1

The first result shows the final hardware design of the prototype developement. This result clearly shows how all the components required for our system is connected. The actual picture of the products refers to Figure 5.

Result 2

The second result shows how the PIR motion sensor working. The PIR sensor show it will detect when the iron no movement with in 10 seconds. It is activate when iron lying on the ironing board. This PIR sensor has sensitivity up to 20 feet (6meters) 110 degrees x 70 detection range. Refer table 1.

Result 3

The thirs result shows how the ADXL335 working. It is operates when the x, y, and z axis being set. Refer table 1.

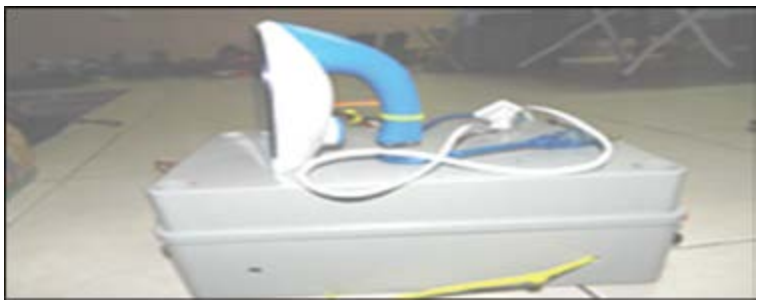


Figure 5 : The actual photo of the innovative travel iron

Table 1: The ADXL335 and PIR sensor test

No	Type of test	picture	output
1	Lying iron on cloth less than 10 seconds		Buzzer ON Iron ON
2	Lying iron on cloth more than 10 seconds		Buzzer ON Iron OFF
	Lying iron on cloth (on left side / right side / up rise)	  	Buzzer ON Iron OFF

Conclusion

The innovative travel iron has been successfully developed by using Arduino Uno as a circuit controller that controls ADXL355 and PIR sensor to operate as planned. This innovation is very helpful to anyone who enjoys travelling and doing outdoor activities which is limitation of power supplies. It is focusing on innovate the iron by using rechargeable battery and the inverter is used to change Direct Current (DC) to Alternating Current (AC). The integration between ADXL335 sensor and the piezoelectric buzzer functioning well where the iron will automatically OFF if the iron is placed on clothes over 10 seconds and the buzzer will sound as an indicator to alert user. The use of PIR sensor that placed on the iron handle also makes innovative iron very practical where if there is no movement for a long time or at least 10 seconds will cause the relay cut OFF supply to the iron. Therefore, this innovation can avoid the clothes from being damaged or burnt. All the tests to identify the sustainability on whole project operation are functioning well. Basically this product succesfully

help all the targetted user.

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Staling of Gluten Free Bread: Correlation Between Instrumental Analysis and Sensory Perception

A. Azwin1, a and A.B. Nurhamimah 2,b
1Politechnic Tun Syed Nasir Syed Ismail, Johor, Malaysia
2Politechnic Tun Syed Nasir Syed Ismail, Johor, Malaysia
aazwin@ptsn.edu.my, bhamimahbakar@ptsn.edu.my

Keywords: Staling; Gluten Free Bread; Crumb Firmness; Sensory Evaluation
Abstract. Stale bread is considered to be one of the hardest economic challenges in bakery industry. Staling is a process of bread aging where breads loses its quality resulting in a shorter shelf life. A decrease in staling was observed by measuring the rate of crumb hardening and moisture loss. This study focuses on the correlation between instrumental analysis and sensory evaluation based on crumb firmness during 72 hours of storage. Nine panels were trained periodically to familiarize with the bread sample. It was found that with addition of potato starch, xanthan gum and sorbitol in the formulation resulted in reduction of crumb firmness but increases the shelf life of the bread. The use of texture analyzer as an instrumental analysis in order to get firmness value was also studied besides the results obtained from the sensory evaluation from trained panels. The correlation between the instrumental analysis and sensory evaluation was 0.94 for the optimized formulation, thereby supports the understanding of the link. As staling occurs, crumb firmness of bread increases over time likewise reduces the sensory acceptance.

Introduction

Bread staling is a term that describes a time dependent loss in terms of textural quality or flavour. It is a main economic loss in bread industries [1]. During aging, the crumb firmness increases and crust crispiness decreases thus causing the loss of the bread flavour. Bread staling has been the subject of a number of studies to get a deeper understanding on the mechanism and modify dough formulation in order to increase the shelf life. Although there are other contributing factors, the recrystallization of amylopectin is important for the staling of bread [2].

Nowadays the addition of emulsifier, additives, or amylases can decrease the effect of recrystallization of amylopectin [3]. Starch retrogradations is a time and temperature dependent process where it proceeds faster at low temperatures, just above the freezing point. Since the rearrangement of starch molecules is simplified by a high water activity or water binding molecules such as hydrocolloids and protein, the staling rate can also slowed down by the incorporation of surfactants, shortening, or heat stable amylase.

Bread staling have various definitions as it can be referred to all of the **changes** which occur in bread after baking. However, another definition of bread staling is that it indicates the decreasing of consumer acceptance towards bakery products by changes in the crumb structure rather than those resulting from action of microbial spoilage [4]. Bread is a processed food that has a very short

shelf life ranging from 3 to 7 days and this is the major cause of staling [5]. Currently, more study is focusing on and are concern with changes in the crumbs structure during staling.

Most food scientist approach a texture problem by thinking in term of which instruments should be used in their work. This is unsatisfactory and inefficient route to solving problems in texture measurement [6]. Since, texture is a sensory property where only the human being that can perceive, describe and quantify texture. A more effective ways, refine the test procedure to give the highest correlation with sensory evaluation of texture[7].

The objective of the present work was to study the correlation between instrumental analysis and sensory evaluation based on crumb firmness in the staling process for the gluten free bread.

Material and Method

Bread Formulation

The ingredients for gluten free bread are based on flour basis. The ratio of rice to tapiocca flour was 4:1, potato starch (40g), xanthan gum (1g), skim milk powder (10g), olive oil (5g), salt (2g), yeast (2g) and water (130g). The variable parameter in the ingredients was the amount of sorbitol, where the optimized formulation uses 5g where as F1 formulation uses 7g and F2 formulation uses 3g. The ingredients for the control formulation was the same however the potato starch, xanthan gum, and sorbitol was omitted.

Bread Making Process

The main dry ingredients were mixed together for 5 minutes at minimum speed using KitchenAid Mixer (model KSM150PSER) in the stainless steel bowl with a flat beater. Yeast was dissolved in the water and sorbitol liquid was added at the same time. The batter were mixed for 15 minutes. Then 200g of batter was placed in aluminium baking pans measuring 20cm x 11cm x 6.5cm and rested in the proofer at 35oC for 45 minutes. The baking process was carried out for 30 minutes at 200oC with top and bottom heat in the laboratory oven (Hanabishi, model HA6180). All the bread was cooled at room temperature for 2 hours. The loaves were packed in a clip-on polyethylene bag and stored at room temperature for further quality and sensory analysis.

Crumb Texture Analysis

Crumb firmness was evaluated by Texture Analyzer (TA-XT plus, Stable Microsystems, UK). Texture profile analysis (TPA) was carried out equipped with 25kg load cell. The bread sample was sliced in the middle of the loaf to obtain uniform slice of 20mm thickness. Two cycle of crumb compression test was performed using the series of P/75 aluminium platen probe at test speed 3mm/s and penetration distance 15mm. The peak force of compression was reported as the firmness value [8].

Moisture Content.

The moisture content of bread crumb was measured by weight difference before and after drying in a hot air oven at 105oC [9].

Staling and Sensory Evaluation by Panels

The staling was measured by observing the crumb firmness within 3 days of storage by using texture analyzer [5]. The sensory evaluation was verified with scoring scale by nine panels from Food Technology Department of Polytechnic Sultan Haji Ahmad Shah. All the panels have been trained periodically in order to familiarised with the bread sample. The relation between these factors have been observed.

Result and Discussion

The bread with the controlled formulation has the hardest crumb texture even on the baking day as well as during the whole period of storage as seen in Table 1. However the crumb firmness for F1, F2 and the optimized formulation with varying amounts of sorbitol was not statistically different 24 hours after baking. Lower initial firmness of crumb with addition ingredients could be caused by the ability of xanthan gum as hydrocolloid to form soft gels. On the other hand crumb firmness is significantly influenced by the volume and density of the loaf. Moreover, increasing of crumb firmness directly after baking is mainly affected by rapidly retrograding of amylose [10].

After 48 hours of storage, the crumb firmness for all formulations have increased. However, it is observable that the controlled formulation had a twofold increment. The staling process became faster by drying the crumb structure which results in higher crumb firmness [11]. This can further be seen in the sensory evaluation score where the controlled bread was significantly different with others by having a score of 5.06 for crumb firmness which means the panels were neither satisfied nor dissatisfied. This shows a weak value and displays that the staling process has started.

Table 1 displayed the moisture content loss after 72 hours of storage. Moisture loss is a sign of the bread has going staling. All the sample have reduced their moisture contents day after day. But, in the control formulation the drastic loss change in moisture content which was 35.66% to 30.5% on 3 days after storage. Otherwise, the moisture content loss in optimized formulation was 48.49% to 47.29% only. This expression that the crumb moisture in the optimized bread containing sorbitol was significantly more than the control after the three day of storage. Sorbitol had high capacity to absorb and hold more water than other polyols sources keep the moisture remain in the crumb [12].

In order to get a step closer to consumer perception, a sensory profiling including texture as parameters was carried out. Sensory evaluation is a powerful tool with a broad range of applications in the bakery industry[13]. An in house sensory panels consisting of nine trained panellists was used for the sensory evaluations. The descriptors for crumb firmness found by the panellist to explain the forced required to compress the crumb in bread during storage, with nine scoring scale, where the minimum value is 1 for soft and maximum value is 9 for hard.

Three days of storage gives a deeper effect on the sensory evaluation score especially on the controlled formulation. The crumb firmness from the texture analyzer showed it drastically increased to 599.37N. The panels gave a high score for controlled bread after 72 hours, which is 6.72 which means the bread was moderately hard. At this stage the bread was still undergoing staling process.

There were no significant differences observed between the F1 and F2 formulation in sensory evaluation during 72 hours after baking. However, the optimized formulation have significant differences between other formulation. The results both from texture analyzer and sensory evaluation from the panels for crumb firmness for 72 hours storage period assign a lower value including moisture which means the bread is still in the soft condition and the moisture content is preserved. In truth, sensory perception plays an important role in consumer preference and feeling to purchase of bread [14].

Table 1. Crumb firmness and moisture content of gluten free bread for 72 hours of storage.

Hours	Formulation	Crumb Firmness		Moisture content %
		Texture analyzer force (N)	Sensory evaluation score	
24	Control	65.69 ± 0.08	4.28 ± 0.36	35.66 ± 0.17
	Optimized	2.63 ± 0.04	1.89 ± 0.33	48.49 ± 0.49
	F1	3.34 ± 0.02	2.28 ± 0.36	47.27 ± 0.79
	F2	2.85 ± 0.05	2.09 ± 0.33	46.54 ± 0.21
48	Control	146.65 ± 0.38	5.06 ± 0.17	33.39 ± 0.07
	Optimized	4.21 ± 0.01	2.28 ± 0.36	48.22 ± 0.05
	F1	5.42 ± 0.15	2.80 ± 0.36	46.85 ± 0.36
	F2	4.95 ± 0.05	2.40 ± 0.33	46.10 ± 0.68
72	Control	599.37 ± 0.15	6.72 ± 0.36	30.50 ± 0.33
	Optimized	8.23 ± 0.01	2.67 ± 0.50	47.29 ± 0.40
	F1	9.58 ± 0.65	3.25 ± 0.36	45.72 ± 0.36
	F2	8.85 ± 03	3.00 ± 0.50	45.33 ± 0.50

Table 2 presented the R2 value for all sample of bread formulation. The value of R2 is aproaching to 1 mean there were a high correlation between the factors. Clearly showed that all the correlation value for all sample is more than 0.9, which mean the texture analyzer data for crumb firmness was supported by the sensory evalution data from panels.

Table 2. R-squared value for all formulation

Sample	R^2
Control	0.969
Optimized	0.941
F1	0.947
F2	0.999

In Figure 1, the linear graph illustrated the results from firmness evaluations made on the texture analyzer plotted against the average sensory score of firmness evaluated by mouth for the bread with controlled formulation. The result showed that there was a good correlation between the sensory perception of firmness and the texture analyzer evaluations with R2=0.9405. This shows that there is a good correlation between instrumental analysis and sensory evaluation from panels. However, a good correlation does not guarantee that differences on the texture analyzer can actually be perceived and vice versa.

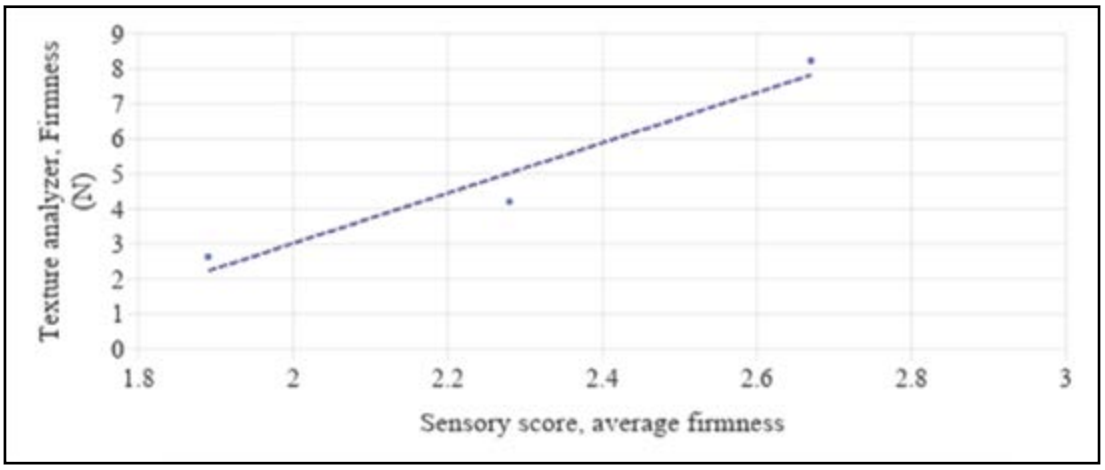

Fig. 1. The correlation between firmness perceived by sensory evaluation and texture analyzer for optimized formulation

Futhermore, this study can be continued with other sensory atrributes such as springiness and cohesiveness of bread crumb, in order to see the effect of staling and it's correlation with texture analyzer result. Besides, the use of more trained panel in sensory evaluation is suggested to get more persis result.

Conclusion

Small differences were observed in the sensitivity of instrument and human, but the results show

that the texture analyzer will give a good indication of the sensory perceived for the bread firmness. The correlation between the instrument data from texture analyzer and sensory evaluation evaluate by panel was 0.94 for optimized formulation, thereby supports the understanding of the link. The sensory score brings a step closer to the consumer's experience when eating the bread. Hence, sensory evaluations strongly enhance an instrumental information, yet can be used to ensure that applied instrumental methods provide sensory relevant information.

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Personal Internet Use: The Use of Personal Mobile Device at the Classroom

H. Hashim 1, and Z. Othman 2,
1Selangor, Shah Alam, Malaysia
2Selangor, Shah Alam, Malaysia
ahasnihashim@psa.edu.my, bzakiah@psa.edu.my

Keywords: Gen Y; Personal internet use; Problematic internet use; Habit; Facilitating condition.

Abstract. This paper reports the result of the factors that influence personal internet use among generation Y (Gen Y) of Polytechnic Sultan Salahuddin Abdul Aziz Shah. The students answered set of self-administrated questionnaires. The questionnaires were divided into sections A and B where section A consists of demographics profiles and section B consists of all the questions related to personal internet use, problematic internet use, habits and facilitating condition. The findings revealed that there were significant positive relationships between facilitation condition, habit and problematic internet use with personal internet use. Data relating to the constructs were collected from 184 respondents of Gen Y at Politeknik Sultan Salahuddin Abdul Aziz Shah. This study also provides an opportunity to expand the research on the different background of the respondent, either through other education background, different level of age and also level of internet literacy.

Introduction

Internet usage literacy is very important nowadays, in the world which is keep on going in very fast phase. With the existence of the internet, people are connected with outside world, able to get the information needed anytime and from everywhere using the powerful tools called internet services. Not only to get an information, the internet can help people connected with others through the use of internet either via mobile phone, smartphone, tablets, personal desktops and other gadgets. With this new type of communications services, almost all level of age relies on the internet for communications, performing financial transactions, getting information either with the real world or through media social platform. With the new wave of an internet phenomenon, it is transforming education, research, entertainment and commerce connected through a new way of communication [8].

Background of Personal Internet Use in Malaysia

Internet revolution in Malaysia started with the beginning of commercial internet in 1996, when MIMOS or Malaysian Institute of Microelectronic System launched Jaring as first Malaysian ISP. The growth of internet host began with its first Cari Internet search engine and web portal [3]. Later on, mobile network providers such as Celcom, TMTouch, Digi, Maxis and other telecommunication companies offered internet mobiles services with affordable rate. This made the usage of internet in Malaysia increased tremendously. Internet usage showed tremendous hike from the year 2000 to the year 2010, with the growth of 444.8% worldwide. Asia's users contribute a larger proportion (42.2%) of internet users, followed by Europe (24.2%) and North America (13.5%). Malaysia, one of

the Asia countries was among the Top 10 highest number of internet users in the year 2009 alone. In the year 2010, Malaysian internet users recorded 16,902,600 and increased to 25,084,255 in 2018. This showed that there is 148 % increment in eight year time and this involved 64.6% of the total population [15]. Internet user population increased 880% since year 2006 which comprised of 76.1% user from between age 20 and 49, while 5.8% from those of aged 18 and below [10]. In par with the initiatives Ministry of Education which aimed that through teaching and learning activities, lecturer should include materials which need to be alligned with 4.0 Industry Revolution and involved Internet of Things (IoT) [1].

Problem of Statement

With the evolution of mobile phone, smartphone, tablet and supported by attractive and competitive internet fees, anyone is easily subscribed even with being billed or just buy prepaid sim card which affects the usage of the internet are widely used by higher learning students in Malaysia. More students bring their devices during teaching and learning session. Most of the higher learning institutions encourage students to use the internet as part of their e-learning process. Smartphone is the main medium on how Malaysia use the internet. [2] Currently, there are 18.6 million internet users in Malaysia and about 84.2% of them are Facebook users. However, via their devices, students nowadays not only using the internet to find related material with their subjects, but they privately use the internet for their personal interest. [14] A social media analytics platform, the majority of Malaysian Facebook account holders are between 18 and 24 years old, and they make up 33.1% of the users in the country. Students also are engaging with a number of different applications on their smartphones and tablets. Almost 60% of the claims to regularly use games (73%), music (67%), entertainment (64%) and social networking (64%) apps, with a majority also uploading photo and video (53%) apps to use. With the high penetration towards using their personal mobile device for a matter that not related to their studies, this will give bad impact on the attention span while in the classroom. Therefore it is a necessary for the researcher to look at this issue as even with technologies, as the concentration of students during learning session will be distracted due to the permission using of their personal internet.

Objectives of the research

Objectives of this study is to determine the relationship between problematic internet use and personal internet, to identify the relationship between habit and personal internet and also to identify the relationship facilitating condition and personal internet use of Gen Y.

Scope of the Study

The research is focused on personal internet use among students of Politeknik Sultan Salahuddin Abdul Aziz Shah. It is further highlighted on the personal internet use in classroom by generation Y in Malaysia, particularly young generations.

Significance of the Study

This study is conducted to identify the main factors that influence personal internet use

among Gen Y. The researcher also will try to determine of core problems, whether the educators or regulator will be able to develop interactive programs and design relevant courses or rules which can help assist to make fully utilize of teaching and learning session via their personal internet use. It is also important in order for higher education level institution, to put certain restriction in order to ensure their teaching and learning session can achieve the highest impact without any obstacle especially with the usage of personal use of internet.

Limitations

This study is necessary for the researcher to explore in depth and further on the subject. Education world are having difficulties in maintaining interactive session, if students themselves cannot give full concentration during teaching and learning session. Research on quantitative method will be used which is well known to most academicians. However, there may be vary unforeseen information that researchers lack to gather because million information available online, printed, published, reported and also by verbal.

Literature Review

Personal Internet Use

With the affordability of internet, everybody can use internet from everywhere as long they have the internet and also with compatible devices. People nowadays cannot live without internet. Most of the university students make use of internet not only for purchasing, but also to prepare their academic assignment, do research, sent an email, and also sources of their entertainment [7]. Gen Y in UK spent more time on internet to communicate, general surfing or browsing, social media, entertainment, look for work or studies information (66% vs. 50%) and also search for leisure information [8]. This proved that Gen Y widely use the internet not only for their study, but also to any other related activities that concern them.

Problematic Internet Use

Problematic internet use as excessive or poorly controlled preoccupations, urges, or behaviours regarding computer use and Internet access that lead to impairment or distress [17]. The majority of respondents (64%) use their laptops to access the internet, while 21% use their desktops to access the internet and 12% stated they use their smart phones to access the internet. This clearly indicates that the tendency to use laptops and smart phones to access the internet is on the rise [13].

Habit

habit as a behavior pattern acquired by frequent repetition or physiologic exposure [18]. Habit was found to be the strongest predictor for personal Internet use [4].

Facilitating conditions

By performing online banking, transactions can be performed without have to walk in personally over the counter [5]. However, due to no personal contact with the officer from the bank, banks must deliver higher service quality in order to compete with other banks in order to attract more customers to use online banking. Meanwhile, 50 % of respondents in the study [12] agreed that internet banking is convenient and flexible ways of banking and it also have various transaction related benefits.

Gen Y

Generation can be best defining as a group of people or society which about same age or within one particular group of age [6]. Gen Y or normally known as Gen Y is the generation of people born during the 1980s and early 1990s. Gen Y also known with high numbers of births, from their parents which are from the Boomer Is and most of the Boomer IIs. Most of the college students, particularly those are from generation Y are having high level of awareness about the internet [16]. This trigger that most of the generation Y are well informed about internet use, however the higher learning institution should provide adequate facility in order to equip them to be full aware of internet, and particularly in this study is online banking.

Theoretical Framework

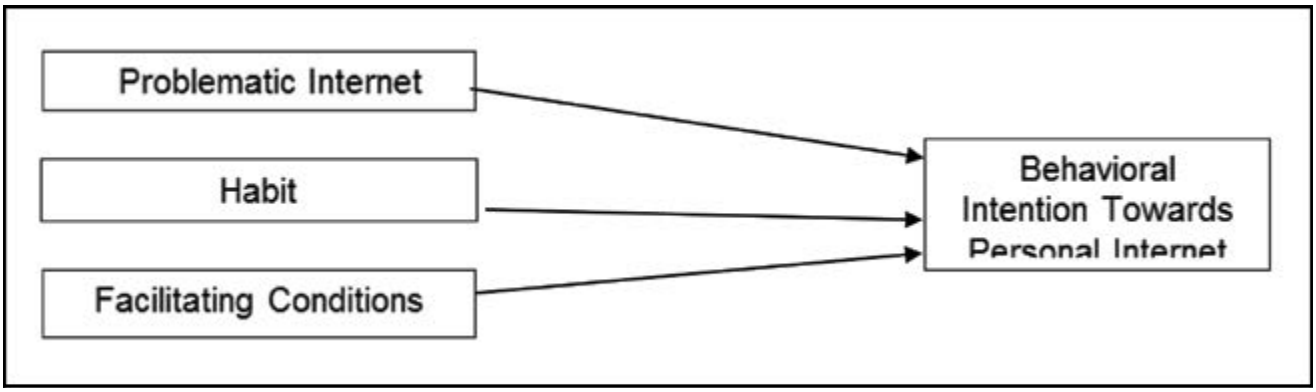

Chart 1: Framework Based on UTAUT

Questionnaires have been adopted and adapted from earlier study which investigates the level and determinants of personal internet use using personal device based on problematic internet use, habit, facilitating conditions and locus of control at workplace [4]. However only three variables been used in this research which are problematic internet use, habit and facilitating conditions.

Research Methodology

This study is descriptive in nature to utilize research methodology. In completing this study, the researcher will use quantitative research methodology. The questionnaires distributed to the Politeknik Sultan Slahuddin Abdul Aziz Shah students in the amount equal to the sample size of 184 respondents. Questionnaires are divided into sections A and B. Section A, consist of demographics profiles and in section B, 1 dependent variable and 4 independent variables will be asked. All variables constructed in section B was based on proposed theoretical framework and using Likert

scale measurement [11].

Analysis and Findings

Reliability test will be performed by using Cronbach's Alpha. This test will indicate how well the items positively correlated to one another. If the result of Cronbach's alpha is close to 1, it means the internal consistency reliability is higher [11]. The Cronbach's alpha test on 184 respondents showed that all constructs are exceeding the minimum alpha value of 0.6.

Table 1 Summary of Reliability

Variables	Cronbach's Alpha	No of Items
Problematics Internet Use	0.726	7
Habit	0.751	5
Facilitating Condition	0.838	5
Personal Internet Use	0.749	5

The strength and direction between two different variables can be analyzed using linear relationship Correlation analysis [9]. Pearson Correlation Coefficient analysis will be used to test of the hypotheses of this study.

Table 2 Summary of Correlations

Variables	Correlations
Problematics Internet Use	0.451
Habit	0.502
Facilitating Condition	0.539
Personal Internet Use	1.000

As for Pearson Correlation Analysis was performed on 184 respondents, all independent variable are strong positively associated with the Personal Internet Use (PIU). Facilitating Condition (FC) has the strongest correlation with Personal Internet Use (PIU) (0.539), followed by Habit (H) (0.502) and Problematic Internet Use (PIU) (0.451). Based on the correlation analysis also , we can accepted all hypotheses as the p values are less than 0.05. Therefore there are significant relationship between Facilitating Condition, Habit and Problematic Internet Use with Personal Internet Use of Gen Y.

Discussion and Conclusions

Internet use played an important roles nowadays in our live. Most of us rely on internet to perform our personal matters, work related matters, perform financial transactions, parenting advice, marriage tips and even getting more information related almost about everything via internet. Furthermore, cost of using internet are getting cheaper than before either you are prepaid or postpaid user. User can be connected with internet either when they are on the go (using mobile data), or they at places which equipped with WIFI facilities. However when user more concentrate with mobile phone or android, they tend to forget what is happening around them. The use of personal mobile device

inside classroom not only can enhance student knowledge and their IT skills, but it also is the fastest way to get additional information about their studies. However if the facilities is misused by them, this will lead to disturbance during teaching and learning session. They will lose concentration, and may lead to unable to gain anything during class session. Therefore, it is important for the students, themselves to control their personal internet use inside classroom or during teaching and learning session. Educator, teacher or facilitator also must play the roles in order to get involvement form student. They can provide tutorial which involved internet use or mobile related material or activities. Indirectly this can help to make use the internet and mobile device to enhance the quality of teaching and learning session.

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Identification of Main Factors in Safety Health and Environment (SHE) In the Construction of Toll Road Projects

Fajar Susilowati1, a and Iwan Supriyadi2,b
1Politeknik Negeri Jakarta, Indonesia
2Politeknik Negeri Jakarta, Indonesia
afajar.susilowati@sipil.pnj.ac.id, biwan.supriyadi@sipil.pnj.ac.id

Keywords : Construction Project; Safety Culture; SHE

Abstract. The construction of toll road projects requires an intensive implementation of safety, health and environment (SHE) in which a safety culture environment should be created in such a way to provide the safe working condition. This research identifies and analyzes the factors influencing the said safety culture. This is a descriptive study with a quantitative approach using factor analysis methods. There are 6 (six) factors which will be analyzed including top management's commitment, SHE regulations and procedures, communication, worker competence, work environment, and worker involvement in the plan and implementation of SHE. These factors will then be categorized as worse, bad, quite good, good, and very good. The results indicated that the communication is categorized as "good", while the involvement of workers in the SHE and top management's commitment are categorized as "bad". As such, these last 2 (two) factors are those mainly influencing the lack of safety culture at site. It is strongly advised that the companies optimize the safety culture environment starting from the top management by putting the implementation of SHE as priority and urge workers to participate in the plan and implementation thereof, so that the workers have the personal responsibility during the construction for the smooth implementation of SHE.

Introduction

The construction of a project is known as one of the most hazardous activities. The article written in the Kompas (one of the Prominent Indonesian Newspaper) of February 15, 2018 said that approximately 8.1 million construction workers in Indonesia recorded in 2017, only 365,471 are qualified or experts. Meanwhile, the number of skilled workers is about 1.7 million consisting of 1.11 million High School graduates and 675,669 Vocational High School graduates. The majority of unskilled workers are those Primary School graduates of 3.94 million, and Elementary School of 2.03 million.

Data from the same newspaper of March 7, 2018 also mentioned that within seven months period, 14 (fourteen) cases of work accidents have occurred. Due to the fact, the government took a firm stand by temporarily halting the construction projects that have elevated structures.

In each construction project naturally, there must be some standards and regulations that have been applied to the methods of work undertaken in its relevant construction projects. However, in reality based on initial observations in research locations, many obstacles were still encountered, either from the contractor or worker, in the implementation of SHE standards and regulations.

Among construction worker, most injuries or accidents at work happened because of the lack of knowledge of SHE for example performing unsafe activities at the workplace. In addition, there are still other factors that may influence the non-fulfillment of the standards and regulations of SHE on a construction project as seen in the Outer Ring Outer Ring Road (JORR) W2 Utara Section II Package 4 Project. The said Project is located in Jakarta, Indonesia.

The research objective is to identify and analyze the factors that shape the SHE culture and determine the main factors that influence the SHE culture in the toll road construction project.

Culture of Safety Health and Environment (SHE)

The concept of SHE culture is a part of the organization culture which combines behaviors, attitudes, and values. Whilst the result is performance, that moves the organizational machine or in other words it is a top priority in the organization. Through the commitment to SHE, it is expected that work accidents can be minimized, since work accidents occurred in construction projects will be one of the causes of disruption or cessation of project work activities [1]

The findings one of study revealed that the construction managers will improve the construction workers' attitude towards safety, health and environment and also good safety culture in the building construction industries [2].

Risk of failures can be exist on any job activity, and when a work accident occurs, however small it is, can result in losses. These include damage, organizational disorder, grievance, disability, and even death. Factors that affect the occurrence of work accidents include SHE training, top management's commitment, work environment, worker awareness, regulations and occupational health and safety procedures, availability of SHE signs in the workplace, and workers' communications. In addition, the level of work experience is also an influential factor ([3]

Occurrence of work accident can be categorized into 2 (two). First, the mechanical and environmental factors (unsafe condition), while the second one is the human factor (unsafe action). Previous studies have shown that the human factor plays an important role against the occurrence of occupational accidents that is between 80 to 85%. Further, it has a Risk Level L (Low) of 56%, in particular on the awareness in the use of Personal Protective Equipment (PPE) [4]. A worker, who performs unsafe acts, has a background why doing such actions. Basically, human behavior is a reflection of various psychological conditions such as knowledge, desire, interest, emotion, will, thought, motivation, perception, attitude, reaction, etc. [5].
The factors influencing safety on construction sites, namely [6]:

a) The historical factor is assessed by the background and characteristics of the individual, such as age and experience.

b) The economic factor is determined by the monetary values which are associated with safety such as, hazard pay.

c) The psychological factor is assessed by the safety behavior of fellow workers on site including

supervisors.

d)The technical and procedural factors are assessed by the provision of training and handling of safety equipment on site.

e)The organizational and environmental factors are assessed by the type of policy that the management adapts to site safety.

Based on previous research, it can be concluded that the culture of SHE occurs as a result of several dominant factors, i.e. : Top management's commitment, SHE regulations and procedures, Communication, Worker Competence, Work environment, and Worker involvement [7].

Methods

This research is a descriptive study using a quantitative approach. It is conducted by the survey analyzing the factors that cause the lack of the SHE culture in the toll road construction Project. The total respondents are 75 (seventy five) workers and 5 (five) people of project management level. One step in this study is the literature study to determine the variables that will serve as a research instrument. The instruments are based on dominant factors consisting of 6 (six) variables i.e. [7] :

a) Top management's commitment (X1)
b) SHE regulations and procedures (X2)
c) Communication (X3)
d) Worker Competence (X4)
e) Work environment (X5)
f) Worker involvement (X6)

The above 6 (six) factors are variables that are measured by a questionnaire to be filled in based upon the perception of respondents. Each variable will be explored to be some questions using Likert scales (score 1-5). The research used a descriptive analysis to explain the data in general by using "mean". All the score will be summed and calculated to find the mean. Then the mean score will be interpreted and classified into (5) five categories as follows:

a) A mean score (1.00 - 1.49), "worse" category.
b) A mean score (1.50 - 2.49), "bad" category.
c) A mean score (2.50 – 3.49), "quite good" category.
d) A mean score (3.50 – 4.49), "good" category.
e) A mean score (4.50 – 5.00), "very good" category.

The result thereof shall then be illustrated in the bar chart.

The main factor was determined by the mean scores. Based on the mean scores, the indicators and factors can be sorted. The factors with a mean score of less than 2.5 are categorized as bad or worse category. They are the "most dominant factors" to create the lack of the SHE culture condition in the said project.

Results and Discussions

The analysis was performed on the whole of SHE culture factors as above which were obtained from the filled in questioners by workers and managements. The Bar Charts figures were provided to illustrate the analysis result of the two, namely Figure 1 of Worker Respondent and Figure 2 of Management Respondent.

The following Figure 1 is a bar chart of the analysis result of all SHE culture factors, X1, X2, X3, X4, X5, and X6, presented based upon the response of the workers respondents.

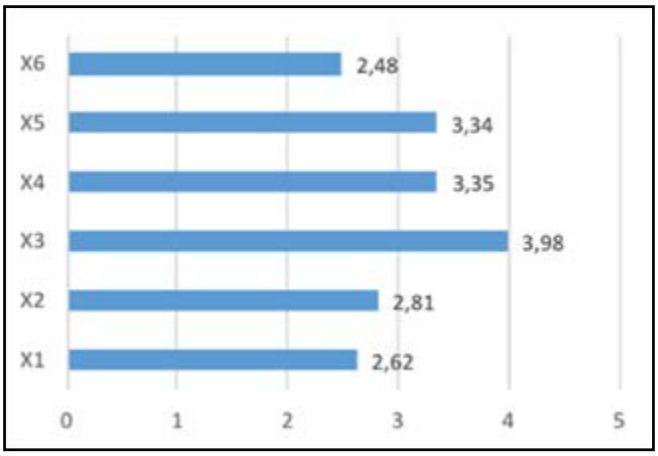

Figure 1. Analysis Result of SHE Culture Factors from The Worker Respondents

The above Figure 1 showed that X6 (Worker Involvement in SHE) factor has the lowest score of 2.48 (a Mean Score of < 2.50) which justifies that this is the most dominant factor causing the lack of fulfillment of SHE culture in the captioned project based on the views of the workers' respondents. This also indicates a lack of workers' sense of responsibility to implement the SHE properly. Workers often ignore situations or circumstances that endanger their life during the construction of the project.

In contrast, the X3 (Communications) got the highest mean score of 3.98 which constitutes the strong point to improve the SHE culture therein. There has been a good communication system in the project related to SHE implementation, but this does not guarantee that workers will have awareness in the implementation of SHE.

Figure 2 below depicts the analysis result of SHE culture factors, X1, X2, X3, X4, X5, and X6 based on the response of the management respondents.

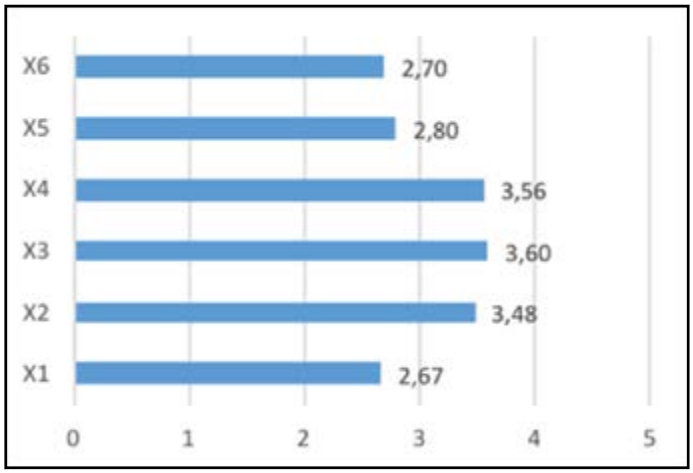

Figure 2. Analysis Result of SHE Culture Factors from The Management Respondents

It must be understood that the perception of management respondents of SHE culture factors is different from that of workers. There is no factor with a mean score below 2.5. The X1 (Top Management's Commitment to SHE) is the lowest score factor with a mean of 2.67. The X3 (Communications) and X4 (Workers Competence) are top 2 highest score factors of 3.60 and 3.56 respectively. The interesting point of these two figures is that the X3 (Communications) is placed in the highest mean score. This shall mean that the communication is the dominant factor that most reflects the establishment of SHE culture in the project.

For better understanding, Table 1 below was prepared to compare all analysis result of SHE culture factors between respondents' and workers' views:

Table 1. Comparison of Analysis Result of SHE Culture Factors

	Worker Respondent	Management Respondent
Factor with Highest Score	X_3	X_3
Factor with Lowest Score	X_6	X_1

It can be seen that both groups of respondents in this research have the same view about the main factor that has the highest score in establishing the SHE culture in the project, namely X3 (Communications). Factor X3 has a good influence in the establishment of SHE culture in the project. The delivery of information within the organization (project) has been clearly understood by both parties, thus facilitating the establishment of SHE culture.

Another thing is that both groups of respondents have a slightly different perception of the factors that cause less the establishment of SHE culture in the project. The managements' respondents put X1 (top management's commitment) as the lowest score, and the workers' respondents put X6 (workers' involvement in the SHE) as the lowest score. It can be said that workers' involvement in

the SHE culture is still less in practice as well as participation of top management's commitment. The SHE culture will be more effective if direct involvement of workers and strong commitment from the top management in the SHE have been implemented correctly and continuously.

The rank (highest to lowest) of factors affecting the health and safety of the Toll Road Project based on the assessment and perceptions of the two respondents is X3 (3.79), X4 (3.46), X2 (3.15), X5 (3.07), X1 (2.65), and X6 (2.59). As such, the X6 (involvement of workers in SHE) factor needs most special attention in the implementation of SHE to create workers' personal sense and responsibility in the implementation of SHE leading to the successful completion of the project.

Conclusion

The result of the research concluded that "communication" ranks first as the most influence factor in the creation of safety culture in the toll road construction project. The workers' and the managements' respondents have slightly different views on the dominant factors that influence the lack of a safety culture. From the angle of the workers, the workers' involvement in the SHE is the least factor, while from the assessment of the management "the commitment of top management involvement" in the SHE lies on the bottom score. However, these 2 (two) factors are still possible to be reviewed and improved for effective implementation of a safety culture environment therein. The combination of the assessment from the workers and management has resulted in the lowest rank factor of "workers' involvement" in the SHE. It most requires special attention by the related parties involved in the construction, so that the proposed project can be executed smoothly with zero accidents.

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KEBERKESANAN PENGLIBATAN AKTIVITI KOKURIKULUM TERHADAP PEMBANGUNAN SAHSIAH PELAJAR KOLEJ KOMUNITI SEGAMAT 2 MELALUI PENDEKATAN MODEL KIRKPATRICK

Hasimahwati Binti Abu Yamin
Unit Sijil Teknologi Maklumat, Kolej Komuniti Segamat 2, Segamat, Malaysia
shim_apekfan@yahoo.com.my

Kata kunci: Sahsiah pelajar; Kokurikulum; Interpersonal; Intelektual; Emosi; Model Kirkpatrick.

Abstrak. Aktiviti kokurikulum adalah sebahagian daripada proses pengajaran dan pembelajaran di institusi pengajian tinggi. Ia berperanan sebagai pelengkap kepada keberkesanan pengajaran dan pembelajaran (PdP). Tujuan kajian ini adalah untuk mengukur keberkesanan penglibatan pelajar dalam aktiviti kokurikulum terhadap pembentukan sahsiah pelajar di Kolej Komuniti Segamat 2. Objektif kajian ini adalah untuk mengukur sama ada penglibatan pelajar di dalam aktiviti kokurikulum dapat mengetengahkan bakat kemahiran interpersonal pelajar, menganalisa sama ada terdapat pengaruh positif dari segi pembangunan intelektual pelajar serta mengkaji bagaimana pelajar dapat menguasai emosi kendiri mereka dalam menghadapi cabaran kehidupan. Kajian ini adalah berbentuk kuantitatif dengan menggunakan borang soal selidik. Hasil dapatan dianalisa menggunakan perisian komputer Statistic Package for Social Sciences (SPSS). Penyelidik menggunakan model Kirkpatrick untuk menilai sejauh mana aktiviti kokurikulum yang dilaksanakan oleh Kolej Komuniti Segamat 2 (KKS2) memberi impak kepada pelajar dari segi kemahiran interpersonal, pembangunan intelektual, dan pengurusan emosi pelajar. Hasil kajian mendapati bahawa pelajar KKS2 memberi reaksi yang positif terhadap penglibatan dalam aktiviti kokurikulum yang telah dijalani. Mereka mampu menunjukajar dan mengaplikasikan semula apa yang dipelajari semasa latihan kepada kumpulan audien yang terpilih. Pelajar juga mampu mempamerkan mutu komunikasi, komitmen dan keyakinan yang tinggi dalam diri mereka sendiri apabila berhadapan dengan audien. Mereka mampu bekerja dalam kumpulan tanpa mendiskriminasikan idea pelajar lain serta mengiktiraf bakat masing-masing. Kesimpulannya, aktiviti kokurikulum mampu membangun dan menambah baik sahsiah seseorang pelajar. Ini kerana, aktiviti kokurikulum menonjolkan kelebihan pelajar, memperbaiki kekurangan interpersonal, mencambah pembangunan intelektual, memperbaiki pengurusan emosi serta mampu mengajar pelajar menerima perbezaan pendapat secara lebih terbuka.

Pengenalan

Aktiviti kokurikulum adalah sebahagian daripada proses pengajaran dan pembelajaran (PdP) di institusi pengajian tinggi. Kepentingan program ini juga setara dengan kepentingan aktiviti di dalam bilik kuliah kerana peranannya merupakan penyumbang dan pelengkap kepada keberkesanan PdP. Aktiviti kokurikulum adalah kegiatan yang dijalankan di luar bilik kuliah termasuklah kegiatan sukan, kelab dan persatuan, lawatan sambil belajar, kursus dan bengkel, serta aktiviti luar kuliah yang lain.

Kolej Komuniti Segamat 2 (KKS2) yang mula beroperasi pada tahun 2003 telah teguh menunjang aspirasi pendidikan negara sebagai institusi yang menawarkan alternatif pembelajaran

diploma dan sijil secara sepenuh masa dan pembelajaran sepanjang hayat melalui penganjuran kursus-kursus pendek kepada komuniti. Bilangan pelajar semasa bagi program Diploma Solar Fotovoltan (DTS) adalah seramai 15 orang, Sijil Teknologi Elektrik seramai 100 orang, Sijil Teknologi Maklumat seramai 49 orang dan Sijil Teknologi Senibina seramai 40 orang.

Pelajar KKS2 datang dari latarbelakang sosiobudaya yang berbeza. Oleh itu, kajian ini dijalankan untuk merungkai sama ada aktivtiti kokurikulum yang dihadiri pelajar mampu membentuk sahsiah terpuji pelajar KKS2. Kajian ini akan dinilai menggunakan Model Kirkpatrick. Ia akan membincangkan tentang Kemahiran Interpersonal (KI), Pembangunan Intelektual (PI) dan Pengurusan Emosi (PE) pelajar selepas menghadiri aktiviti kokurikulum sama ada di dalam atau di luar kolej. Pecahan jenis aktiviti yang telah diikuti oleh pelajar bagi tahun 2018 adalah (1) Sukan dan permainan seramai 119 orang, (2) seminar, kursus, bengkel, program dalaman dan luaran melibatkan 201 orang, (3) pengurusan program dalaman atau luar kolej melibatkan 50 orang, (4) pertandingan kemahiran dalam bidang pengajian melibatkan 26 orang, (5) pertandingan inovasi melibatkan 44 orang, dan (6) program pembangunan keusahawanan melibatkan 38 orang.

Melihat daripada data responden ini jelas menunjukkan aktiviti kokurikulum telah menjadi sebahagian daripada sesi pembelajaran luar kuliah bagi setiap pelajar KKS2 tanpa mengira bidang pengajian dan latarbelakang sosiobudaya. Rajah 2 menunjukkan kekerapan penglibatan pelajar dalam aktiviti kokurikulum bagi tahun 2018. Seramai 75.5% pelajar telah menghadiri sehingga 6 buah program setahun, manakala 24.5% pelajar telah menghadiri lebih 7 kali program seumpamanya sepanjang tahun 2018. Pelajar KKS2 berada dalam skala umur 18 – 27 tahun dengan majoriti adalah pelajar lepasan Sijil Pelajaran Malaysia (SPM) yang rata-ratanya berumur 18 dan 19 tahun.

Jadual 1. Kekerapan penglibatan Aktiviti Kokurikulum.

	Kekerapan	Peratusan Populasi
1 – 3 kali setahun	86	42.2
4 – 6 kali setahun	68	33.3
7 – 9 kali setahun	25	12.3
Lebih 10 kali setahun	25	12.3
Jumlah	204	100.0

Pernyataan Masalah

Aktiviti kokurikulum merupakan aktiviti wajib yang disertai oleh semua pelajar daripada peringkat sekolah, kolej vokasional dan membawa kepada peringkat intitusi pengajian tinggi. Melalui aktivti luar bilik kuliah ini, para pelajar didedahkan kepada pelbagai suasana pembelajaran yang mampu mencakna tahap kecergasan dan kecerdasan seseorang pelajar. Pelajar KKS2 telah terlibat di dalam aktiviti-aktiviti berunsurkan (1) sukan dan permainan (58.33%), (2) seminar, kursus, bengkel, program dalaman dan luaran (98.52%), (3) mengurus program dalaman / luaran kolej (24.5%), (4) pertandingan kemahiran dalam bidang pengajian (12.74%), (5) pertandingan inovasi (21.56%) dan (6) program pembangunan Keusahawanan (18.62%). Di mana, pecahan data ini

adalah bagi setiap 204 orang responden.

Namun, para pelajar yang terlibat dengan aktiviti kokurikulum ini masih menghadapi masalah kemahiran komunikasi berkesan dengan golongan pendidik, rakan sebaya dan persekitaran. Para pelajar ini masih menggunakan laras bahasa yang kurang sopan dan mencarut apabila berinteraksi dengan rakan sebaya sehingga penyampaian maklumat sebegini mengganggu sesi pengajaran dan pembelajaran (PdP) dan merosak penggunaan bahasa yang respektif dalam persekitaran pembelajaran. Ini menimbulkan persoalan adakah kemahiran interpersonal pelajar tidak dapat dididik melalui penglibatan kokurikulum yang sering memfokus kepada pembentukan jati diri indivitu yang berdikari dan berwawasan. Malah, sifat kepimpinan yang ditonjolkan oleh seorang individu dicaras dengan kemahiran interpersonal yang lemah.

Selain daripada itu, pembangunan intelektual dan fokus pembelajaran pelajar di dalam dan di luar bilik kuliah turut diberi penekanan yang serius kerana terdapat pelajar yang sukar fokus dan menyiapkan tugasan yang diberikan pensyarah kerana gagal menyeimbangkan kehidupan yang aktif dengan PdP. Contohnya, pelajar yang menghadiri program luar perlu mengejar semula sesi PdP yang ditangguhkan. Namun, pelajar ini agak sukar untuk menyiapkan tugasan kerana kekurangan masa dan usaha, tidak fokus, dan kurang minat terhadap aktiviti di dalam bilik kuliah juga dapat dilihat sebagai faktor. Seterusnya, turut dikaji adalah bagaimana seseorang pelajar mengurus emosi. Contohnya seperti ketika menerima penolakan apabila cadangannya ditolak, adakah pelajar mampu menggarap idea lain untuk diutarakan, serta tidak mudah berputus asa apabila menghadapi cabaran sebagai pelajar dan sebagainya.

Penyelidik berpendapat bahawa penglibatan pelajar yang terlalu kerap dan aktif boleh mengganggu konsentrasi dan fokus di dalam bilik kuliah. Selain daripada itu, pelajar yang sering ketinggalan pelajaran akan menghadapi kesukaran dalam memahami dan menyelesaikan setiap tugasan yang diberikan oleh pensyarah. Bukan itu saja, pelajar juga tidak menggunakan semula pengetahuan dan pengalaman yang didapati daripada aktiviti-aktiviti kokurikulum yang disertai ke dalam kehidupannya sebagai pelajar apabila sikap keanakkan dan tidak matang masih diamalkan secara terangan semasa berhadapan dengan situasi tertentu. Sahsiah yang terpuji hendaklah dipupuk secara berterusan untuk menjawap objektif kajian ini. Setiap kategori permasalahan ini dirungkai secara holistik pada seksyen berikutnya.

Matlamat Kajian

Tujuan kajian ini dilaksanakan adalah untuk mengukur keberkesanan penglibatan pelajar di dalam aktiviti kokurikulum sebagai wacana yang mencorak pembentukan sahsiah pelajar Kolej Komuniti Segamat 2 menggunakan penilaian model Kirkpatrick.

Objektif Kajian

a) Mengenalpasti sama ada aktiviti kokurikulum dapat melonjak kemahiran interpersonal pelajar.
b) Menganalisa sama ada pembangunan intelektual dipengaruhi oleh penglibatan aktif pelajar dalam aktiviti kokurikulum.
c) Mengkaji sama ada pelajar mampu mempertingkatkan pengurusan emosi kendiri melalui aktiviti

kokurikulum.

Populasi

Dalam kajian ini, bilangan populasi diambil daripada semua pelajar semasa Kolej Komuniti Segamat 2 seramai 204 orang tanpa mengambil kira pelajar yang sedang menjalani latihan industri.

Kajian Literatur

KI adalah kemahiran seseorang untuk berinteraksi dengan individu lain secara berkesan sama ada secara satu lawan satu atau dalam kumpulan [4]. Sebagai seorang pelajar, KI sangat penting dalam menyampaikan maksud dan maklumat. Contohnya, semasa aktiviti pembentangan tugasan atau projek, berinteraksi secara matang dengan rakan sebaya, berinteraksi secara berkesan dengan pensyarah dan berkomunikasi penuh yakin dengan komuniti. Kemahiran ini merangkumi juga bahasa badan yang sesuai, intonasi dan nada suara, penggunaan perkataan yang baik, serta kesesuaian intipati maklumat yang disampaikan. Kemahiran ini amatlah penting diaplikasikan kerana ia berpotensi mempengaruhi pelajar apabila berada di dalam dunia pekerjaan kelak. Contohnya, seperti semasa menghadiri temuduga, dan berinteraksi dengan rakan sekerja, majikan dan pelanggan. KI yang terbaik adalah refleksi akhlak terpuji dan keyakinan seseorang individu dalam mendepani arus cabaran duniawi yang mencabar.

Seseorang pelajar hendaklah mempunyai daya pemikiran yang memandang ke hadapan, kritis dalam menyampaikan pendapat, berinisiatif tinggi dalam menyelesaikan masalah dan inovatif dalam hasil kerja. Keupayaan minda pelajar ini sentiasa diuji sama ada ia mampu mencakna dan menilai setiap ilmu dan maklumat agar ia boleh di praktikkan dengan mahir atau separa mahir, dan kemudiannya mampu pula dikongsikan kepada rakan pelajar yang lain. Oleh itu, pengkaji juga melihat keupayaan PI pelajar yang telah menerima rangsangan luar sama ada melalui pengetahuan berbentuk teknikal, atau bukan teknikal. Adakah pelajar dapat memproses manfaat pengetahuan tersebut untuk kebaikan diri dan rakan-rakan yang lain juga dikaji. Selain itu, adakah tahap pemikiran yang berkembang ini membantu menghindarkan pelajar daripada mudah terpengaruh dengan perkara-perkara yang negatif dan menyumbang kepada penyelewengan amanah dan ketidakbertanggungjawaban terhadap tugas yang diberikan juga dikaji. Pengkaji juga melihat motivasi dan kesungguhan pelajar memperbaiki kelemahan diri dalam aspek sahsiah.

Seterusnya, pengkaji juga mengkaji bagaimana para pelajar mengurus emosi. Pengkaji akan menilai sejauh mana pelajar dapat menerima kritikan dan darinya menjadi lebih baik. Contohnya, di dalam sesi latihan dalam kumpulan (LDK) di mana pelajar harus menyelesaikan masalah di dalam kumpulan yang mempunyai personaliti yang beragam. Bagaimana untuk berhadapan dengan situasi di mana seorang pelajar lebih mendominasikan sesi perbincangan dan kerap mencantas idea dan hujah pelajar lain? Apakah tindakan pelajar-pelajar yang lain? pengkaji hendak melihat bagaimana emosi pelajar diuruskan untuk menerima situasi tersebut sebagai peluang untuk memberi cadangan yang lebih baik berbanding terus menyepi diri dan bersikap berkecuali. Pembangunan sahsiah yang melibatkan rasa rendah diri merupakan salah satu punca kegagalan pelajar mengurus emosi dalaman yang negatif. Mampukah pelajar menukarkan aura emosi negatif kepada emosi yang positif

akan dibincangkan di dalam kertas kajian ini.

"Apa sahaja yang diucapkan dari mulut datangnya daripada minda, dan apa yang difikirkan oleh minda datangnya dari seketul daging bernama hati". Ayat ini menjadi cetusan ilham pengkaji untuk melihat komunikasi dari mulut, intelektual dari minda dan emosi dari hati, adakah mempengaruhi sahsiah seseorang pelajar yang telah didedahkan dengan latihan luar kuliah yang perlbagai. Fokus kajian ini adalah untuk melihat bagaimana pembangunan sahsiah kendiri pelajar berkembang (evolve) secara positif atau sebaliknya selepas menerima latihan-latihan tersebut.

Adi Wijaya et al. [1] telah membuat kajian seumpamanya terhadap guru-guru matematik bagi tahun 2013 dan 2014 di Jogjakarta. Kajian tersebut mengukur kadar peningkatan profesionalism seorang guru setelah terlibat dalam aktiviti berkaitan ilmiah dengan menggunakan model Kirkpatrick. Antara aktiviti yang telah dijalani oleh para guru ini adalah (1) pembentangan di dalam forum ilmiah, (2) penerbitan hasil kajian dan inovasi dalam pendidikan formal, dan (3) penerbitan buku teks akademik dan sebagainya. Satu set soal selidik diedarkan kepada responden yang terpilih. Hasil kajian mendapati bahawa responden kurang memberi perhatian terhadap aktiviti-aktiviti berunsurkan ilmiah seperti yang telah dinyatakan kerana kajian mendapati para guru kurang cenderung untuk melaksanakan pembentangan ilmiah, inovasi dalam pendidikan dan penerbitan ilmiah.

Mehwish Rafiq [5] pula telah membuat kajian keberkesanan kursus terhadap peserta yang mengikuti latihan di PIA Training Center. Kajian ini dilaksanakan secara temuramah dengan empat julat masa berbeza mengikut empat tahap berbeza dalam model Kirkpatrick terhadap kumpulan responden yang sama. Sesi temuramah pertama (tahap 1) dilaksanakan sejurus selepas sesi latihan berakhir, sesi kedua (tahap 2) adalah selepas 3 bulan, sesi ketiga (tahap 3) adalah selepas 6 bulan dan sesi keempat (tahap 4) selepas 12 bulan sesi latihan. Hasil kajian mendapati (1) peserta memberikan reaksi positif terhadap kursus yang telah dijalani, namun berpendapat tempoh kursus sangat pendek, dan (2) maklumbalas peserta menyatakan bahawa mereka telah menggunakan semula pengetahuan dan kemahiran yang dipelajari semasa kursus di dalam dan di luar ruang lingkup tugas mereka.

Siw Calfjord et al. [6] juga telah membuat kajian terhadap kursus-kursus berasaskan sains di kalangan ahli sains. Pengkaji mendapati walaupun permintaan kursus-kursus berkaitan sains sangat tinggi, namun pelaksanaannya sangat kurang. Jadi pengkaji mengedar 2 set soal selidik kepada para peserta yang telah mengikuti kursus berkenaan. Set pertama diedar selepas kursus tamat dan set kedua diedar secara mel elektronik beberapa bulan kemudian. Hasil kajian mendapati bahawa peserta kursus memberi maklumbalas yang sangat positif terhadap kursus yang telah disertai. Mereka berpendapat objektif kursus sangat sesuai dan berpandu. Mereka juga melaksanakan perpindahan ilmu kepada orang lain agar lebih ramai peserta yang menerima kelebihan daripada kursus tersebut. Selain itu, responden juga telah melaksanakan projek dan kajian di dalam dan di luar bidang mereka setelah sesi kursus berakhir.

Metodologi Kajian

Kajian ini dilaksanakan bagi menilai keberkesanan penglibatan pelajar KKS2 dalam aktiviti kokurikulum terhadap pembentukan sahsiah kendiri yang terpuji. Penyelidik telah mengedar borang

kaji selidik yang terpandu bagi menjawab objektif kajian. Ia dibahagikan kepada dua bahagian iaitu (1) demografi responden dan (2) penilaian sahsiah pelajar. Sahsiah didefinisikan sebagai keperibadian yang utama seperti menuntut ilmu dan melengkapkan proses pembinaan peribadi atau insan yang terpuji [3]. Ini menunjukkan bahawa pembentukan keperibadian kendiri seseorang manusia adalah melalui faktor-faktor kepintaran, sikap yang terpuji, keyakinan kendiri dan komitmen dalam melaksanakan sesuatu. Oleh itu, penyelidik telah menyediakan set penilaian kaji selidik yang holistik agar hasil kajian lebih relevan bagi menjawab objektif kertas kajian ini. Hasil analisa data direkodkan pada seksyen Perbincangan. Kesemua data yang diperoleh dianalisa menggunakan perisian Statistic Package For Social Sciences (SPSS).

Kajian ini dinilai menggunakan model Kirkpatrick [2]. Walaupun model ini telah ditambahbaik pada tahun 2010, namun penyelidik memilih model Kirkpatrick ini kerana ianya lengkap dan masih relevan. Model Kirkpatrick mempunyai empat tahap penilaian seperti pada Rajah 1 iaitu (1) tahap 1: Reaksi (Reaction), (2) tahap 2: Pembelajaran (Learning), (3) tahap 3: Kelakuan (Behaviour), dan (4) tahap 4: Keputusan (Result). Instrumen penilaian bagi setiap tahap boleh dilihat pada Rajah 1.

Tahap 1: Reaksi (T1)	Ia adalah persepsi pelajar terhadap keseluruhan program [6]. Pada tahap ini, sama ada pelajar merasakan latihan yang dilalui menyeronokkan, *engaging* dan releven kepada tugas yang dipertanggungjawabkan dikenalpasti.
Tahap 2: Pembelajaran (T2)	Ia adalah penilaian terhadap pembelajaran, pengetahuan dan pencapaian pelajar terhadap objektif latihan [6]. Pada tahap ini, pelajar menerima ilmu pengetahuan, kemahiran, sikap yang baik, pengalaman pembelajaran, keyakinan dan komitmen melalui penglibatan secara aktif dalam latihan yang diikuti.
Tahap 3: Tingkahlaku (T3)	Tahap ini mengukur bagaimana pelajar menggunapakai (*apply*) pengetahuan dan pengalaman yang diperolehi semasa sesi latihan dalam kehidupan seharian sebagai seorang pelajar [6] dan dalam melaksanakan tugas yang dipertanggungjawabkan di kolej.
Tahap 4: Keputusan (T4)	Tahap ini mengukur bagaimana pelajar *apply* pengetahuan dan pengalaman yangn diperoleh sepanjang latihan dalam kehidupan seharian dan di kalangan komuniti luar.

Rajah 1: Empat tahap Model Kirkpatrick [2]

Model Kajian

Penyelidik telah menyediakan item soal selidik yang lebih terperinci dalam membincangkan pembentukan sahsiah pelajar mengikut tahap-tahap pada Model Kirkpatrick. Tahap ini menilai sejauh manakah responden dapat menggunakan segala ilmu, kemahiran, sikap terpuji, keyakinan dan komitmen setelah menjalani aktiviti kokurikulum [2]. Empat tahap penilaian Model Kirkpatrick adalah seperti berikut:

a) Reaksi pelajar (T1)
b) Pembelajaran pelajar (T2)

c) Tingkahlaku pelajar (T3)
d) Hasil Keputusan penglibatan (T4)

Tahap 1: Reaksi Pelajar

Pada tahap ini, reaksi pelajar terhadap latihan-latihan yang dijalani semasa aktiviti kokurikulum diukur sama ada pelajar merasakan aktiviti kokurikulum yang dihadiri memberi pengalaman pembelajaran yang berharga kepada dirinya. Tahap ini mengukur keberkesanan latihan dari segi persepsi dan tingkahlaku [5] pelajar. Selain itu, adakah berlaku perkongsian ilmu-ilmu baru dan idea yang bernas dan terpandu, adakah bahan pembelajaran sepanjang aktiviti menyokong interest pelajar sehingga terus engage kepada aktiviti yang dirangka dan adakah pelajar percaya bahawa aktiviti kokurikulum yang telah dihadiri relevan dengan apa yang dipelajar di dalam sesi perkuliahan atau kehidupannya sebagai seorang individu. Dalam kajian ini, reaksi pelajar terhadap keberkesanan aktiviti kokurikulum sebagai wadah perkongsian ilmu pengetahuan & pengalaman; adakah pelajar mampu membina perkaitan diantara apa yang disampaikan oleh tenaga pengajar terhadap aplikasi dunia sebenar? Persoalan ini akan dikaji secara holistik. Hasil kajian dibincang secara terperinci pada seksyen Perbincangan.

Tahap 2: Pembelajaran Pelajar

Pada tahap ini, pelajar diuji dari segi keberkesanan pembelajaran yang diterima semasa dan selepas aktiviti kokurikulum. Ia mengukur hasil pembelajaran dari latihan yang diikuti dan bukannya prestasi [5] pelajar dalam PdP. Pelajar juga hendaklah mampu membina jatidiri unggul, keyakinan diri dan komitmen dalam melaksanakan sesuatu tugasan yang diberi sama ada secara individu atau berpasukan. Selain itu, penerimaan pelajar terhadap keberkesanan aktiviti kokurikulum sebagai wadah perkongsian ilmu pengetahuan & pengalaman, adakah ia memberi kesan kepada pembangunan sahsiah kendiri dan pembelajaran turut dikaji. Hasil kajian dibincang secara terperinci pada seksyen Perbincangan.

Tahap 3: Tingkahlaku Pelajar

Pada tahap ini, kemampuan pelajar untuk mengaplikasikan ilmu pengetahuan yang dipelajari semasa aktiviti kokurikulum diteliti. Pelajar seharusnya mampu menyerap segala ilmu yang dipelajari dan berkongsi ilmu tersebut kepada orang lain. Pengkaji juga melihat kemampuan pelajar mempraktikkan apa yang dipelajari dalam kehidupan sehariannya. Hasil kajian dibincang secara terperinci pada seksyen Perbincangan.

Tahap 4: Hasil Keputusan penglibatan

Tahap ini menganalisa hasil penglibatan pelajar terhadap aktiviti kokurikulum. Adakah ia berhasil membentuk keperibadian yang jitu dari segi KI, PI dan PE?. Hasil kajian dibincang secara terperinci pada seksyen Perbincangan.

Perbincangan

Data-data yang diterima daripada borang kaji selidik dari responden diproses dan hasil kajian dibincangkan pada seksyen ini. Data Purata Skor Markah (Mean) diinterpretasi seperti Jadual 2.

Jadual 2: Intepretasi Min

Julat Markah	Tahap Refleksi
1.00 – 1.80	Sangat Rendah
1.81 – 2.60	Rendah
2.61 – 3.40	Sederhana
3.41 – 4.20	Tinggi
4.21 – 5.00	Sangat Tinggi

Objektif 1: Mengenalpasti sama ada aktiviti kokurikulum dapat melonjak kemahiran interpersonal (KI) pelajar.

Objektif pertama kajian ini adalah keberkesanan aktiviti kokurikulum dalam meningkatkan KI pelajar. Jadual 3 menunjukkan purata penilaian bagi item objektif 1. Model Kirkpatrick tahap 1 merujuk kepada reaksi pelajar terhadap penglibatan dalam aktiviti kokurikulum. Hasil analisa yang positif ini menunjukkan bahawa impak aktiviti kokurikulum terhadap KI adalah tinggi kerana di sinilah wadah pertemuan para pelajar dengan pelajar dari kelas, program, dan kolej komuniti yang berbeza. Aktiviti kokurikulum membantu pelajar berjumpa lebih ramai rakan sebaya di dalam dan di luar kolej di mana proses perkongsian idea dan pendapat, percambahan jalinan hubungan (network) dan perkongsian pengalaman dapat berlaku secara sihat.

Jadual 3. Purata Skor Markah Kemahiran Interpersonal (KI)

Soalan	Purata	Interpretasi
Saya suka terlibat dengan aktiviti kokurikulum. (T1)	4.07	Tinggi
Saya memahami erti kerjasama adalah dengan memanfaatkan kekurangan dan kelebihan orang lain untuk kebaikan bersama. (T3)	4.14	Tinggi
Saya lebih mudah menyesuaikan diri dalam kumpulan rakan sebaya di sekeliling saya. (T3)	4.08	Tinggi
Saya berasa lebih yakin berkomunikasi dengan rakan sebaya secara matang. (T4)	4.11	Tinggi
Saya mampu melihat hala tuju hidup melalui cabaran yang dihadapi semasa aktiviti kokurikulum. (T4)	3.90	Tinggi
Saya yakin dalam mengutarakan pendapat dan cadangan. (T4)	3.76	Tinggi

Pelajar juga bersetuju bahawa hubungan interaksi sosial terhadap keupayaan komunikasi yang berkesan adalah tinggi. Ini dapat dilihat melalui kerjasama yang ditunjukkan dalam aktiviti-aktiviti yang disertai bersama dalam menyelesaikan sesuatu tugasan dan amanah. Pelajar selesa

menyesuaikan diri dengan rakan sebaya bukan sahaja kerana mudahnya mencari persamaan dan kecilnya jurang perbezaan antara mereka, tetapi juga mudah untuk memanfaatkan kekurangan dan kelebihan antara mereka untuk mencapai sesuatu objektif dalam menggalas amanah yang dipertanggungjawabkan.

Selain itu, pelajar juga setuju bahawa mereka mampu berkomunikasi secara matang di dalam kumpulan rakan sebaya walaupun baru sahaja mengenali sesama sendiri, apatah lagi jika saling mengenali. Jadi, mereka mampu bekerjasama dengan sangat baik kerana kurangnya perasaan malu untuk mengutarakan pendapat dan cadangan. Pembahagian tugas yang berstruktur memudahkan proses kerja dan tugasan yang diamanahkan menjadi ringan. Melalui komunikasi yang berkesan dan pemanfaatan kemahiran yang pelbagai memberi kepuasan dan keputusan yang terbaik dalam kerja kumpulan. Tambahan pula, segala cabaran yang dilalui bersama semasa aktiviti kokurikulum memberi idea bagaimana laluan hala tuju kehidupan pada masa hadapan. Jadi, dapat disimpulkan bahawa aktiviti kokurikulum mampu melonjak dan memperbaiki KI pelajar.

Objektif 2: Menganalisa sama ada pembangunan intelektual (PI) dipengaruhi oleh penglibatan aktif pelajar dalam aktiviti kokurikulum.

Hasil kajian purata skor markah pada Rajah 4 bagi objektif 2 mendapati pelajar mempunyai keupayaan yang tinggi untuk memproses maklumat dan mencari alternatif dalam menyelesaikan sesuatu tugasan selepas terlibat dengan aktiviti kokurikulum kerana pelajar lebih mudah fokus di dalam kelas. Ini terbukti apabila purata skor markah bagi T1 adalah tinggi. Ini menunjukkan pelajar bersetuju bahawa mereka banyak belajar perkara baru melalui struktur pembelajaran yang sangat praktikal dalam aktiviti yang disertai.

Jadual 4. Purata Skor Markah Pembangunan Intelektual

Soalan	Purata	Interpretasi
Saya belajar perkara baru melalui penglibatan yang aktif dalam aktiviti kokurikulum. (T1)	4.20	Tinggi
Aktiviti kokurikulum yang saya ikuti relevan dan berkaitan dengan apa yang dipelajari dan sangat praktikal. (T1)	4.19	Tinggi
Saya lebih mudah fokus di dalam kelas kerana saya lebih cergas dan bersemangat. (T1)	3.90	Tinggi
Saya lebih mudah mendalami kemahiran berkaitan pembelajaran selain yang telah dipelajari di dalam bilik kuliah. (T2)	4.11	Tinggi
Aktiviti kokurikulum menghindarkan saya dari aktiviti yang tidak bermanfaat kepada aktiviti yang menyumbang kepada pelajaran dan kecemerlangan sahsiah diri. (T2)	4.08	Tinggi
Saya faham erti tanggungjawab apabila diberi kepercayaan menggalas dan melaksanakan sesuatu tugas dan amanah. (T3)	4.20	Tinggi
Saya lebih bijak mengatur masa dan menyeimbangkan di antara penglibatan aktiviti kokurikulum dengan pelajaran. (T4)	3.89	Tinggi

Tambahan pula, aktiviti luar berbentuk teknikal seperti pertandingan kemahiran pula menyediakan platform bagi pelajar mengaplikasikan ilmu yang dipelajari di dalam kelas ke peringkat yang lebih tinggi. Ia sangat padan dengan T2 pada Model Kirkpatrick. Pelajar akan tercabar untuk menambah ilmu baru bagi menghasilkan produk/projek yang terbaik. Selain itu, aktiviti kokurikulum lain yang berbentuk bukan teknikal seperti program berunsur keusahawanan adalah ruang terbaik bagi pelajar menimba dan meningkatkan ilmu pengetahuan baru. Ia menjadi nilai tambah seorang individu yang pelbagai bakat (multi-talented) dalam pelbagai segi. Ilmu keusahawanan akan membantu pelajar jika pelajar berkecimpung dalam bidang perniagaan nanti. Seorang usahawan dalam bidang teknikal juga perlu memahami bagaimana sesebuah perniagaan berfungsi untuk menyelaras operasi syarikat secara berstruktur dan telus. Hatta, melalui aktiviti sebegini pelajar bersetuju bahawa pengalihan fokus kepada aktiviti kokurikulum mengelakkan mereka daripada terpengaruh dengan budaya dan aktiviti-aktiviti yang tidak bermanfaat di samping meningkatkan minat mereka dalam aktiviti PdP.

Selain daripada itu, pelajar bersetuju bahawa penglibatan di dalam aktiviti kokurikulum mengajar mereka erti tanggungjawab, amanah dan kepercayaan. Oleh itu, setiap tugasan dan amanah yang diberikan pensyarah akan diselesaikan dengan penuh takzim. Contohnya, Pengerusi persatuan Unit Sijil Teknologi Maklumat yang diberi amanah untuk melaksanakan sebuah program pelajar; akan merancang sebaiknya program tersebut. Pelajar akan membina ahli jawatankuasa yang mantap untuk memastikan program yang dirancang akan dapat direalisasikan dengan cemerlang. Perkara ini bersesuaian dengan T3 dalam model Kirkpatrick. Bagi sesi akademik pula, pelajar akan melaksanakan tugasan yang diberi oleh pensyarah bagi setiap subjek dengan usaha 200% agar hasil tugasan menepati keperluan dan expectation pensyarah.
Seterusnya, bagi T4 dalam model Kirkpatrik dilihat bagaimana pelajar yang aktif dengan aktiviti kokurikulum juga mampu menyerlah di dalam pelajaran. Ini kerana mereka telah dibiasakan untuk menyeimbangkan keperluan PdP dan aktiviti luar. Di harap apabila pelajar menceburkan diri di dalam dunia pekerjaan, mereka sudah arif menyeimbangkan tuntutan tugas dengan keluarga dan perkara-perkara lain berkaitan. Oleh itu, dapat disimpulkan bahawa aktiviti kokurikulum ternyata mampu menyeimbang dan mempertingkatkan PI pelajar.

Objektif 3: Mengkaji sama ada pelajar mampu mempertingkatkan penguasaan emosi (PE) melalui aktiviti kokurikulum.

Bagi menjawab objektif keberkesanan PE selepas melibatkan diri dalam aktiviti kokurikulum, model Kirkpatrick digunakan untuk meneliti bagaimana pelajar mengawal emosi. Purata skor markah adalah pada Jadual 5. Merujuk kepada T1 model Kirkpatrick, rata-rata pelajar bersetuju bahawa mereka diberi lebih banyak ruang dan peluang untuk mengekspresi diri dan mengetengahkan bakat yang ada pada diri mereka. Contohnya seperti bakat dalam bidang teknikal, sukan, keusahawanan dan sebagainya. Mereka merasa seronok kerana mereka dapat meneruskan aktiviti luar seperti di zaman persekolahan dan terlibat dengan lebih aktif dalam lapangan aktiviti baru seperti pertandingan kemahiran, aktiviti keusahawanan dan sebagainya. Kehidupan mereka sebagai pelajar tidak hanya berkisar tentang akademik sahaja dan lebih santai dengan pelbagai aktiviti kecergasan.

Pelajar KKS2 kebanyakannya tinggal di asrama. Jadi, sebahagian kehidupan seorang pelajar dilalui bersama-sama dengan rakan sebaya secara berdikari. Melalui kajian pada T2 model

Kirkpatrick, para pelajar sangat setuju bahawa kehidupan berdikari menjadi lebih mudah apabila mereka mampu mengawal perasaan berbaur negatif. Kesannya, pelajar lebih optimistik untuk mengelak dariapada ajakan negatif rakan sebaya demi mempertahankan prinsip dirinya. Contohnya, KKS2 telah menggariskan peraturan-peraturan tertentu demi kemaslahatan semua pelajar dan staf. Pelajar akan mempunyai keyakinan yang teguh untuk menolak niat buruk dan ajakan rakan untuk melanggar peraturan-peraturan ini.

Jadual 5. Purata Skor Markah Pengurusan Emosi

	Purata	Interpretasi
Aktiviti kokurikulum memberi peluang kepada saya untuk ekspresi diri dan menonjolkan bakat yang ada. (T1)	4.08	Tinggi
Saya belajar untuk lebih berdikari. (T2)	4.28	Sangat Tinggi
Saya belajar untuk mempertahankan prinsip diri. (T2)	4.19	Tinggi
Saya lebih percaya diri setelah terlibat dengan aktiviti kokurikulum. (T2)	4.04	Tinggi
Saya tidak melihat perbezaan bangsa, agama dan latar belakang sebagai penghalang untuk bersatu padu. (T3)	4.25	Sangat Tinggi
Saya lebih empati kepada kehidupan dan perinsip orang lain. (T3)	3.70	Tinggi
Saya tidak mudah putus asa sekiranya pendapat dan cadangan saya ditolak. Saya akan beri cadangan lain yang lebih baik. (T4)	4.07	Tinggi

Malaysia sangat sinonim dengan warganya yang pelbagai bangsa, budaya, dan agama. Pelajar yang didedahkan dengan pergaulan di luar kelas sangat bersetuju bahawa mereka tidak mempunyai sebarang sentimen terhadap perbezaan bangsa, budaya dan agama di antara mereka kerana mereka memahami dan empati terhadap pendapat dan pendirian orang lain. Hubungan sosial dengan rakan sebaya sangat harmoni kerana telah biasa bekerjasama dengan rakan-rakan yang pelbagai etnik. Tiada sebarang masalah timbul dari segi perbezaan bangsa kerana aktiviti kokurikulum merupakan platform menjalin ikatan persahabatan dan mengukuh perpaduan antara bangsa Malaysia di samping belajar untuk menerima kelebihan dan kekurangan orang lain.

Selain daripada itu, model Kikpatrick turut menilai T4 dan mendapati pelajar setuju bahawa mereka mempunyai mindset bahawa "Gagal sekali buban bererti gagal selamanya". Apabila pelajar diperlukan untuk memberikan buah fikiran contohnya, mereka akan berusaha memberi idea dan pendapat yang terbaik. Namun sekiranya ia ditolak, pelajar tersebut tanpa putus asa akan memberikan idea dan pendapat lain yang lebih berkualiti. Penolakan bukanlah bererti sesebuah idea atau pendapat itu salah, cuma ia memerlukan idea atau pendapat lain yang lebih baik.

Kesimpulan

Hasil kajian mendapati bahawa pelajar KKS2 memberi reaksi yang positif terhadap aktiviti kokurikulum yang telah dijalani. Ini membuktikan bahawa penglibatan pelajar dalam aktiviti kokurikulum mampu melestarikan sahsiah yang terpuji dari segi komuikasi intelektual dan emosi. Mereka mampu menunjukajar dan mengaplikasikan semula apa yang dipelajari semasa latihan kepada kumpulan audien yang terpilih. Pelajar juga mampu mempamerkan mutu komunikasi, komitmen dan keyakinan yang tinggi dalam diri mereka sendiri apabila berhadapan dengan audien. Mereka mampu bekerja dalam kumpulan tanpa mendiskriminasikan idea pelajar lain serta mengiktiraf bakat masing-masing. Aktiviti kokurikulum juga menonjolkan kelebihan pelajar, memperbaiki kekurangan interpersonal, mencambah pembangunan intelektual, memperbaiki pengurusan emosi serta mampu mengajar pelajar menerima perbezaan pendapat secara lebih terbuka.

Masalah komunikasi di antara pelajar dengan pensyarah, rakan sebaya, dan komuniti telah diperbaiki melalui latihan-latihan berasaskan komunikasi, pengucapan awam, high-impact presentation, kepimpinan pelajar yang berkesan dan sebagainya. Tambahan pula, pelajar lebih mudah fokus di dalam kelas, yakin untuk mengutarakan soalan dan pendapat yang bernas di dalam kelas serta mampu mengurus emosi dengan sangat baik. Secara keseluruhannya, sahsiah pelajar yang terpuji boleh dipupuk secara berterusan melalui penglibatan yang aktif dalam aktiviti kokurikulum.

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A Microcontroller Based Line Tracing Mobile Robot With A Single Sensor Input And PWM Control Scheme

I. Ariffuddin1, a, A. Juliyanna2,b
1Electrical Engineering Department, Politeknik Merlimau, Melaka
2Mechanical Engineering Department, Politeknik Merlimau, Melaka
aariffuddin@pmm.edu.my, bjuliyanna@pmm.edu.my

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Abstract. This paper explores the development of a microcontroller based line tracing mobile robot with a single sensor and PWM control scheme. The purpose of mobile robot development is as a teaching and learning (t&l) aid for Embedded System Application (DJM6132) course at Mechanical Engineering Department, Politeknik Merlimau, Melaka. The SB40T target board is built from the PIC16F887 microcontroller with complete support circuit, input and output terminals. The Junior Mobile Robot platform is used as the basis for building robots to facilitate the preparation and deployment of major control circuits and other electronic components. A line sensor array is used to detect the edge of black line over a white surface. The MPLAB IDE ver8.63 software and PIC Kit 2 programmers are used to program the robot. As a result, a microcontroller based line tracing mobile robot with a single sensor and PWM control scheme is successfully developed and understand by ten groups of students within two hours of practical session.

Introduction

Line tracing robot is one of microcontroller application that is fun, attractive, increase the spirit of competition and attract the students to learn the microcontroller application related and current trends in automation technology[1,2,3,4]. A line tracing robot is an autonomous robot which detect the edge of black line on a white surface and vice versa. There are several devices used for sensing white or black lines and controlling the signal that has been applied. Optical sensor were use to follow white line and PIC16F72 as processor [5], opto-coupler sensor were used by [6] to detect black tape with PIC16F877A, Atmel's AVR microcontroller with eight infrared sensors used by [7]. Proximity sensor were used by [8] to detect metal line with Arduino Uno as controller. Microcontroller dsPIC30F6015 and reflective optical sensor were used[3].

The significant of the study is to aid the t&l process of the DJM6132, Embedded System Application course offered to students of Diploma in Mechatronics Engineering, Politeknik Merlimau by developing a microcontroller based line tracing mobile robot with a single sensor input and PWM control scheme. The course expose to the student on the basics and application of microcontroller especially PIC16F, Hi-Tech C programming and installation of electronic circuits. Here, development of a microcontroller based line tracing mobile robot with a single sensor input and PWM control scheme is presented by using the SB40T target board and Junior Mobile Robot Platform. Only a single sensor is used to ease and as an introductory step to the student to understand the autonomous

robot. The equipment selection is done by considering the low cost factors, off-shelf solution, time-saving, real application and student friendly environment compared to other education training kit that only give minimum wiring experience. Gamification factor such as robot speed competition that can be embedded through the t&l process are also a major encouragement for the utilization of the kit. Previously, ADROIT V1 Education Robot kit is an alternative that can be used for robotics in Education Program[1]. PIC microcontroller board with portable National Instruments 'my DAQ' device as project work for students in Manchester University[4].

Other than education and competition purposes, the student is exposed to the line tracing robot application either in conceptual or in daily basis, health care, industries and many more. The concept as patient monitoring robot were used by [9], the concept to industrial cutting of two axis were prototyped by [10], application in industrial manufacturing process proposed by [11], the concept were apply on health care management system[12]. The concept on irrigation based application also applied by [13].
The selected programming part, the assembly of the circuit, the output produced and the time achieved by the student to complete the task is in the timeframe are discussed in this research paper.

Methodology

The SB40T kit and the Junior Mobile Robot platform are the microcontroller learning kit manufactured by Astana Digital Sdn. Bhd[14]. The programming skill, electronic circuit assembly and understanding of the microcontroller can be achieved through the use of the kit. Compared to other development board which is readily installed with other pheripheral of I/O, SB40T and Junior Mobile Robot Platform still require the student to assemble the I/O devices. The kit can be embedded into a specific prototype or product development as part of control system.

The software used for high level programming is MPLAB IDE ver8.63. MPLAB IDE is software used in personal computers to develop microcontroller based applications issued by Microchip Technology Company. MPLAB provides management, editing, debugging and programming of 8 bit, 16 bit and 32 bit microcontrollers. The Hi-Tech C compiler is used to translate the programs that are built into the machine language. The compiler featuring the Omniscient Code GenerationTM which used for Microchip Technologies of 8, 16 and 32 bit PIC microcontroller and dsPIC® digital signal controller architectures[15].
Hardware used in the development is PIC Kit 2 programmers, SB40T kits which contain of PIC16F887 microcontroller, junior mobile robot platform, line sensor array, L293D H-Bridge motor driver, dual 5vdc geared motor and 6v battery with booster circuit as primary supply.

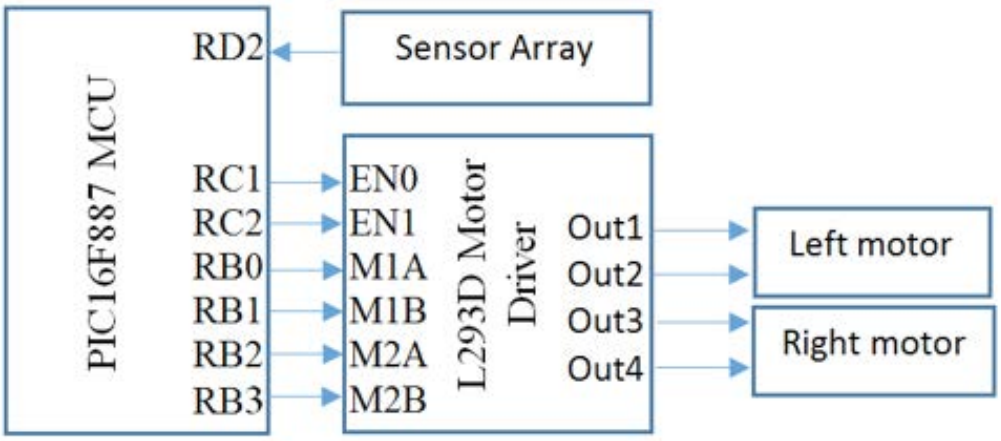

Fig. 1. Assembly block diagram of a microcontroller based line tracing mobile robot with a single sensor input and PWM control scheme

The circuitry is assembled according to the block diagram in Figure 1. Figure 1 shows a microcontroller based line tracing mobile robot with a single sensor input and PWM control scheme block diagram. The circuit is assembled to meet the requirement based on the program and library file. Port RC1 and RC2 are used as it is the CCP1 and CCP2, Capture-Compare-Pulse-Width–Module. This 16 bit module each is specially designed for modulation and waveform generation application. The CCP1 and CCP2 are connected to the Enables pin of L293D to control the motor speed by using PWM. Table 1 show the motor speed depends on the PWM value.

Table 1. A microcontroller based line tracing mobile robot with a single sensor input and PWM control scheme speed value

PWM Value	Left Motor	Right Motor	Robot Response
0	STOP	STOP	Robot stop
150	ON	ON	Robot forward in moderate speed
255	ON	ON	Robot forward in full speed

Port RB0 and RB1 determine the rotation direction of left motor. Meanwhile RB2 and RB3 used to determine the rotation direction of right motor. A pair of Out1 and Out2 is connected to the leads of left motor and Out3 and Out4 is connected to the leads of right motor. Port RD2 is declared as input port and connected to the sensor array which will lead to signal the microcontroller as detection of the edge of black line over white surface. Table 2 provides the logic for the line tracing algorithm using one sensor. As the sensor detects the edge of black line, the robot is strived to align left and vice versa. This will make the robot to move forward by tracing the black line.

Table 2. A microcontroller based line tracing mobile robot with a single sensor input and PWM control scheme logic table

Sensor	Left Motor	Right Motor	Robot Response
0	ON	OFF	Robot align to right
1	OFF	ON	Robot align to left

The program flowchart of the mobile robot is shown in figure 2(a). The equipment used for the project development is shown in figure 2(b).

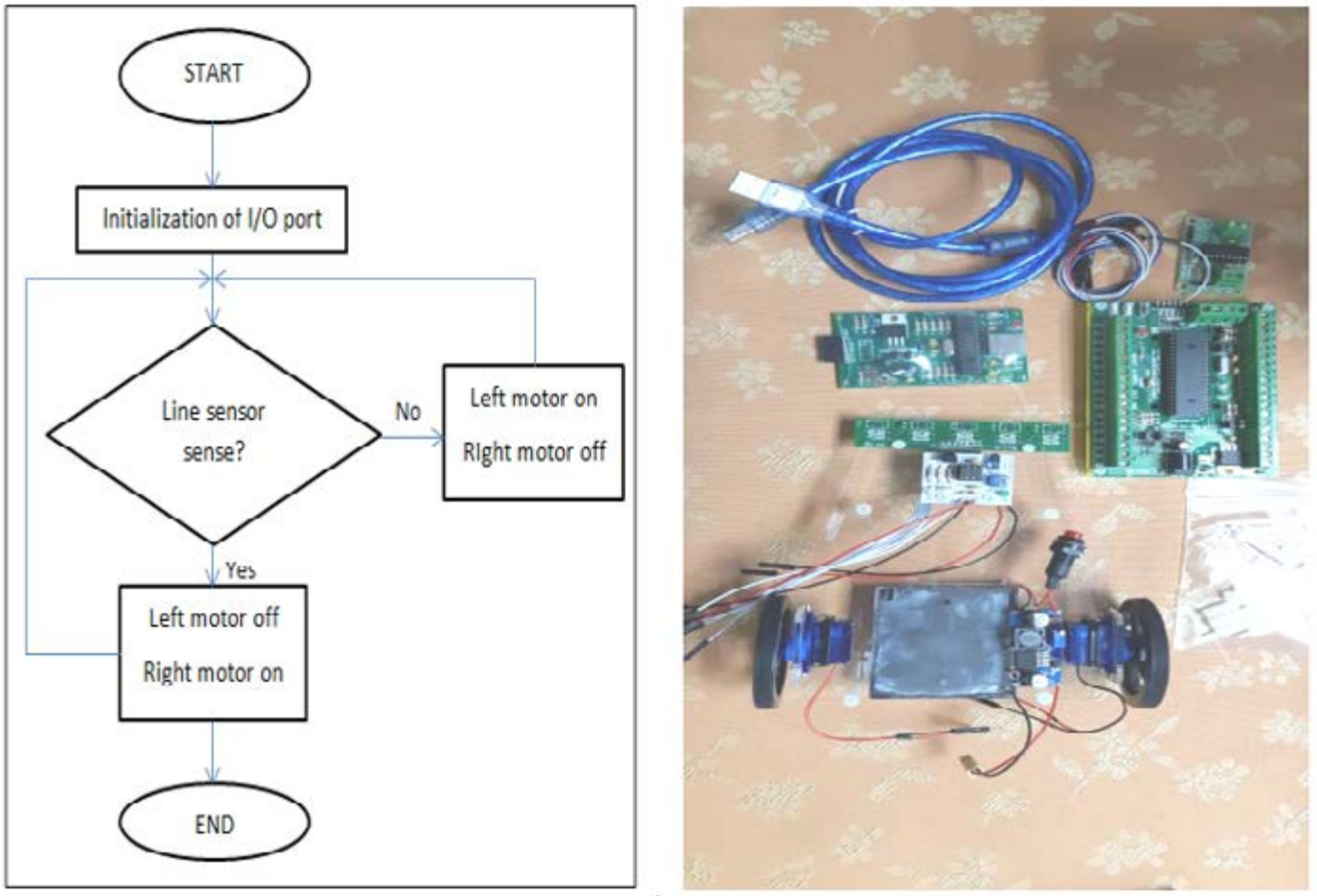

Fig. 2. Figure of (a) program flow chart and (b) equipment used for the project development

The program for the mobile robot is shown in figure 3(a), the library file. The main program in fig. 3(b) is then compiled by using the Hi-Tech C compiler.

```
//#include          <htc.h>
//#include "config.h"
//#define _XTAL_FREQ 20000000
#define bitset(var,bitno) ((var) |= (1 << (bitno)))
#define bitclr(var,bitno) ((var) &= ~(1 <<
(bitno)))
#define bittst(var,bitno) (var & (1 << (bitno)))

// Initialize the PWM module
void pwm_init(void){
        //unsigned char x;
        // configure timer 2
        T2CKPS1 = 1; // pre scale of 16
        //T2CKPS1 = 0; // pre scale of 16
        //T2CKPS0 = 1; // pre scale of 4
        // configure PWM
        PR2 = 255;// set PR2 to max value
        CCPR1L = 0;//(255 >> 1);
        CCPR2L = 0;//(255 >> 1);
        CCPR1H = 0;
        CCPR2H = 0;
        //clear lower 2 bits of duty cycle
        bitclr(CCP1CON, 5);
        bitclr(CCP1CON, 4);
        bitclr(CCP2CON, 5);
        bitclr(CCP2CON, 4);
        bitclr(TRISC,2);// set CCP1 output
        bitclr(TRISC,1);// set CCP2 output

        // Set to PWM Mode
        bitset(CCP1CON, 3);
        bitset(CCP1CON, 2);
        bitset(CCP2CON, 3);
        bitset(CCP2CON, 2);
        __delay_ms(30);

}


// Set the PWM output dutycycle
// 'pin' refers to which CCP pin (not which
PORTC pin)
// 'val' can be between 0 to 255
void pwm_out(int pin, int val){
        if(pin==1){
                CCPR1L = val;
        }
        else if(pin==2){
                CCPR2L = val;
        }
}
```

a

```
// Edge detection of black line robot with array sensor

#include<htc.h>          //include header file
#include <stdio.h>
#define _XTAL_FREQ 20000000 // define clock
frequency
__CONFIG(0x2CF2);      //configuration bits
#include "pwm.c"


void main (void) //main file
{       // start of main

unsigned int i;

ANSEL = 0;
ANSELH =0;


TRISB = 0b00000000;
PORTB = 0b00000000;

TRISC = 0b00000000;
PORTC = 0b00000000;

TRISD = 0b00000100;//use middle line sensor- RD2
PORTD = 0b00000000;

pwm_init();

        while(1){// start of endless loop

        pwm_out(1,200);//enable motor 1 -left
        pwm_out(2,200);//enable motor 2 -right
        if (RD2==1){
        RB0=1;// motor 1 direction pin
        RB1=0;
        RB2=0;// motor 2 direction pin
        RB3=0;
        }


        else{
        RB0=0;// motor 1 direction pin
        RB1=0;
        RB2=1;// motor 2 direction pin
        RB3=0;
        }

        }//end of endless loop

}       //end of main
```

b

Fig. 3. Figure of (a) library program for pwm and (b) main program for the mobile robot

The students are divided into ten groups in pair. The students are given a detailed description about the program and directed to sketch the circuit assembly based on the program. After a brief checking of the circuit, the student write and execute the program, assemble the circuit, testing and modifying the robot performance by adjusting the parameters such as PWM speed control, ambient light and other mechanical factors.

Results and Discussion

Fig. 4(a) shows the complete circuit assembly of the mobile robot by the students. The robot is tested on a track built specially for testing the robot. The black line is built from 2.5cm waterproof black colored seal ring adhesive tape, pasted over combined 80gsm white A4 papers.



a b

Fig. 4. Figure of (a) complete assembly of a microcontroller based line tracing mobile robot with a single sensor input and PWM control scheme and (b) the robot is successfully moving forward by detecting the edge of black line over white surface.

From the observation, all the mobile robot build by the students are able to move forward by tracing the single black line pathway precisely. The robot movement however, seems is not as smooth as only the middle sensor at the sensor array was used.

From oral assessment and observation, the student's capabilities to understand and practice the method to develop, control the motor speed and adjust the sensor precision of a microcontroller based line tracing mobile robot with a single sensor input and PWM control scheme is determined as in Fig.5

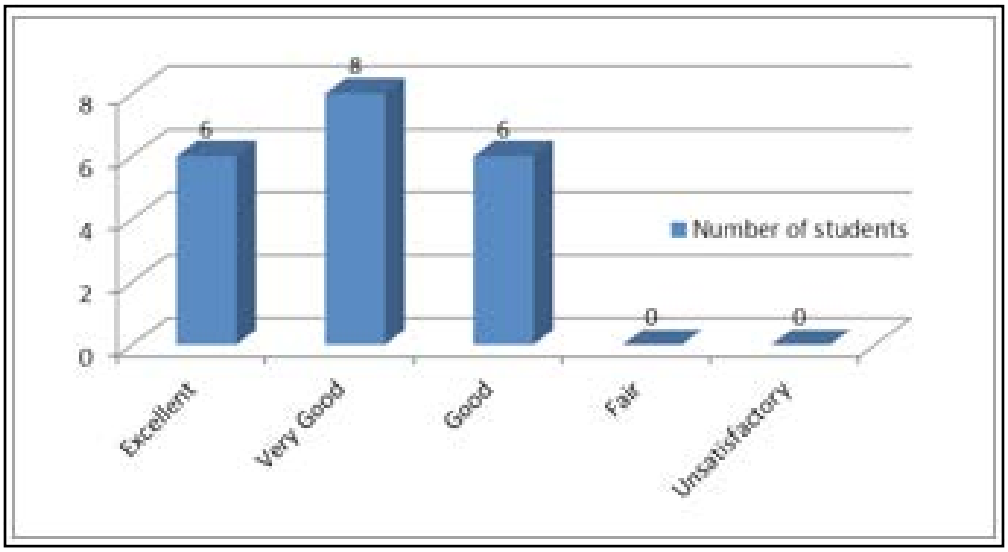

Fig. 5. The student's capabilities to understand and practice the method to develop, control the motor speed and adjust the sensor precision of a microcontroller based line tracing mobile robot with a single sensor input and PWM control scheme

The time allocated to successfully build and understand the mobile robot by each group of student is shown in Table 3. The task is suitable to be completed within 2 hours of practical session.

Table 3: Time allocated to build and understand the microcontroller based line tracing robot with a single sensor input and PWM control by groups.

	$x <$ 1 hour	1 hour $\leq x \leq$ 1½ hour	1½ hour $\leq x \leq$ 1¾ hour
*Complete the task, x	3 groups (30%)	4 groups (40%)	3 groups (30%)

*The time counted is including the duration of wiring installation, programming, testing, and oral evaluation.

Conclusion

A microcontroller based line tracing mobile robot with a single sensor input and PWM control scheme is a suitable startup for the student to learn on developing real application of a microcontroller. The robot gives an idea to the student that a mobile robot can be easily developed. This is also a good example of a closed loop system[6]. This will increase the confidence level of the student to learn the programming subject.

Acknowledgement

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An Investigation of Heat Treatment Effect on Tool Life Performance in Friction Drilling

M.A. Mohammad Sayuti1, a, M.K. Kusaini1, b and M.A. Mohd Daud1, c,

1Mechanical Engineering Department, Politeknik Banting Selangor,
42700 Banting, Selangor, Malaysia

a anas@polibanting.edu.my, b khazaren@polibanting.edu.my, c azam@polibanting.edu.my

Keywords: Friction drilling; SKH 9; Tool life; Heat treatment;

Abstract.: More than 40% of material removal process in metal fabrication processes is perform b drilling. Traditionally, drilling tool used is made of high speed steel (HSS) which is normally generate heat during drilling procedure. Therefore, drilling tool become dull easily and reduce the tool's lifespan. Thermal friction drilling is a non-traditional hole making process in which a conical rotating tool is applied to penetrate into workpiece and create the hole in a single step, without generating chips. The process relies on the heat generated due to the frictional force between tool and workpiece, to soften, penetrate and deform the work material into a bushing shape. To achieve sufficient heat from the friction, the force applied and the spindle rotating is relatively high compared to traditional drilling process. Throughout the experiment, measurement of length and weight on both drilling tool, hardened and non-hardened tools were conducted after various number of holes drilling procedures. One of the major unanswered questions in friction drilling is the tool life. High temperature and force instigate questions about tool wear. It is a concern because it affects the characteristics and tolerances that are achievable. From the experiment, hardened tools exhibited twice as long tool life than non-hardened tools.

INTRODUCTION

Drilling operation is a well-known process for hole making. The mechanics of material removal is due to combination of extrusion and negative rake cutting. Traditionally, a drilling tool is made of High Speed Steel (HSS). It generates high temperature during drilling process, therefore the drilling tool become dull and leads to a shortened service life. For the workpiece, traditional drilling methods have few disadvantages which are inherit from the machining process such as when the chips adhered to exit of a drilled hole [1]. This condition can cause a poor dimension accuracy and quality of surface finish which also is matter of concern for high end application. Thermal friction drill is a non-traditional hole making method, it is also known as flow drilling, thermal drilling, form drilling or friction stir drilling. Friction drilling utilized the heat generated from the friction between a rotating conical tool and the workpiece to soften and penetrate thinwalled workpieces and to form a hole [2-6]. The tools are often made of tungsten carbide and rotate at high speed, which produce friction heat. The friction heat energy thus produce softens and facilitate the drill to penetrate the workpiece forming a hole. Friction drill also forms a bushing in situ and is clean and chipsless [7,8].

In drilling operation, tool wear is a progressive process; it occurs at an accelerated rate once a drill become dull. During this procedure, the cutting forces increase, temperature of tool rises, and drill point deformation and immediate loss of sharp edges occur. After certain limit, tool wear can cause catastrophic and sudden failure of the tool without any warning that causes considerable damage to the workpiece and even to the machine tool. The actual cutting ability of the drill also reduced with increased wear, resulting poor in surface finish over size holes. Conventional drilling tool can be sharpened over time, but this option is not available for friction drilling tool. It is found that no comprehensive studies are available on the performance of harden and non-hardened tool as well as effect of heat treatment on friction drilling tools.

EXPERIMENTAL SET UP

Experiment

Fig. 1 shows the five stages during friction drilling. The friction drill comes into initial contact with the workpiece and then penetrates into it at high spindle speed and axial force (Step 1). The friction force on the tool to workpiece interface produces heat and melting of the workpiece material occurred. Further drilling pushes up the molten metal (Step 2). Finally, the friction drill breaks into the workpiece, making a hole through which the molten metal is pushed down (Step 3). The workpiece material fractures with the drill penetrating through the workpiece (Step 4). Finally, the hole is friction drilled with a petal-shaped bushing formed (Step 5).

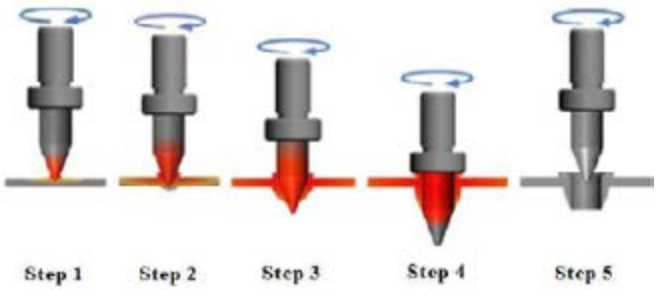

Fig. 1. Steps in friction drilling process

Worpiece

The work piece is square tubing AISI 1008 with wall thickness of 1.6mm, width of 25.4mm and average length of 400mm. In average, 30 holes can be drilled on a single specimen. The chemical composition of AISI 1008 material is shown in Table 1.

Table 1. Chemical composition of AISI 1008

Element	C	Mn	P	S
Weight %	0.10	0.30 – 0.50	0.030	0.050

Tool

Fig. 2 shows tool used in the friction drilling process, the entire region of the friction tool is divided into five explicit regions namely, (i)center region, (ii)conical region, (iii)cylindrical region, (iv) shoulder region and
(v)shank region.

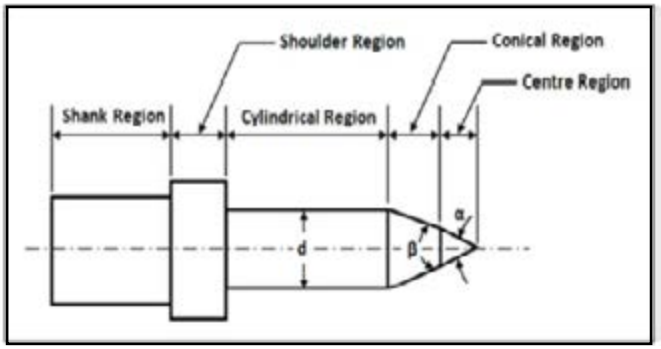

Fig. 2. Schematic diagram of friction drilling tool

Table 2 shows the key dimension of drilling tool used in this experiment. The tools are made of SKH 9 tool steel. Two type of tools are prepared, non-hardened (19.8 HRC) and hardened (64.5 HRC).

Table 2. Friction drilling tool geometry and key dimensions

Dia, mm	α, deg	β, deg	Centre region, mm	Conical region, mm	Cylindrical region, mm	Shoulder region, mm	Shank region, mm
7.3	90	36	0.97	8.49	7.3	10	20

Experimental Procedure

To conduct the drilling experiment, the workpiece was fixed with blocks across two vices that provide support in the axial direction to minimize bending at the workpiece. After each hole was drilled, the tool was indexed 15mm to the right automatically. Between drills, dwell time was set to allow heat dissipation from the tool because of the high temperature during process. 30 holes could be drilled in each side of the square tube. The drill parameter were set as follows: (i) spindle speed of 2800 rpm, (ii) feed rate of 254 rpm and (iii) dwell time of 2 seconds. Throughout the experiment, measurement of drilling tool length and weight measurement were conducted after drilling hole numbers 1, 3, 5, 10, 20, 30, 50, 80, 110, 140, 170, 200 and every following hundreds holes. Both friction drilling tools, hardened and non-hardened were gone through the same procedure.

Analysis of Tool Life Performance

All required data in the experiment were collected including the weight data, graphical data of tools and produced hole diameter after drilled numbers of holes as per predetermined. These data were analysed for three main aspect as describe below:

1. Tool Weight

Weight of tool after drilled predefined number were measured using a digital weighing scale. The capacity of the weighing scale using is 500.00 grams with 0.01mm accuracy. Both hardened and non tools were measured before drilling process (n=0) and after the process at certain number of drilled holes

2. Tool Profile

After drilled certain numbers of holes as determined earlier, tool was dismantled from its holder. An optical microscope was used to capture the graphical image of the tools. These graphical image was used in two type
of analysis, namely:

- Tool profile observation

Observation is made on graphical image, technical and analytical comment were made base on the images.

- Tool profile measurement

Image of the tools were measured virtually on screen. Measurement of the tools diameter and length were made on predefined point as shown in Fig. 3. Point 1 is the radial wear of the tool at the cylindrical region. This wear
will affect the hole inner diameter. Point 2 is the area with significant wear at the intersection of the conical and cylindrical region. Point 3 indicates the wear in the middle of the tool center region. Point 4 is the intersection of the center and conical region Point 5 is the wear in the axial direction at the tool tip.

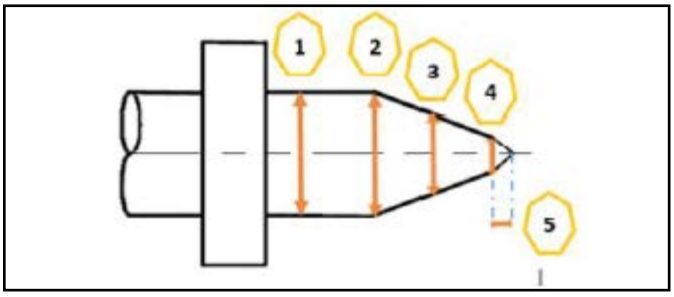

Fig. 3. Tool wear measurement points.

3. Hole Diameter.

Apart from tool measurement, the produced holes also measured. The measurement was made

using a vernier calliper with 0.02 accuracy. The purpose of this measure is made to find range of useable holes product. This information can be compared to other analyses result of tool weight and profile to find any relation.

RESULTS AND DISCUSSION

Tool wear

Tool wear was quantified by measuring the variation in tool weight after drilling predetermined holes by using electronic weighing machine. It should be noted that every weight measurement was a balance of the loss due to tool wear and the gain due to work-material transferred to the tool. This method was used by researcher [9] to study the wear of a tungsten carbide friction tool used for drilling a low carbon steel workpiece. Fig. 4 shows results of the weight measurement for non-hardened tool. The weight for the non-hardened tool changed from 31.6 g for new tool to 30.3 g after 230 holes, which indicate a while Fig. 5 shows results of the weight measurement for hardened tool. The weight for the hardened tool changed from 31.6 g for new tool to 29.2 g after 720 holes, which indicate a decrease of 1.3 g, of 2.4 g. To justify the tool wear base on the weight loss, comparison were made 1.3 gram loss at as shown in Fig. 6. Non-hardened tool loss 1.3 gram of its initial mass after drilled 230 holes while hardened tools loss 1.3 gram from its initial mass after drilled 500 holes. Relatively non-hardened tool loss 5.6 mg of its mass in every drill and 2.6 mg on hardened tool. Among this two friction tools, change of tool weight was higher for non-hardened due to its low hardness value (19.8 HRC) and change of tool weight was low for hardened tool due to its high hardness value (64.5 HRC).

Tool profile

The tool wear also was quantified by observing the tools profile and measuring the tool diameter at predefined points marked as 1, 2, 3, 4 and 5 which is shown in Fig. 4.

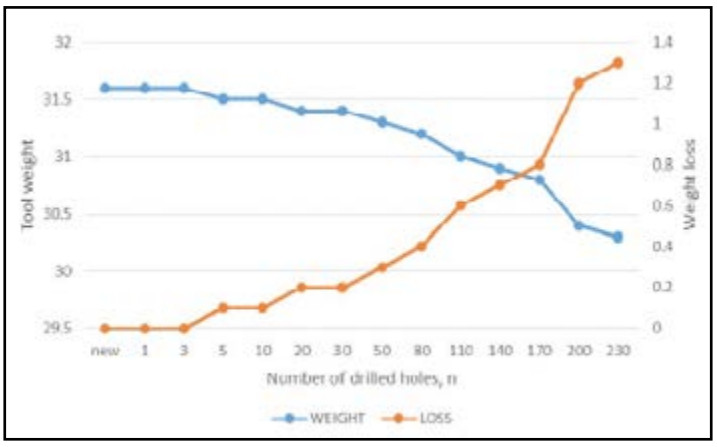

Fig. 4. Tool Weight vs Weight Loss Non-Hardened Tool

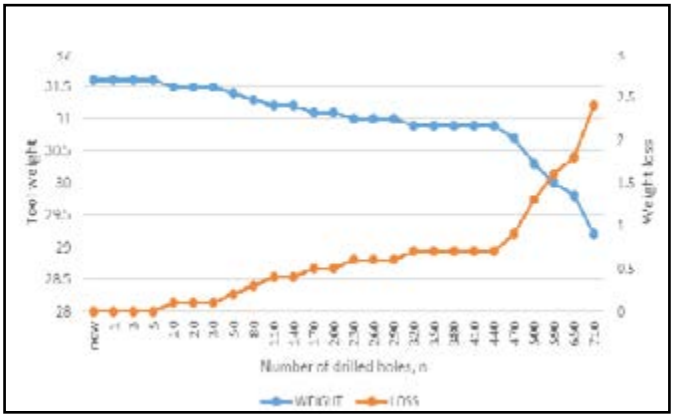

Fig. 5. Tool Weight vs Weight Loss Hardened Tool.

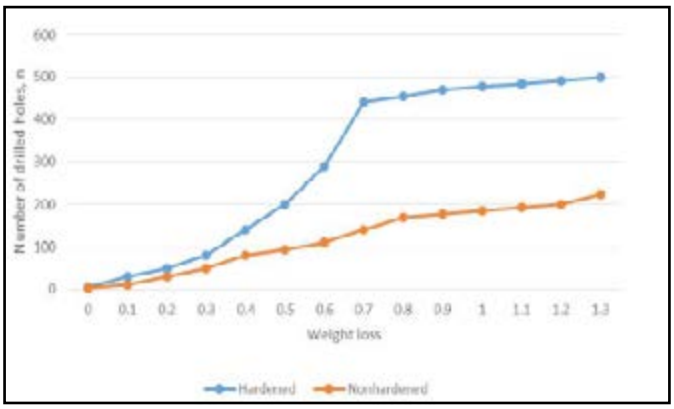

Fig. 6. Weight Loss Hardened vs Non-Hardened Tool

 Tool Profile Observation

Fig. 7 shows the non-hardened tool after 3, 50, 140 and 230 drilled hole. It is clearly visualised non-hardened tool significantly lost its center region and formed concave cross sectional profile in its conical region only after drilled 3 holes as shown in Fig. 7(b).

This wear characteristic is expected since it is knows the center region support drills and generate peak force in this drilling process. High friction and temperature can easily deformed non-hardened material. Fig.8 (c) shows, after 50th hole drilled concave cross sectional profile on the conical region gradually formed into spearhead shape. Another phenomenon observed there was a circular groove around the tool peripheral develops in the area intersecting tool conical and cylindrical region which is marked as point 2. This groove is likely due to the abrasive wear. After drilled 50 holes, previous characteristic shows in Fig. 7(c) propagated as shown in Fig.7(d). The drill tip become smaller and the circular groove become deeper and wider. Fig.7(e) shows final condition of friction drilling after drilled 230 holes. It lost more than half of its conical region. Diameter on point 1 also reduced creating new intersecting point between conical region and cylindrical region on initially was a cylindrical region. It is also observed that approaching the shoulder region, the

diameter of cylindrical was remain the same without significant changes in surface deformation.

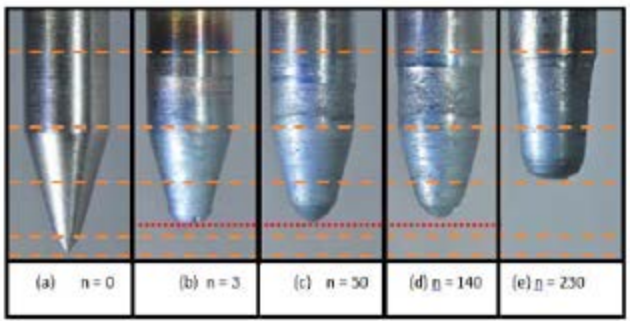

Fig. 7. Non-hardened tool condition

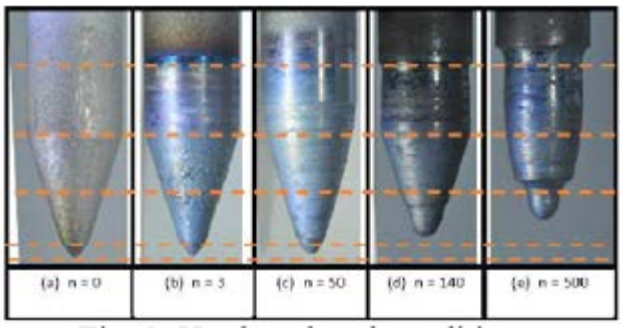

Fig. 8. Hardened tool condition

Fig. 8 shows the hardened tool after drilled 3, 50, 140, and 500 holes. Initial finding after drilled 3 holes, the center region of the tools still there. Only slight erosion observed as shows in Fig. 8 (b). Another finding was there were adhesions of work material to the tool observed, mostly at conical region. Fig. 8(c) shows tool condition after drilled 50 holes. The previous found work material adhesion removed by abrasive effect during the drilling process. The abrasive effect is also believed has remove outer layer of conical region. It can be seen the diameter of the conical region reduced. The intersection point between conical region and cylindrical region also effected. After drilled 140 holes, as shown in Fig. 8 (d) the center region was completely eroded as well as some portion of conical region. The diameter of cylindrical region also found reduced. The reduction is likely due to abrasive wear. Fig. 8 (e) shows tool condition after drilled 500 holes. Major deformation observed, most conical region and cylindrical effected. Another finding observed, a step was formed in conical region with lower step resembles the center region shape.

Tool Profile Measurement

Fig. 9 shows the profile of the new non hardened tool and the tool after drilling 30 and 230 holes. The horizontal axis represents the tool cylindrical axis and the vertical axis represents radial position of the tool surface. Large wear occurs at tool center region, after drilled 30 holes the

center region eroded reduced the tool length about 2.0mm and reduced 4.0mm more after drilled 230 holes. Diameter at intersecting area of tool conical and cylindrical region also reduced from 7.3mm to 5.36mm with 1.94mm reduction.

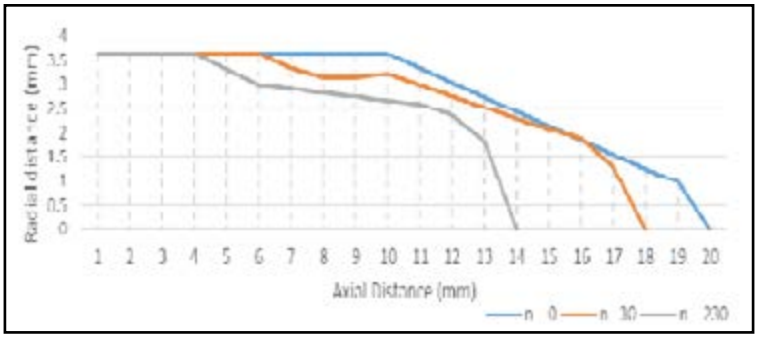

Fig. 9. Measured Profile of Non-Hardened Tool

Fig. 10 shows the tool profile of the new hardened tool and the tool after drilled 50 and 500 holes. The horizontal axis represents the tool cylindrical axis and the vertical axis represents radial position of the tool surface. Noticeable wear occurs at tool center region, after drilled 50 holes the center region eroded reduced the tool length about 1.0mm. Another significant effect found is the uniform removal of outer layer at conical region. Most of the area lost 0.5mm. Diameter at intersecting area of tool conical and cylindrical region also reduced from 7.3mm to 5.94mm with 1.36mm reduction. After drilled 500 holes the tool was badly affected, the tool length reduce about 5mm and overall diameter reduce about 1.52 mm.

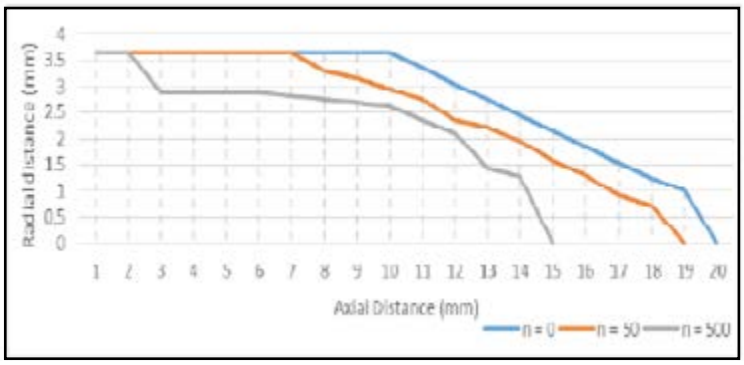

Fig. 10. Measured Profile of Hardened Tool

Hole diameter

The ultimate function of drilling is to get a hole and the most important effect of wear in drilling tool is the dimension alteration of drilled hole. In friction drilling process, wear tools normally produced smaller holes which is cannot be taped or utilized. In this study M8 fastener was selected to be tapped in 7.3 holes. For an M8 x 1.25, tapping recommended drill holes are

between 7.26mm to 7.41mm. Fig. 11 shows the measured hole diameter and acceptant range. A general trend of reducing hole diameter is observed. The hole diameter
was reduced about 0.42mm for non-hardened tool and 0.56mm for hardened tool. Even though holes drilled with hardened tool shows significant diameter reduction, the tool was managed to produce 80 useable holes compared to non-hardened tool with only 40 useable holes. The larger reduction in holes diameter drilled using hardened tool is due to longer operation time until the conical region broke. Another important observation in this study is that, even with the tool worn in the center and conical region, the holes produced still are in acceptable range. Initially it may be simplified that, the hole diameter is largely determined by the tool cylindrical region rather than either center or conical region.

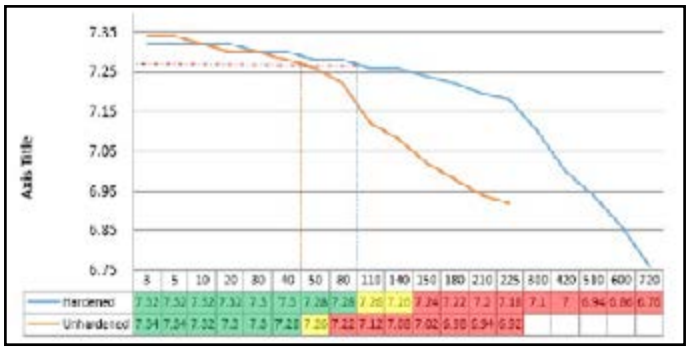

Fig. 11. Hole measurement and acceptance range.

CONCLUSION

The primary goal of this research was to study effect of harden and non-hardened condition on tool wear and to study wear characteristic of friction drilling tool. The effect on tool weight, profile changes any hole formations were analyse. The results were for these two tools were compared and following conclusions have been determined. Extended tool life is observed on hardened tool in comparison with non-hardened tool in friction drilling process. The hardened tool exhibit twice as long tool life than non-hardened tools for friction drilling. Diameter of holes produced in friction drilling are largely determined by the tool cylindrical region. Based on the results, the researchers suggest the Cyrogenic Treatment on the drilling tools can be conducted to improve wear resistance on the tools and produce improvement in the result.

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Fabrication Y-shaped Fracture Plates of Ti40Nb Alloy by Powder Metallurgy Route

Mazyan Yahaya1, 3, a, Nurul Azna Idayu Ab Aziz2, Seri Nian Akmad 1, Nur

Zarina Mohd Zin1, Maheran Sulaiman1 and Muhammad Hussain Ismail3,b

1Department of Mechanical Engineering, Politeknik Nilai, 71760 Negeri Sembilan, Malaysia

2Department of Mathematics, Science and Computer, Politeknik Nilai, 71760 Negeri Sembilan, Malaysia

3Centre for Advanced Materials Research (CAMAR), Faculty of Mechanical Engineering, Universiti Tekhnologi MARA, 40450 Shah Alam, Selangor, Malaysia

Corresponding authors: a mazyan@polinilai.edu.my, b hussain305@salam.uitm.edu.my

Keywords: Y-shaped mould; compaction pressure; beta-phase; density ; porosity.

Abstract. Beta-type titanium alloy is potentially good biomaterials which possess the properties such as better mechanical mimic to human bone. The Ti40Nb alloy fracture plate for metacarpal and proximal phalangeal fracture fabricated by powder metallurgy route were investigated. Niobium powder (Nb) was ball milled with titanium powder (Ti) with 40 %wt and cold-compacted into Y-shaped mold by varies pressure (7 tonne and 9 tonne). The green samples were sintered in high vacuum furnace at 1200°C for 2 hours. The as-sintered samples were characterized in terms of shrinkage, density, porosity, microstructures and hardness. The 9 tonne sintered samples gives higher density value. The same sample also gives lower shrinkage and porosity data. This is due tot he high compaction pressure which gives higher contact area between powder particles. The observation from SEM image also proved that higher density and decreased the shrinkage and porosity with more uniform size of pores and complex grain structures. The hardness number of 229.4 kgf/mm² and 177.56 kgf/mm² for as-sintered samples by 9 tonne and 7 tonne compaction pressure were obtained. This data showed the titanium alloy fabricated are suitable for biomedical implant application.

Introduction

One of most common injuries are hand injury. In medical, they are termed as metacarpals and phalangeal fractures. They are one of the most demanding fracture as they cause disabilities of hand as all joint at fingers are interdependence with one another [1]. This traumatic fracture developing complication of stiffness, malunion, nonunion and tendon rapture [2]. Furthermore, phalangeal fracture need complex work to correct the alignment rather than metacarpal fractures [2]. Loss of these functions have prevent people from making ergonomic progress of their daily life.

Most surgeon preferred internal fixation because of small implanted material. The plate

fixation implant for hand fracture usually in 1–2 mm in thickness with locking screw according to varies of fracture type [1]. Basically, for finger fracture the surgeon use more than one techniques as it need to balance of more than one finger joint of the same finger[1]. As for the complex shape and selected dimension for specific clinical applications, most implant used powder metallurgy as the way to fabricate the implant. This is due to near net shape of end product and higher number in demand in biomedical applications [3].

Conventional method of powder metallurgy, which is compaction method are resulting in strengthening the green part properties of the samples produced. Compaction process can be in varies types which are cold, warm or hot surrounding [4]. Compaction of powders is forcing the powder particles to closed together. In a recent study, Ti-40Nb elemental powder had been hot pressed in solid cylinders that successfully resulted in homogeneous porosity all over the volume formed [5]. In past experimental, the composition 40wt%Nb compacted at room temperature in solid cylinder are able to gain yield strength 35MPa and a 60% porosity level [6]. The compaction can also be done in cold compaction with the present of binders or coating around the mould where the purpose is still the same which is to increase the strength of particle bonding before sintering process.

By sintering process, the elemental powder particle in green body are diffusing each other causes shrinkage of the size by below melting temperature [3]. Higher dimensional changes after sintering occur will gives low density materials formed. Bonding process requires surface energy of the particles [4]. As green density requires more pressure, the powder particles will be packed in the die/mold pattern that gives more contact area. Shrinkages is the process where the neck growth in initial stage between particles [4]. This stage will adds grain boundary energy to increase strength which effect the mechanical properties [4,7]. The objective of the study are to characterized the Y-shaped fracture plates fabricated via powder metallurgy method.

Experimental

Elemental Ti powder (<20 μm) and Nb powder (1-5 μm) morphology was analyzed using Scanning Electron Microscope (SEM). Density of the powder also being analyzed by Pycnometer Test using micromeritics AccuPyc II 1340. The powder was mixed as in Ref. [8]. The composition of 40 wt% of Niobium to Titanium powder in total of 100g are used. As-mixed powder was cold-compacted in Y-shaped (Figure 1) complex mould with controlled pressure (7 and 9 tonne) and powder weight (0.9-1.1 g) of each samples are varies until good samples was obtained. Then, the apparent density was calculated by Hooke's Law based on the thickness of the green samples. The green samples were sintered in tube furnace with high vacuum up to 1200˚C temperature and a heating rate of 5˚C/minfor 2 hours. After that, the as-sintered samples were characterized in term of microstructure, shrinkage, porosity and hardness. The microstructure were observed by SEM (back-scattered image) to identify the porosity and texture of the sintered samples. Archimedes Principle and pycnometer test were performed to identify the density of sintered samples. Lastly, characterization of the mechanical properties as-sintered samples was performed using Mitutoyo MVK-H1 Vickers Hardness Tester with 1kg load for hardness data.

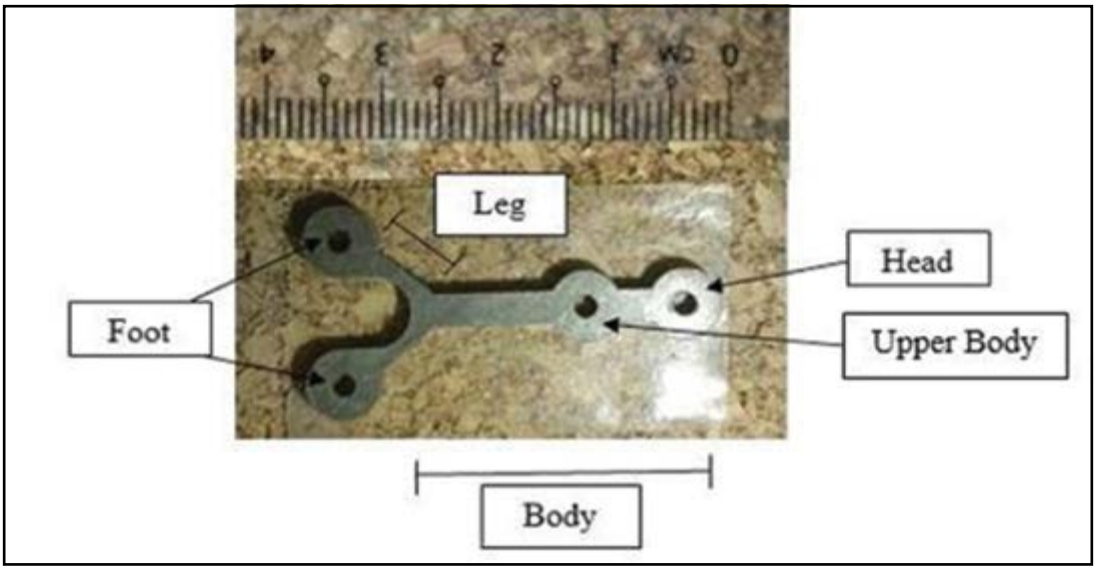


Figure 1: Green body of Y-shaped fracture plate fabricate

Results and Discussion

Density, Porosity and Shrinkage. From the results in Table 1, it shows Nb powder is denser than Ti powder. But the value does not varies much as compared to theoretical values. The density test for as-sintered samples showed that 9 tonne samples are denser than 7 tonne sample. Therefore the rate of powder densification depends on the contact area of the powder particles[4,9]. This is due to the higher the compaction pressure cause the powder particle deformation. This deformation will increase the contact area as the void spaces are being squeezed [4]. It will also causes repacking the powder particles into arrangement [10]. Furthermore, the higher coarse and fine powder are combined give rise in porosity [10]. This is because the smaller size particles will fill the void between the bigger particle during compaction. This phenomenon are shown in Table 2 where the 7 tonne pressure gives higher porosity of 9.24% than 9 tonne pressure samples with 1.43% porosity.

Table 1: Density of elemental powder, as-mixed and as-sintered samples

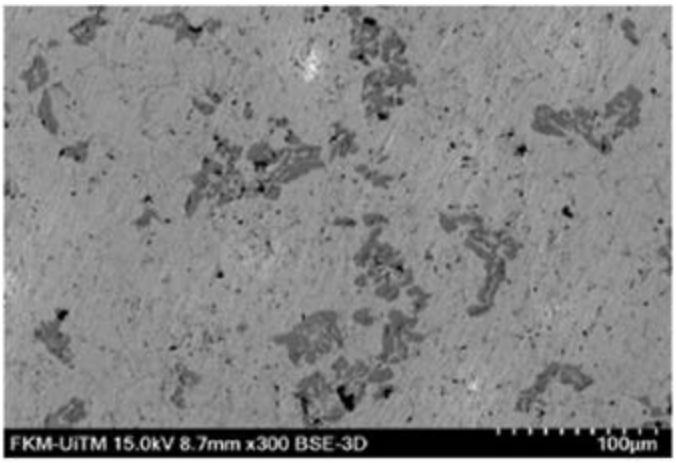
			Experimental Value, Pycnometer Density (g/cm^3)	Archimedes Principle, (g/cm^3)
As-sintered samples	Ti40Nb	7 tonne	6.0404	5.1426
		9 tonne	6.5317	6.5317

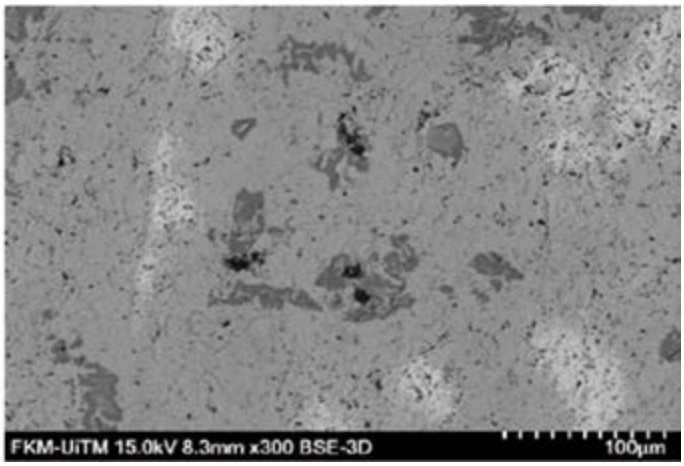
Table 2:Porosity and shrinkage percentage of as-sintered samples

	9 tonne	7 tonne
Porosity As-sintered, θ (%)	1.43	9.24
Shrinkage (%)	4.62	9.24

For Y-shaped implant, to obtain the thickness about 1-2 mm, the easiest way is to control the dimension of the green parts with higher green density. So that, less changes in dimension during sintering process. From Table 2, the data represent the shrinkage of as-sintered samples. It shows the lower the compaction pressure gives higher shringkage value of 9.24%. For 9 tonne samples, there are 4.62% less shrinkage compared to 7 tonne pressure for as-sintered samples fabricated. By sintering process, the elemental powder particle in green body are diffusing each other which causes the shrinkage of the size below the melting temperature [3]. Higher dimensional changes for 7 tonne samples at sintering occur when low density (6.0404 g/cm3) for 7 tonne pressure samples formed during compaction process.

Microstructure. Based on the SEM image below in Figure 1 shows lamellar structures. The dark (grey) region represented the alpha phase, the light region (white) represented the beta phase and the black spot were pore performed after sintering process [11]. The grain boundary of higher compaction pressure was more complex than lower compaction. From the observation, it shows the pores in lower compaction pressure were bigger in size and looked uniform than in higher compaction pressure. Therefore, the porosity value discussed earlier are proven with the observed image in Figure 1. The powder particles with neck growth will diffuse in each other and overlap at final stage, the pores are closed and become spherical [4,7]. Therefore during sintering process, the powder particles will be become rounded due to the diffusion process





Hardness. Based on result in Figure 2 below, it shows that 9 tonne samples gives higher hardness number than 7 tonne sample. This is because the 9 tonne sample are denser and the grain boundaries are more complex than the 7 tonne sample. Improve grain boundary energy will

increase strength which effect the mechanical properties [4,12]. The indentation happened to be at pores as both samples have distribution of pores either as close or open pores. Both resulted better in hardness compared to Ti implant used nowadays, Ti-6Al-4V (340.51 VHN) [13]

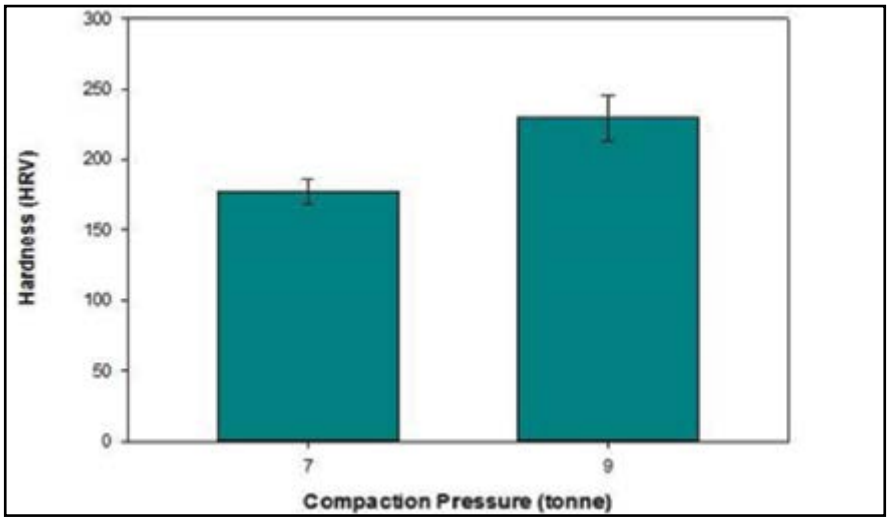


Fig. 1: Hardness versus compaction pressure

Conclusion

Titanium based alloy, Ti40Nb have been successfully developed using conventional method of powder metallurgy of cold-compaction. This method outcomes are near net shape with almost to full green density of green samples. From the discussion, the denser as-sintered samples had less shrinkage which was 4.62% with porosity 1.43% and hardness 229.4. Even though the shrinkage and porosity of as-sintered samples with lower compaction pressure were bigger, they were also possible for fracture plate application as hardness number of 177.56 is within the biomedical material criteria. Further study for biocompatibility of the material are recommended for this new alloy fabricated.

Acknowledgement

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Kid's Alert - Portable Tracking system using Bluetooth Sensor With Sound Notification

Rosuzaini Isa1, a,Syed Syazwan2,b and Syed Arif3,c

1Department of Information Technology and Communication, Politeknik Muadzam Shah, Pahang Malaysia

2Department of Information Technology and Communication, Politeknik Muadzam Shah, Pahang Malaysia
3Department of Information Technology and Communication, Politeknik Muadzam Shah, Pahang Malaysia

arosuzaini@pms.edu.my , bsyed.ikmlumut@gmail.com, csyedarif@yahoo.com
*Corresponding author : Rosuzaini Binti Isa , rosuzaini86@yahoo.com

Keywords: Arduino; IoT; Bluetooth; Buzzer;

Abstract. This study is related to a prototype to detect children's position if they are away from their parents. This prototype is called "Kids Alert" which uses IoT technology, the Internet of Things. This prototype uses two approach: bluetooth sensor and buzzer sensors connected on Arduino boards and can be controlled via smartphones. The function of this project is that the buzzer will sound when over 10 meters and connected to the smartphone using Bluetooth. This project has been develop by using two software which are Arduino and MIT App Inventor. This project used an Agile methodology which involved six phases. The phases are planning, analysis, design, testing, and maintenance. Based on the results of the test, the project was able to help parents monitor children when they were outdoors. It is hoped that this project will reduce the problem of missing children when outside.

Introduction

The case of losing children is increasingly being heard in the mass media today. This news is very disturbing as the number reported missing goes up day by day. This situation will concern parents if they want to bring children outdoors, parents should always monitor the condition of the children to be near them. Based on the Statement of Statistics The latest Under 18 Children released by the Royal Malaysian Police (PDRM) showed that in the two-month period, 268 cases were reported with 191 cases involving girls while boy only 77.

Mostly parents nowadays more spent their time by using smartphone. Based on Pew Research Center's survey firm, Malaysia is one of the highest paid holders with a penetration rate of 65 percent and ranked 10th in the world with a population of smartphones (Utusan Online, 2018). Additionally, according to the Newzoo Global Market (Utusan Online, 2018) report, Malaysia ranked 29th on the world's highest internet usage. The findings revealed that there were about 24,572,446

internet users in Malaysia.

This Kids Alert system will make it easier for parents to monitor children when doing activities and always ensure that children are not far away from them. This situation is because when kids who use the Kids Alert system are over 10 meters from their parents, Kids Alert will produce a buzzer sound and send a notification to parents via the uploaded app in the parent's smartphone. Smartphones are connected to the Children Tracking system via Bluetooth. Kids Alert is a portable device to be keep by the children and it is not very weight for children to bring.

Literature Review

Observing Malaysians today, most of them are spending hours on smartphones in everyday life. Therefore, Android-based phones have become an option in the development of this system. From our research results, we use Bluetooth devices as a medium of contact between Arduino and smartphones. Based on figure 1.0, it shows the relative distance between devices and phones. Bluetooth devices show the closest distance between contacts. It's important that the tracking system installed on children will not be lost in the long distance, so children are always close to the smartphone held by parents.

Table 1: Comparison between IoT Connectivity (Richard Barry, 2018)

	Description	Typical Range	Security	It is good for	It doesn't work well for	Keep in mind for costing
Bluetooth	Bluetooth, BLE, and ANT are radio protocols meant for Personal Area Networks (PAN). Mostly these are on a person's body or near them.	20m (line of sight)	Devices are paired – which is a process of exchanging encryption keys.	Devices that stay nearby of each other, like between a smartphone and a headset, heart rate monitor, bicycle speedometer	Devices that are separated by more than a few meters, and devices that need a high communication data rate.	This is a popular option for health monitors and smart homes as many people have Smartphones.
Wi-Fi	Wi-Fi is meanly meant for broadband network connections in a confined space. Normally less than 100 square metres per access point.	50m (indoors)	Recently Wi-Fi security suffered from many exploits.	Works well within the area it is set up in. Great for security cameras, power meters or anything that is installed in a fixed location, has power, and needs the bandwidth.	Only works in space where it is set up and has limited range. Also uses a substantial amount of power, so it is not ideal for battery operated devices.	Although we cannot assume that everyone has home Wi-Fi, this is a great option for industry.
GSM	GSM is the second generation mobile telephone system. It is mainly meant for voice, but also supports data in the form of SMS and GPRS. Because this is an old system, it is widely adopted, and hardware is available at low cost.	35km (hard technical limit)	This old standard also suffers from exploits.	Long range capabilities, used most commonly in the industry such as traffic lights, tracking of trucks and sometimes animal tracking.	Requires a lot of energy, so it is not ideal for battery operated devices.	It is always put on and thus can consume a lot of energy. Due to the good roaming capabilities tracking over borders is easier using GSM.



Figure 1: Diagram of Arduino Uno

Portable tracking system chooses Arduino Uno as the main board to create this project because Arduino Uno contains everything needed to support the micro controller. By using Arduino Uno, it is easier to connect to analog sensors, motors, and other electronic components. This is why the Arduino is best used for projects like the tracking system. Besides that, The Arduino's power supply requirements are very simple because we can plug it into the battery pack, and it will start running code immediately.



Figure 2 : Piezo Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke. We are using a piezo buzzer to make some noise with Arduino.

Methodology

To develop Kids Alert project, we used an Agile Methodology because it is the most relevance methodology to IoT (Internet of Things). The agile methodology is well suited to dealing with the demands of the consumer and from this new interconnected environment. Agile calls for frequent updates to software so that it is constantly up-to-date with the latest technology. The continual updates keep the consumer happy by always keeping the software fresh, and they keep the developers happy because they can more easily manage their development schedule.(Leila Modarres, 2015). For this project, we are using an interview and questionnaire to collect data and information. Based on information and literature studies we design and develop the Kids Alert prototype. There are six phases involved in this methodology; the phases are planning, analysis, design, testing, and maintenance. For this project, we are using questionnaire as a fact-finding to collect information. Based on the information we gather, we design the prototype and decide to use Bluetooth to connect

mobile phone to device and also use Arduino. During the testing phase, we testing the prototype to make sure there is no any failure and function as well.

Development and Result

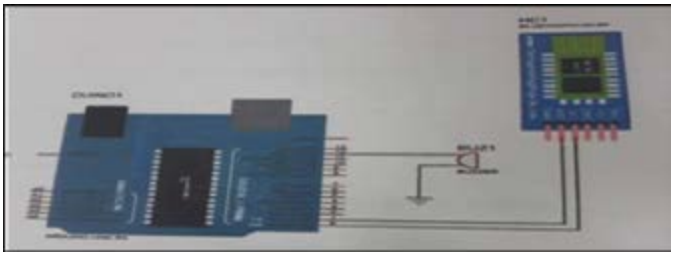

Figure 3 : Schematic diagram

As to make the Kids Alert to be more suitable for children, the Arduino board is placed in the box to facilitate a child by putting in the child's bag when using this prototype. The buzzer will sound when Kids Alert is 10 meters away from parents' smartphones that have been uploaded to the Kids Alert app. This prototype produces a very strong sound. However it can adjust the sound according to the desired sound.



Figure 5 : Interface Kids Alert

First of all, the smartphone must on the bluetooth and then open the Kids Alert application and push the Bluetooth button to open the bluetooth sensor on Kids Alert device. After that, find the connection to connect with the device. User also can choose the sound they want by click at the sound button. After the phone and device were connected by bluetooth, the status at the application will turns to Connected. Once connected, the system will function as well, which is the sound will be on once the device are ten metre away or the bluetooth connection are not connected anymore.

Based on the testing report, users gave a good feedback and some comments and idea to improve

this project.We hope this project will help parents to monitor their children when doing outdoor activities.

Discussion and Conclusion

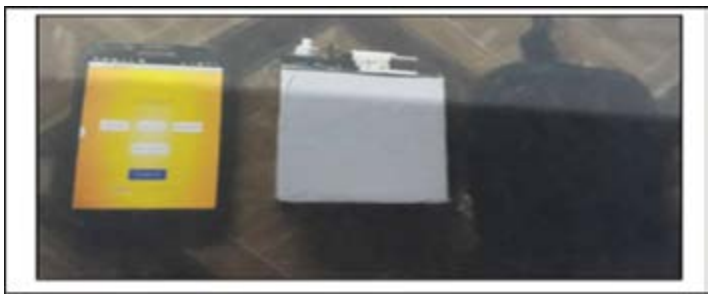

Figure 6 : Prototype Kids Alert

The conclusion, this project can give notification from the buzzer sound to the parents when the children away from them. Other than that, this project can be use to track the valuable things like handbags to keep the items in safe. Based on the feedback we get, mostly user satisfied this project and they want we improve this project by change the size to smaller like wristband to make sure the children more easier to bring it.

Acknowledgments

I would like to express my gratitude to everyone who had contributed to complete this project. Especially, my beloved husband, my children, my lovely students and my fellow friends.

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Keberkesanan Electrical Wiring Kit Sebagai Alat Bahan Bantu Mengajar (ABBM) Bagi Kursus Asas Pendawaian Elektrik

Shaiful Hanif Mat Din [1] dan Nor Hanida Ahmad[2]

1,2 Jabatan Kejuruteraan Elektrik, Politeknik Seberang Perai, Pulau Pinang, Malaysia

Emel : shaiful@psp.edu.my

Emel : hanida@psp.edu.my

Kata Kunci : Alat bahan bantu mengajar (ABBM), Electrical Wiring Kit, Asas Pendawaian Elektrik

Abstrak : Alat bahan bantu mengajar (ABBM) merupakan salah satu pendekatan yang digunakan oleh pensyarah untuk memastikan kaedah pengajaran lebih efektif. Oleh itu, satu ABBM iaitu Electrical Wiring Kit direka untuk memudahkan proses pengajaran pensyarah bagi kursus asas pendawaian elektrik domestik di Jabatan Kejuruteraan Elektrik, Politeknik Seberang Perai. Kajian ini dilaksanakan untuk melihat sejauh mana keberkesanan penggunaan Electrical Wiring Kit dapat membantu proses pengajaran pensyarah dan pembelajaran pelajar. Kajian ini dijalankan di Jabatan Kejuruteraan Elektrik, Politeknik Seberang Perai. Responden kajian adalah 20 orang dan dipilih di kalangan pensyarah yang berpengalaman dalam kursus pendawaian elektrik. Instrumen kajian ialah satu set soal selidik. Keputusan kajian menunjukkan maklum balas positif di mana ABBM ini dapat menjadikan proses pengajaran dan pembelajaran lebih efektif dan pelajar dapat membuat amali dengan baik.

Pendahuluan

Proses pengajaran dan pembelajaran (PdP) merupakan satu proses yang kompleks dan penuh cabaran. Oleh yang demikian pengurusan PdP yang dinamis dan sistematik dapat memacu perkembangan pembudayaan saintifik, pengetahuan baru dan pencetus idea kreatif.lebih mapan. Proses PdP bermula dengan perancangan dan penyediaan alat bahan bantu mengajar(ABBM) yang sesuai. Penggunaan ABBM dapat membantu pensyarah untuk menerangkan sesuatu konsep kepada pelajar. hanya sebahagian pelajar sahaja yang dapat memahami dengn jelas tentang apa yang diajar manakala sebahagian lagi memerlukan sokongan pembelajaran[15]. ABBM yang digunakan perlu diinovasi supaya bersesuaian dengan keperluan pelajar masa kini. Penggunaan ABBM yang relevan ini dapat menjadikan proses PdP lebih menarik dan objektif dapat dicapai. Pelbagai ABBM boleh disediakan untuk sesuatu kursus dan disimpan di dalam bekas yang dinamakan kit pengajaran dan pembelajaran. Penggunaan kit pengajaran dan pembelajaran dapat mendatangkan kesan minat , seronok dan bersemangat kepada pencapaian pelajar[1]. Selain itu, peningkatan pencapaian akademik dapat ditingkatkan. Proses PdP bagi kursus kejuruteraan di institute pengajian tinggi kebiasaanya diajar secara teori dan pelajar menjalankan amali did makmal atau bengkel untuk mendapatkan konsep kejuruteraan yang betul. Namun begitu pelajar

akan mengalami masalah yang serius apabila tiada ABBM yang bersesuaian untuk menunjuk hubungan sebenar mekanisme kejuruteraan. Oleh yang demikian penerangan berserta demonstrasi menggunakan ABBM dapat membantu pelajar menghayati perhubungan antara teori dan realiti. Pensyarah pasti dapat menghasilkan satu pengajaran yang bermakna. ABBM seperti Electrical Wiring Kit dibangunkan khusus untuk pelajar kejuruteraan elektrik yang mengambil kursus asas pendawaian elektrik domestik. ABBM ini dibangunkan untuk membantu pensyarah memberikan gambaran yang lebih jelas terhadap isi pembelajaran. ABBM ini berupaya untuk menerangkan tentang pendawaian elektr*ik domestik yang terkandung daam silibus pelajar.*

Pernyataan Masalah

Setiap pelajar adalaha berbeza secara individu gaya pembelajaran mereka. Pelajar yang mendaftar program kejuruteraan elektrik di Politeknik Seberang Perai terdiri dari pelbagai latar belakang akademik. Raha Yaacob (Harian Metro, 15 Januari 2002) dalam artikel yang bertajuk "Memperkasakan Pendidikan Vokasional" menyatakan bahawa hanya 10 peratus sahaja pelajar mendapat keputusan cemerlang dalam peperiksaan awam. Manakala 40 peratus mendapat keputusan sederhana dan 40 peratus mendapat keputusan kurang baik. Menurut Menteri Pendidikan Malaysia pada masa itu, Tan Sri Musa Mohamad, pelajar yang mendapat keputusan kurang baik itu tidak bodoh tetapi pelajar ini tidak cenderung kepada konsep menghafal dan mengingati fakta. Oleh yang demikian, untuk membantu pelajar bukan teknikal yang mendaftar program kejuruteraan elektrik, tumpuan kepada latihan praktikal dalam proses PdP adalah penting. Sehubungan itu, pendekatan proses PdP seharusnya menggunakan ABBM yang berbentuk praktikal yang boleh menjayakan proses pengajaran pensyarah.Sehubungan itu, timbul persoalan tentang keberkesanan penggunaan ABBM dalam proses PdP pensyarah untuk kursus asas pendawaian elektrik domestik. Penggunaan ABBM mampu membantu meningkatkan keberkesanan proses PdP pensyarah[17]. ABBM Electrical Wiring Kit dibangunkan khusus untuk pelajar kejuruteraan elektrik yang mengambil kursus asas pendawaian elektrik domestik dan membantu pensyarah memberikan gambaran yang lebih jelas terhadap isi pembelajaran.

Alat Bahan Bantu Mengajar (ABBM)

Electrical Wiring Kit ini merupakan satu ABBM yang direkabentuk berasaskan struktur silibus kursus Electrical Wiring . ABBM ini dibina menggunakan bahan-bahan yang mudah diperoleh dan disenggara dengan mudah. Responden hanya perlu menukar mentol atau suis apabila berlaku kerosakan. ABBM ini direkabentuk menggunakan papan lapis sebagai kerangka utama; plug 3-pin sebagai peranti masukan; suis satu hala, suis dua hala dan suis perantara sebagai peranti kawalan dan mentol sebagai peranti keluaran. Kos penghasilan satu ABBM ialah RM68.90. Namun begitu, ABBM ini boleh digunakan dalam tempoh jangka hayat yang lama. ABBM ini selamat digunakan kerana mempunyai peralatan perlindungan litar. ABBM ini juga ringan dan mudah dibawa. Ini bermaksud proses PdP tidak semestinya berlaku di dalam bengkel pepasangan dan pendawaian domestik sahaja.

Objektif Kajian

Kajian ini dijalankan untuk mengenalpasti keberkesanan Electrical Wiring Kit dalam membantu proses PdP pensyarah yang mengajar kursus asas pendawaian elektrik domestik.

Rekabentuk Kajian

Penyelidik menjalankan kajian ini untuk mendapatkan maklum balas penggunaan ABBM dalam proses PdP pensyarah Electrical Wiring. Oleh yang demikian , kajian ini berbentuk tinjauan awal. Jumlah responden ialah 20 orang di mana mereka merupakan pensyarah yang mengajar kursus ini. Kajian ini hanya melibatkan aktiviti pengumpulan data dan maklum balas dari sampel kajian sahaja.

Instrumen Kajian

Kaedah borang soal selidik dipilih bagi mendapatkan maklum balas daripada responden. Item soal selidik diambil dan dioleh dari kajian oleh Khairul Anuar et al (2018). Borang soal selidik ini mengandungi dua bahagian; bahagian A meminta responden memberi maklum balas data demografi iaitu jantina, pengalaman dalam proses PdP pendawaian domestic dan pemilikan sijil kemahiran manakala bahagian B meminta responden memberi maklum balas mengenai rekabentuk dan keberkesanan Electrical Wiring Kit dalam proses PdP pendawaian elektrik domestik. Skala yang digunakan ialah skala Likert dan Jadual Tahap Skor Min.

Jadual 1 : Skala Likert

Amat tidak setuju	Tidak Setuju	Kurang Setuju	Setuju	Amat Setuju
1	*2*	*3*	*4*	*5*

Jadual 2 :Tahap Skor Min

Skor Min	1.00 -2.33	2.34 – 3.66	3.67 – 5.00
Interpretasi	Rendah	Sederhana	Tinggi

Electrical Wiring Kit dibangunkan untuk membantu proses PdP pensyarah. Analisis dapatan dibentangkan dalam bentuk jadual peratusan dan jadual min. Jadual di bawah merupakan analisis demografi responden.

Item Soal Selidik	Jantina		Program			Memiliki Sijil Kemahiran		
	Lelaki	Perempuan	Kurang dari 1 tahun	2-3 tahun	4 tahun ke atas	Ya	Tidak	Dalam Proses Permohonan
Peratus (%)	90	10	10	30	60	10	40	50

Jadual 3:Taburan Peratusan Responden Mengikut Jantina, Tahun Pengalaman Dalam Pendawaian Domestik Dan Pemilikan Sijil Kemahiran Dalam Bidang Pendawaian Domestik.

Jadual 3 menunjukkan taburan peratusan responden mengikut jantina, tahun pengalaman dalam pendawaian domestik dan pemilikan sijil kemahiran dalam bidang pendawaian domestik. Didapati daripada taburan ini sebanyak 70% responden adalah lelaki dan selebihnya ialah perempuan. Didapati juga sebanyak 60% daripada responden mempunyai pengalaman dalam pendawaian domestik yang melebihi daripada 4 tahun. Walau bagaimana pun hanya 10% responden yang memiliki sijil kemahiran dalam pendawaian domestik.

Item Soal Selidik	Min
Rekabentuk Electrical Wiring Kit :	
1. Rekabentuk Electrical Wiring Kit bersesuaian dengan struktur silibus	4.30
2. Bahan yang digunakan untuk membangunkan Eletrical Wiring Kit menyamai senarai alatan dan bahan amali yang digunakan	4.67
3. Susun atur Electrical Wiring Kit mudah difahami	4.61
4. Electrical Wiring Kit mudah dikendalikan oleh pelajar	4.56
5. Electrical Wiring Kit mudah alih dan boleh digunakan di dalam bilik kuliah	4.73
6. Electrical Wiring Kit ini tidak membahayakan pelajar	4.57
Nilai Purata Min	4.57

Jadual 4 :Nilai Skor Min Dari Aspek Rekabentuk ABBM

Jadual 4 menunjukkan skor min bagi item soal selidik dari aspek rekabentuk ABBM. Didapati nilai purata min ialah 4.57 . Nilai ini berada di dalam julat Setuju. Dapatan ini menunjukkan rekabentuk Electrical Wiring Kit ini bersesuaian digunakan dalam proses PdP kursus Electrical Wiring. Ini kerana Electrical Wiring Kit dibina berdasarkan struktur silibus Electrical Wiring. Khendak silibus kursus akan sentiasa tercapai sekiranya ABBM mengikut struktur silibus[17]. Secara keseluruhan pembangunan Electrical Wiring Kit ini sesuai dengan silibus Electrical Wiring.

Item Soal Selidik	Min
Keberkesanan pembangunan Electrical Wiring Kit dalam PdP :	
1. Electrical Wiring Kit dapat menjelaskan asas pendawaian domestik	4.74
2. Electrical Wiring Kit memudahkan proses PdP tentang pendawaian domestik	4.30
3. Electrical Wiring Kit memudahkan pelajar membuat pendawaian sebenar selepas menggunakannya	4.40
4. Electrical Wiring Kit menarik minat pelajar untuk mengikut pelajaran seterusnya	4.76
5. Penggunaan Electrical Wiring Kit dapat menjimatkan masa PdP	4.46
6. Kawalan kelas menjadi lebih mudah	4.53
Nilai Purata Min	4.53

Jadual 5 :Nilai Skor Min dari Aspek Proses PdP di Dalam Kelas

Jadual 5 menunjukkan nilai skor min dari aspek keberkesanan Electrical Wiring Kit dalam proses PdP di dalam kelas. Hasil analisis mendapati nilai purata min ialah 4.53. Nilai ini berada di dalam julat Setuju. Ini menunjukkan ABBM Electrical Wiring Kit ini bersesuaian digunakan dalam proses PdP kursus Electrical Wiring. Penggunaan ABBM dalam PdP mampu membantu pelajar mengaplikasi hasil pembelajaran[21] . Ini disokong dengan skor min (4.40) pada item soal selidik pelajar dapat membuat penyambungan litar semasa amali dengan lebih mudah selepas proses PdP. Selain daripada itu, Electrical Wiring Kit ini berkesan digunakan dalam proses PdP kerana dapat menjimatkan masa[11,18]Mereka menyatakan bahawa penggunaan ABBM dapat memberi kesan positif terhadap pembelajaran berkesan dan masa lebihan proses PdP akan diberikan kepada pelajar untuk beraktiviti. Dalam konteks kursus Electrical Wiring, pelajar akan mendapat masa yang lebih untuk membuat pendawaian sebenar. Oleh yang demikian disimpulkan bahawa Electrical Wiring Kit berkesan terhadap proses PdP pendawaian elektrik domestic.

Kesimpulan

Penghasilan Electrical Wiring Kit ini dilihat dapat membantu pelajar melatih keyakinan diri untuk membuat pendawaian domestik satu fasa dengan selamat dan betul. Ini keran ABBM ini dilengkapi dengan MCB sebagai litar kawalan keselamatan. Di samping itu, ABBM ini terbukti dapat membantu pelajar memahami asas pendawaian domestic sebelum membuat pemasangan yang sebenar. Ini kerana pelajar dapat memindahkan lakaran skematik pendawaian kepada bentuk ABBM sebelum mengaplikasikan secara sebenar di bilik pendawaian . Penggunaan Electrical Wiring Kit dalam PdP membuatkan pembelajaran lebih menarik. Ini kerana PdP dapat dilaksanakan bukan sahaja di bengkel tetapi juga di bilik kuliah. Ini telah membuka ruang kepada pensyarah untuk menjadi lebih kreatif dalam penyampaian PdP kerana ia dapat membantu pensyarah menjimatkan masa penyampaian isi pembelajaran dan memudahkan kawalan kelas.

Memandangkan Electrical Wiring Kit ini berpotensi untuk mempengaruhi prestasi pelajar, satu kajian lanjutan perlu dilakukan untuk melihat keberkesanan ABBM dari perspektif pelajar. ABBM ini

juga dapat digunapakai oleh Kolej Vokasional dan Kolej Kemahiran yang menawarkan kursus asas pendawaian satu fasa.

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Faktor Yang Mendorong Pelajar Menipu Semasa Peperiksaan: Satu Tinjauan di Politeknik Seberang Perai

Nor Hanida Ahmad [1] dan Shaiful Hanif Mat Din[2]

[1,2] Jabatan Kejuruteraan Elektrik, Politeknik Seberang Perai, Pulau Pinang, Malaysia

Emel : hanida@psp.edu.my

Emel : shaiful@psp.edu.my

Keyword : Faktor, Menipu semasa peperiksaan

Abstrak : Ketidakjujuran dalam akademik semakin meningkat dan menjadi cabaran dalam dunia pendidikan peringkat tertier. Peningkatan kes penipuan pelajar dalam peperiksaan semakin menjadi barah dalam dunia akademik. Sehubungan itu, kajian ini dilaksanakan untuk mencari kaedah penipuan dan punca berlakunya penipuan di dalam peperiksaan di kalangan pelajar Politeknik Seberang Perai khususnya pelajar Jabatan Kejuruteraan Elektrik. Soal selidik diberikan kepada pelajar secara rawak semasa sesi perkuliahan (n = 280) dan dianalisa menggunakan SPSS versi 18.0.0. Kajian mendapati 90.4% daripada responden mengakui pernah terlibat dengan penipuan semasa peperiksaan sekurang-kurangnya sekali sepanjang pengajian. Lebih mengejutkan hanya 9.6% daripada responden yang mengaku tidak pernah meniru di dalam peperiksaan sepanjang pengajian. Hasil kajian mendapati faktor utama yang mempengaruhi responden untuk meniru semasa peperiksaan ialah takut untuk gagal kursus dan tidak cukup persediaan untuk menghadapi peperiksaan.

Pendahuluan

Integriti dalam akademik adalah tonggak pengukuhan sistem pendidikan negara. Ia merupakan satu nilai yang paling penting dalam sistem pendidikan sesebuah negara [11]. Nilai integriti ini penting dalam membentuk generasi ilmuan yang mempunyai nilai etika yang tinggi. Namun demikian nilai integriti tersebut semakin terhakis pada masa kini . Ini kerana penipuan dalam akademik semakin berleluasa di universiti. Kajian melaporkan bahawa peratusan masalah penipuan dalam akademik di Taiwan ialah sebanyak 61.7%.[7] Manakala sebanyak 55.4% pelajar di Jepun mengaku mereka menipu di dalam peperiksaan[4]. Sementara itu, di New Zealand, hampir sembilan daripada sepuluh pelajar akan terlibat dalam penipuan dalam akademik[14] Malaysia juga tidak ketinggalan dalam isu ini di mana didapati 82% pelajar UiTM pernah melakukan penipuan dalam akademik.[9] . Kajian juga mendapati majoriti pelajar universiti melakukan penipuan dalam akademik disebabkan oleh dua faktor utama iaitu ingin memperoleh gred yang lebih tinggi (92%) dan kekangan masa dengan pelajaran dan tugasan (75%).[6] Akhbar Utusan Malaysia bertarikh 26 Januari 2001 melaporkan bahawa penipuan di dalam akademik yang paling banyak berlaku di universiti Malaysia ialah kes

meniru semasa peperiksaan. Perbuatan meniru dalam peperiksaan telah menjadi satu fenomena yang biasa berlaku dalam kehidupan pelajar university[1]. Sebenarnya isu ini adalah kritikal. Namun begitu ,isu ini jarang dilaporkan oleh ahli akademik[12, 5]. Ini kerana mereka mempercayai bahawa sekiranya isu kritikal ini dilaporkan, reputasi institusi tersebut akan terjejas.

Pernyataan Masalah

Prosedur Peperiksaan Politeknik telah mensyaratkan bahawa setiap pelajar wajib lulus semua kursus untuk dianugerahkan Diploma atau Diploma Lanjutan. Ini menyebabkan pelajar mengambil jalan pintas dengan meniru semasa peperiksaan dijalankan dengan tujuan untuk lulus di dalam kursus yang didaftarkan. Kes pelajar meniru di dalam peperiksaan di Politeknik Seberang Perai telah menimbul kebimbangan kepada pihak pengurusan tertinggi dan jabatan akademik. Statistik di bawah menunjukkan kes pelanggaran peraturan-peraturan dan arahan-arahan peperiksaan akhir yang dikeluarkan oleh unit peperiksaan Politeknik Seberang Perai.

Jadual 1 :Statistik Pelajar Ditangkap Meniru Semasa Peperiksaan di Politeknik Seberang Perai

Sesi Pengajian	Bilangan Pelajar	Jantina	Jabatan	Hukuman
Jun 2014	10	Lelaki	Perdagangan	Dimansuhkan semua kursus peperiksaan yang diambil pada semester berkenaan
		Lelaki	Mekanikal	
		Lelaki	Elektrik	
		Perempuan	Elektrik	
Jun 2015	5	Lelaki	Perdagangan	Dimansuhkan semua kursus peperiksaan yang diambil pada semester berkenaan
		Perempuan	Perdagangan	
		Lelaki	Matematik	
Disember 2015	6	Lelaki	Perdagangan	Dimansuhkan semua kursus peperiksaan yang diambil pada semester berkenaan
		Perempuan	Teknologi Maklumat	
		Perempuan	Perdagangan	
Jun 2016	6	Lelaki	Perdagangan	Dimansuhkan semua kursus peperiksaan yang diambil pada semester berkenaan
		Lelaki	Mekanikal	
		Perempuan	Mekanikal	
Disember 2016	3	Perempuan	Perdagangan	Dimansuhkan semua kursus peperiksaan yang diambil pada semester berkenaan
Jun 2017	2	Lelaki	Elektrik	Dimansuhkan semua kursus peperiksaan yang diambil pada semester berkenaan
Disember 2017	6	Lelaki	Elektrik	Dimansuhkan semua kursus peperiksaan yang diambil pada semester berkenaan
		Perempuan	Teknologi Maklumat	
		Lelaki	Perdagangan	

Daripada statistik di atas, didapati semua program yang ditawarkan di Politeknik Seberang Perai terlibat dalam kes pelajar meniru semasa peperiksaan. Seperti menjadi satu trend, setiap semester pasti akan ada pelajar yang terlibat dalam kes meniru semasa peperiksaan walaupun bilangan pelajar yang terlibat sentiasa berubah. Permasalahan ini menimbulkan kebimbangan di kalangan pengurusan tertinggi dan jabatan akademik. Oleh yang demikian, kajian ini dilakukan untuk mengenalpasti faktor yang menyumbang kepada masalah pelajar meniru semasa peperiksaan.

Objektif Kajian

Berdasarkan kepada penyataan masalah yang tertera, objektif kajian ini ialah mengenalpasti faktor yang menyumbang kepada kes penipuan semasa peperiksaan

Populasi dan Persampelan

Pada sesi Jun 2018, Jabatan Kejuruteraan Elektrik mempunyai pelajar seramai 849 merangkumi semester satu hingga semester enam. Walaubagaimanapun pelajar yang menjalani latihan industri (pelajar semester enam) tidak terlibat dalam soal selidik ini. Menurut Veal (2005) dalam bukunya Business Research Method : A managerial Approach, minimum saiz sampel untuk selang kepercayaan ± 5% bilangan responden ialah 280

Rekabentuk Kajian

Soal selidik diedarkan semasa minggu perkuliahan kedua dan ketiga secara rawak kepada pelajar semester satu hingga semester lima di dalam kelas dengan bantuan wakil kelas. Masa yang diambil oleh responden untuk menjawab soalselidik ialah kurang dari 15 minit. Penyelidik berada di dalam kelas untuk membantu responden menjawab soalan.

Instrumen Kajian

Kaedah borang soal selidik dipilih oleh penyelidik untuk mendapatkan maklum balas dari responden. Item soal selidik diambil dan diolah dari hasil kajian Odondo, N.J (2014). Borang ini mengandungi dua bahagian ; Bahagian A meminta responden memberi maklum balas berkaitan data demgrafi seperti jantina, semester dan program yang diikuti di Politeknik Seberang Perai manakala Bahagian B meminta responden memberi maklum balas berkaitan faktor yang mendorong mereka untuk menipu semasa peperiksaan.

Keputusan Kajian

Perisian Statistical Package for Social Science (SPSS) ver.18 telah digunapakai untuk menganalisa data kajian yang diperolehi dari soal selidik. Analisis demografi dalam kajian ini membincangkan taburan peratusan responden mengikut jantina, semester dan program yang diikuti di Jabatan Kejuruteraan Elektrik, Politeknik Seberang Perai.

Jadual 2 :Taburan Peratus Responden Mengikut Jantina, Semester dan Program di Jabatan Kejuruteraan Elektrik bagi Tahun 2018

Item Soal Selidik	Jantina		Semester					Program			Kekerapan Menipu Semasa Peperiksaaan		
	Lelaki	Perempuan	1	2	3	4	5	DEP	DTK	DEE	Tidak Pernah	1 -5 kali	> 5kali
N	140	140	84	14	84	14	84	56	84	140	27	105	148
Peratus (%)	50	50	30	5	30	5	30	20	30	50	9.6	37.5	52

Jadual 2 menunjukkan taburan peratus responden mengikut jantina, semester dan program bagi tahun 2018. Di dapati daripada taburan ini peratus responden yang diambil dari lelaki dan perempuan adalah 50%. 20% responden adalah dari program DEP, 30% dari program DTK dan 50% adalah dari program DEE. Hanya 9.6% responden sahaja yang mengakui bahawa mereka tidak pernah menipu semasa peperiksaan manakala 90.6% yang lain menyatakan bahawa mereka pernah menipu semasa peperiksaan sekurang-kurangnya sekali.

Jadual 3 :Graf Palang Peratus Responden Mengikut Faktor Yang Menyumbang kepada Masalah Meniru di Kalangan Responden

Faktor	Responden	
	Bil. Kes	Peratus
Tidak cukup persediaan	253	90.4%
Keinginan untuk mendapat markah baik	233	83.2%
Takut untuk gagal	266	95.0%
Tekanan Ibu Bapa	158	56.4%
Malas Mengulangkaji	190	67.9%
Kursus yang didaftar susah	200	71.4%
Pengawasan Peperiksaan Lemah	100	35.7%
Tabiat /Suka-suka	60	21.4%
Kursus tidak diminati	187	66.8%
Jumlah	1647	

Daripada graf palang dalam Jadual 3, didapati faktor yang paling tinggi menyumbangkan kepada pelajar meniru semasa peperiksaan ialah takut untuk gagal (95%). Ini disokong dengan hasil kajian menyatakan antara sebab yang mewajarkan pelajar mengambil tindakan meniru ialah takut untuk gagal peperiksaan[13]. Dalam konteks sistem politeknik, pelajar takut untuk gagal kursus. Ini kerana sekiranya pelajar gagal sebanyak tiga kali, pelajar akan diberhentikan pengajian. Faktor kedua tertinggi menyumbang kepada kewajaran pelajar meniru dalam peperiksaan ialah tidak cukup persediaan (90.4%). Selain daripada itu, pelajar memberi alasan tidak mempunyai cukup persediaan untuk menghadapi ujian atau peperiksaan[13]. Ini kerana terdapat segelintir pelajar yang terlibat aktif dalam kegiatan kokurikulum dan sukan. Oleh yang demikian , pelajar-pelajar ini tidak mempunyai masa yang mencukupi untuk persediaan peperiksaan.[3,8]. Keinginan untuk mendapat keputusan yang baik (83.2%) juga menjadi salah satu faktor utama menyumbang kepada kewajaran pelajar meniru semasa peperiksaan atau ujian. Dapatan juga menyatakan bahawa pelajar cenderung untuk meniru semasa peperiksaan kerana keinginan untuk mendapat keputusan yang lebih baik[8]. Kesukaran sesuatu kursus yang didaftarkan (71.4%) menjadi faktor keempat pelajar cenderung untuk meniru. [2]. Lain -lain faktor seperti tekanan daripada ibubapa, kursus yang didaftar tidak diminati, malas mengulangkaji, tabiat dan pengawasan peperiksaan yang lemah bukan merupakan faktor utama yang menyumbang kepada usaha pelajar untuk meniru di dalam peperiksaan atau ujian.

Kesimpulan

Kajian tinjauan yang dilakukan terhadap faktor yang menyumbang kepada kecenderungan pelajar meniru semasa peperiksaan atau ujian mendapati punca utama pelajar meniru ialah takut kepada kegagalan kursus tersebut. Walaupun kajian ini dijalankan di Jabatan Kejuruteraan Elektrik sahaja, namun dapatan yang terhasil menjadi satu permasalahan yang wajar diberi perhatian oleh pihak pengurusan akademik agar dapat dibanteras. Ini kerana masalah ini memberi kesan jangka panjang terhadap psikologi pelajar. Selain itu, masalah ini juga dapat merosakkan reputasi dan nama baik institusi akademik di Malaysia. Untuk mengatasi masalah ini, penekanan terhadap integrity akademik perlu diberi perhatian oleh pihak pengurusan akademik melalui sesi program ceramah. Selain daripada itu, para pensyarah juga perlu menjadi model integrity kepada pelajar dalam mendidik pelajar supaya lebih jujur semasa peperiksaan.

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Faktor Dan Halangan Dikalangan Pensyarah Jabatan Kejuruteraan Mekanikal, Politeknik Port Dickson Untuk Mengikuti Program Sangkutan Industri Pensyarah (SIP)

Che Azlina binti Che Norohoseni1, a, Normawar binti Ali2,b

1 Politeknik Port Dickson, Si Rusa, Malaysia

2 Politeknik Port Dickson, Si Rusa, Malaysia

a cheazlina@polipd.edu.my, b normawar@polipd.edu.my

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Abstrak. Dalam perubahan industri yang pesat pada abad ini, satu tindakan latihan perlu diutamakan bagi meningkatkan lagi kemahiran dikalangan pendidik. Bagi mengurangkan jurang diantara ketidaksepadanan kebolehan graduan dengan kemahiran yang diperlukan oleh industri kini, satu langkah telah diambil dengan memastikan golongon pendidik menjalani satu latihan di industri bagi membolehkan golongan ini meningkatkan kemahiran seterusnya mempratikkan di dalam proses pengajaran dan pembelajaran di kuliah. Namun begitu, permasalahan yang dihadapi adalah bilangan pensyarah yang berminat untuk mengikuti program di industri yang dinamakan Program Sangkutan Industri Pensyarah (SIP). Lalu, objektif kajian ini adalah mengenai cabaran dan halangan untuk mengikuti Program Sangkutan Industri Pensyarah (SIP) dikalangan pensyarah khusus di Jabatan Kejuruteraan Mekanikal, Politeknik Port Dickson melalui penyelidikan terperinci berkaitan tahap pengetahuan pensyarah mengenai Program SIP ini dan mengenalpasti faktor-faktor yang mempengaruhi penglibatan pensyarah. Antara faktor yang dikaji adalah penempatan bagi menjalani program SIP, tempoh latihan, ganjaran, galakan serta halangan. Maklumat yang dikumpul dari kumpulan respoden adalah melalui kaedah kajian yang berbentuk deskriptif (kuantitatif) dimana ianya menggunakan kaedah borang soal selidik dan data yang dikumpul dan dianalisis menggunakan perisian SPSS (Statistical Package for Social Sciencs version 22.0) . Hasil dapatan mendapati tahap pengetahuan pensyarah di Jabatan Kejuruteraan Mekanikal, Politeknik Port Dickson adalah tinggi namun terdapat beberapa faktor yang mempengaruhi penglibatan pensyarah. Faktor-faktor yang mempengaruhi penglibatan pensyarah adalah tempoh latihan dan juga penempatan pensyarah di industri. Oleh itu, penambahbaikan yang dapat dilakukan adalah dengan memperbanyakkan jaringan kolabrasi bersama industri menjurus kepada bidang-bidang utama di jabatan serta mengkaji semula tempoh latihan di industri supaya dapat menangani faktor-faktor yang menghalang kepada penglibatan pensyarah di Jabatan Kejuruteraan Mekanikal, Politeknik Port Dickson dalam menjalani Program SIP ini.

Pengenalan

Dewasa ini, perkembangan teknologi semakin berkembang dengan perubahan yang pesat. Pada tahun 2016, perubahan yang besar mula dapat dirasai dengan penemuan baru dari pelbagai

teknologi. Hasil teknologi ini adalah gabungan penggunaan sistem automasi beserta rangkaian internet dan proses-proses fizikal yang lain. Secara tidak langsung, perubahan ini memberi impak kepada sistem pendidikan khususnya dalam bidang teknik dan vokasional (TVET). Salah satu tindakan yang diambil oleh Bahagian Latihan dan Pembangunan Kerjaya, Jabatan Politeknik melaksanakan pembelajaran berterusan untuk pensyarah teknikal bagi meningkatkan kualiti pendidikan dan latihan. Selari dengan itu, Program Sangkutan Industri Pensyarah (SIP) merupakan aset penting dalam membantu sesebuah politeknik bagi meningkatkan kemahiran dan kreativiti pensyarah teknikal bagi melahirkan graduan yang memiliki kepakaran dan kemahiran bersesuaian dengan kehendak semasa. Dimana Program SIP ini, pensyarah dalam bidang teknikal dapat mengalami sendiri suasana sebenar di industri bagi meningkatkan kualiti pengajaran mereka [3]. Disamping itu, para pensyarah dapat menghubungkaitkan teori-teori pembelajaran di bilik kuliah dengan situasi sebenar di industri. Walaubagaimanapun, Program SIP masih lagi kurang mendapat sambutan dari pihak pensyarah untuk menjalaninya. Penglibatan pensyarah dalam Program SIP ini diambil kira pengalaman di industri dengan mengikuti latihan selama satu hingga tiga bulan [3]. Antara faktor yang menyumbang kadar penglibatan pensyarah masih lagi berkurangan disebabkan menghadapi masalah penempatan yang bersesuaian dengan industri yang sesuai dengan kepakaran pensyarah itu sendiri. Masalah masa tempat dan lokasi yang sesuai juga mempengaruh pensyarah kurang berminat untuk mengikti Program SIP ini. Oleh itu, pihak pengurusan perlu menyemak semula bagi memastikan Program SIP dapat dilaksanakan dengan jayanya mengikut yang disasarkan.

Pernyataan Masalah

Latihan dan pendidikan di kalangan pendidik adalah penting bagi meningkatkan lagi kemahiran dalam perubahan teknologi industri masa kini. Malah, isu pengangguran dikalangan siswazah sering dibangkitkan dan dikaitkan dengan ketidaksepadanan diantara kebolehan graduan dengan kemahiran yang diperlukan oleh industri ianya dinyatakan didalam Pelan Strategik Pengajian Tinggi Negara. Galakan dan dorongan perlu diterapkan bermula dikalangan pendidik. Permasalahan yang dihadapi adalah bilangan pensyarah yang berminat untuk mengikuti Program Sangkutan Industri ini. Ini dapat dibuktikan melalui data Unit Latihan ULPL Politeknik Port Dickson di mana jumlah bilangan pensyarah yang mengikuti program ini adalah seramai 60 orang bermula dari tahun 2009 hingga 2018. Jumlah peratusan sebanyak 16.4% dilihat sebagai angka yang membimbangkan dan pihak pengurusan mengambil tindakan dengan mewajibkan penglibatan pensyarah bagi setiap jabatan dalam menjalani Program Sangkutan Industri ini. Manakala pensyarah Jabatan Kejuruteraan Mekanikal hanya 3% daripada nilai peratus keseluruhan. Disini timbul minat penyelidik untuk mengkaji penglibatan pensyarah Jabatan Kejuruteraan Mekanikal, Politeknik Port Dickson dalam Program SIP. Dimana, aspek-aspek yang dikaji adalah tahap pengetahuan pensyarah mengenai Program SIP serta faktor yang mempengaruhi penglibatan pensyarah dalam Program SIP dan manfaat yang diperolehi selepas mengikuti Program SIP.

Objektif kajian

Objektif kajian ini, adalah untuk mengenalpasti penglibatan pensyarah Jabatan Kejuruteraan Mekanikal, Politeknik Port Dickson dalam program SIP. Oleh itu, kajian ini bertujuan untuk:

i. Mengenalpasti tahap pengetahuan pensyarah mengenai Program SIP.

ii. Mengenalpasti faktor-faktor yang mempengaruhi penglibatan pensyarah dalam Program SIP.

Skop kajian

Kajian ini hanya melibatkan pensyarah Jabatan Kejuruteraan Mekanikal di Politeknik Port Dickson sahaja. Pensyarah ini terdiri dari pelbagai gred penjawatan dalam Sistem Politeknik. Selain dari itu, melalui kumpulan sasaran ini, terdapat pensyarah yang telah mengikuti Program SIP dan kumpulan pensyarah ini dapat memberikan perbezaan sebelum dan selepas mengikuti Program SIP ini.

Kajian Literatur

Di politeknik, Program SIP mula diperkenalkan pada tahun 1999 bagi mengatasi masalah kekurangan pengalaman industri dalam kalangan tenaga pengajar teknikal politeknik yang mana telah memberi kesan terhadap kualiti graduat politeknik (Bahagian Latihan dan Pembangunan Kerjaya Politeknik, 2011). Pelaksanaan program SIP dibahagikan kepada tiga peringkat iaitu sebelum, semasa dan selepas tenaga pengajar teknikal menyertai sangkutan industri. Pada peringkat pertama iaitu sebelum menyertai program SIP, tenaga pengajar teknikal perlu mencari penempatan di industri yang bersesuaian dengan bidang kepakaran sama ada di industri multinasional seperti Intel, Motorola dan lain-lain mahupun industri-industri yang menyediakan program latihan berstruktur.

Peringkat kedua pula adalah semasa dalam sangkutan industri dimana sepanjang tempoh tiga bulan di industri tenaga pengajar teknikal akan terlibat secara langsung dalam penyelenggaran teknikal, operasi dan pengurusan di industri. Dalam tempoh ini, tenaga pengajar teknikal akan diselia dan dipantau oleh penyelia industri dan juga pegawai dari Unit Latihan dan Pendidikan Lanjutan (ULPL). Peringkat terakhir adalah selepas program SIP dimana tenaga pengajar Teknik Vokasional diminta untuk menghantar laporan pencapaian serta mengadakan seminar mahupun kursus jangka pendek untuk perkongsian ilmu dan pengalaman [4]. Objektif program sangkutan industri pensyarah (SIP) tercapai iaitu mendedahkan pensyarah kepada alam pekerjaan di industri seterusnya dapat membangunkan dan meningkatkan kemahiran professional dan peribadi mereka [5]. Pensyarah juga dapat berkongsi maklumat dan idea kepada industri seterusnya dapat mewujudkan kerjasama di antara politeknik dan pihak industri.

Hasil dari kajian lepas menunjukkan bahawa program sangkutan industri pensyarah (SIP) memberi kesan yang positif kepada pensyarah dari segi membangunkan ilmu pengetahuan, kemahiran dan sikap. Ia juga mendapati bahawa program latihan ini telah berjaya mempersiapkan pensyarah dengan perkembangan terkini dalam industri, memperkukuhkan pemahaman mereka tentang hubungan antara teori dan amalan sebenar di tempat kerja, dan juga meningkatkan gaya pengajaran mereka [6,7].

Metodologi Kajian

Reka bentuk kajian ini adalah merupakan satu kajian berbentuk deskriptif. Kajian deskriptif (kuantitatif) merupakan kaedah tinjauan bagi mengumpul maklumat dari populasi yang besar. Penyelidik menggunakan kaedah mengedarkan borang soal selidik untuk dijawab oleh responden

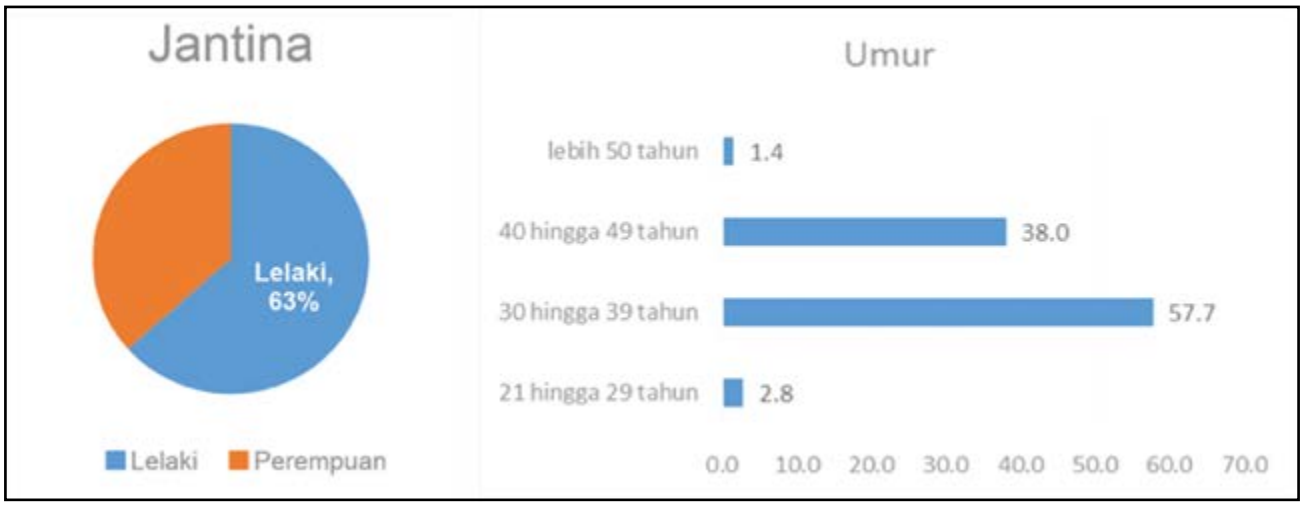
dimana soal selidik lebih pratikal dan berkesan kerana penggunaannya dapat meningkatkan ketepatan dan kebenaran maklumat yang diberikan oleh responden [8,11]. Kajian ini berfokuskan kepada tahap pengetahuan tentang Program SIP, faktor yang mempengaruhi penglibatan pensyarah dan manfaat oleh pensyarah selepas mengikuti Program SIP dan ianya melibatkan 71 responden terdiri daripada pensyarah Jabatan Kejuruteraan Mekanikal, Politeknik Port Dickson. Borang soal selidik ini mengandungi 23 soalan yang dipecahkan kepada tiga bahagian. Bahagian A soal selidik berkaitan dengan demografi responen. Pada Bahagian B pula, penyelidik mengkaji tahap pemahaman responden mengenai Program SIP. Manakala Bahagian C, penyelidik mengkaji faktor-faktor dan halangan mempengaruhi pensyarah untuk mengikuti Program SIP. Bagi kajian kuantitatif, data yang dikumpul untuk dianalisis berdasarkan objektif kajian akan dianalisis menggunakan perisian SPSS (Statistical Package for Social Sciencs version 22.0) [9]. Kaedah skor min digunakan untuk menganalisa data bagi setiap item lalu diterjemahkan dalam julat tertentu untuk menentukan tahap rendah, sederhana dan tinggi [10]. Oleh itu, penyelidik menggunakan skala likert untuk mengukur maklum balas para pensyarah bagi setiap soalan item yang dikemukan.

Jadual 1 : Intepretasi Nilai skor bagi kajian [10].

Min Skor	Intepretasi	Tahap Kecenderungan
1.0 hingga 2.39	Tidak Setuju	Rendah
2.40 hingga 3.79	Kurang Setuju	Sederhana
3.80 hingga 5.00	Setuju	Tinggi

Dapatan Kajian

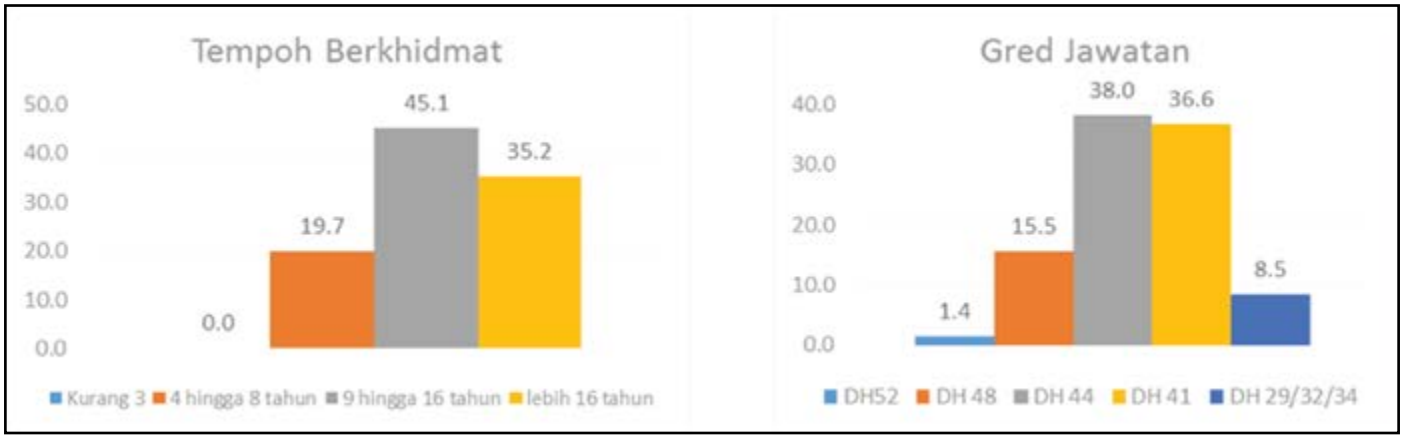
Hasil dari jumlah 71 responden, Rajah 1 menunjukkan taburan mengikut jantina dan umur pensyarah Jabatan Kejuruteraan Mekanikal,Politeknik Port Dickson.



Rajah 1 (a) Taburan responden mengikut jantina (b) Taburan responden mengikut umur

Dapatan kajian ini,mempamirkan 63 peratus adalah jumlah responden lelaki berbanding

dengan responden perempuan, iaitu sebanyak 37 peratus. Ini menunjukkan bahawa, staf lelaki di Jabatan Kejuruteraan Mekanikal melebihi berbanding dengan staf perempuan. Daripada Rajah 1 (b), secara majoriti umur dikalangan staf Jabatan Kejuruteraan Mekanikal ini adalah dalam lingkungan 30 hingga 39 tahun dalah sebanyak 57.7 peratus.



(a) (b)

Rajah 2 (a) Taburan responden mengikut tempoh berkhidmat (b) Taburan responden mengikut Gred Jawatan.

Merujuk kepada rajah 2 (a), hasil dapatan kajian menunjukkan kumpulan responden yang tempoh berkhidmat lebih dari 9 tahun sebanyak 80.3 peratus. Dimana, kumpulan responden yang tempoh berkhidmat 9 hingga 16 tahun mempunyai peratusan yang tinggi sebanyak 45.1 peratus dan yang lebih daripada 16 tahun adalah 35.2 peratus. Daripada Rajah 2 (b), secara keseluruhan 38 peratus adalah dari kumpulan responden Gred DH 44 dan 36.6 peratus dari DH 41. Manakala hanya 1.4 peratus sahaja kumpulan responden dari Gred 52.

Jadual 2 : Taburan skor min tahap pengetahuan mengenai Program SIP

No Item	Item	Skor Min	Tahap
5	Saya tahu mengenai Program SIP ini.	4.44	Tinggi
6	Saya tahu Program SIP dapat meningkatkan kemahiran.	4.32	Tinggi
7	Saya tahu tentang syarat-syarat kelayakan untuk memohon Program SIP.	3.93	Tinggi
8	saya tahu tentang cara untuk memohon Program SIP	3.83	Tinggi
9	Saya tahu tentang cara untuk mendapat tempat latihan Program SIP.	3.69	Sederhana
10	Saya tahu mengenai tuntutan yang ditawarkan semasa menjalani Program SIP	3.61	Sederhana
	Keseluruhan	**3.97**	**Tinggi**

Jadual 2 menunjukkan taburan skor min bagi tahap pengetahuan mengenai Program SIP dikalangan pensyarah Jabatan Kejuruteraan Mekanikal. Terdapat enam item untuk menentukan tahap pengetahuan pensyarah dan skor tertinggi adalah nombor item kelima dengan nilai 4.44. Manakala nombor item kesepuluh mendapat skor min terendah iaitu 3.61 dengan tahap kecendurangan yang sederhana. Ini menunjukkan bahawa pensyarah kurang faham akan kadar tuntan yang ditawarkan semasa menjalani Program SIP. Merujuk pada nilai skor min secara keseluruhan, pensyarah telah sedia maklum akan Program SIP ini dengan tahap kecenderungan yang tinggi iaitu sebanyak 3.97.

Jadual 3 : Faktor yang mempengaruhi pensyarah untuk mengikut Program SIP

No Item	Item	Skor Min	Tahap
(a) Penempatan			
11	Saya mengalami masalah untuk mencari penempatan di industri semasa Program SIP.	3.90	Tinggi
12	Tempat latihan yang ditawarkan jauh dan memerlukan kos yang tinggi.	3.89	Tinggi
13	Tempat latihan yang ditawarkan tidak sesuai dengan bidang.	3.44	Sederhana
14	Kerumitan prosedur penempatan mengikuti Program SIP.	3.79	Sederhana
	Keseluruhan	**3.75**	**Sederhana**
(b)Tempoh latihan			
15	Tempoh menjalani latihan yang ditawarkan Program SIP tidak sesuai.	3.82	Tinggi
16	Tempoh latihan yang dibenarkan tidak sesuai dengan pihak industri.	3.90	Tinggi
17	Tempoh latihan yang singkat tidak memberi impak yang diperlukan dalam peningkatan kompentesi pensyarah	3.94	Tinggi
	Keseluruhan	**3.89**	**Tinggi**
(c) Ganjaran dan imbuhan			
18	Tiada ganjaran atau imbuhan yang ditawarkan semasa mengikuti Program SIP.	3.63	Sederhana
19	Tiada tuntutan elaun yang diberikan oleh Pihak Majikan.	3.52	Sederhana
	Keseluruhan	**3.58**	**Sederhana**
(d) Galakan			
20	Tiada ada galakan dari Pihak Pengurusan	2.83	Sederhana
21	Tidak mahu kerja tambahan selepas tamat menjalani Program SIP seperti membuat laporan dan pembentangan.	3.44	Sederhana
	Keseluruhan	**3.13**	**Sederhana**

Dalam kajian ini, penyelidik mengkaji faktor–faktor yang mempengaruhi pensyarah untuk tidak memohon mengikuti Program SIP. Penyelidik membahagikan kepada empat faktor iaitu penempatan di industri, tempoh latihan, ganjaran yang diperolehi dan akhir sekali faktor galakan dari pihak majikan dan beban tugas. Hasil dapatan mendapati, faktor yang paling mempengaruhi pensyarah untuk

mengikuti Program SIP ini adalah tempoh latihan dengan nilai skor min 3.94 pada tahap kecedurangan yang tinggi berkaitan dengan nombor item ketujuh belas. Faktor kedua yang mempengaruhi adalah faktor penempatan dengan keseluruhan skor min 3.75 pada tahap kecenderungan yang sederhana berkaitan dengan nombor item kesebelah. Oleh itu, pihak politeknik perlu ada jaringan kolaborasi dengan pihak industri untuk membuka peluang kepada pensyarah untuk mengikuti Program SIP [3]. Dalam hasil kajian penyelidik, faktor pemberian ganjaran merupakan berada di tahap sederhana dengan nilai skor min keseluruhan 3.58. Produktiviti seseorang dalam organisasi akan meningkat jika terdapat menawaran ganjaran kepada pekerjanya [12]. Ini menunjukkan bahawa, ganjaran atau imbuhan perlu diberi kepada pensyarah untuk lebih menarik minat mereka mengikut Program SIP. Ganjaran juga mempengaruhi yang terhadap jiwa seseorang untuk melakukan perbuatan yang positif dan bersikap progresif . Manakala hasil dapatan kajian, faktor yang keempat yang mempengaruhi pensyarah untuk mengikut Program SIP adalah galakan berada pada tahap sederhana dengan nilai skor min 3.13. Dimana, kekuatan sesuatu organisasi dapat bertambah dengan memberi galakan kepada kakitangannya [2]. Secara keseluruhannya, dapat disimpulkan tempoh latihan merupakan factor yang mempengaruhi pensyarah tidak mengikut Program SIP kerana nilai skor yang tinggi (3.89). Manakala tiga lagi faktor berada pada tahap sederhana iaitu penempatan semasa Program SIP (3.75), ganjaran dan imbuhan (3.58) dan galakan (3.13).

Jadual 4 : Halangan pensyarah untuk mengikut Program SIP

No Item	Item	Skor Min	Tahap
22	Saya terikat dengan urusan keluarga.	3.77	Sederhana
23	Saya rasa beban tugas akan bertambah selepas mengikuti Program SIP.	3.30	Sederhana
	Keseluruhan	**3.54**	**Sederhana**

Berdasarkan Jadual 4 tersebut, urusan keluarga mempengaruhi pensyarah untuk mengikut Program SIP dengan nilai skor 3.77 pada tahap sederhana. Tuntutan untuk meningkatkan prestasi kerja, menjadikan tanggungjawab mengurus antara keluarga dan kerjaya suatu cabaran pada masa sekarang [1]. Kegagalan mengurus keluarga secara sempurna seiring dengan pencapaian cemerlang kerjaya boleh mengakibatkan peningkatan isu stres di tempat kerja. Sehubungan dengan itu, perasaan yang tidak menyenangkan ini menjadi faktor pilihan bagi pensyarah untuk mengelakkan diri dari berada di dalam linkungan situasi stres yang negatif. Kesimpulannya, Program SIP ini penting bagi pensyarah untuk meningkatkan kemahiran dan pengalaman serta mengikuti perkembangan teknologi terkini. Diharapkan agar lebih ramai lagi pensyarah akan mengkuti Program SIP pada masa akan datang.

Kesimpulan

Melalui kajian ini, hasil dapatan mendapati tahap pengetahuan Pensyarah di Jabatan Kejuruteraan Mekanikal terhadap Program SIP ini adalah tinggi. Namun begitu, di antara faktor-faktor yang mempengaruhi penglibatan pensyarah dalam Program SIP ini adalah tempoh latihan dan juga penempatan dimana tempoh latihan yang diberikan adalah singkat dan tidak memberi impak yang diperlukan dalam peningkatan kempentesi pensyarah dari sudut kemahiran yang

boleh diperolehi di industri untuk dipratikkan pada sesi pengajaran dan pembelajaran semasa kuliah. Disamping itu, penempatan tempat latihan bagi Program SIP ini juga dilihat antara faktor yang mempengaruhi penglibatan pensyarah dimana mereka mengalami masalah untuk mencari penempatan di industri semasa Program SIP. Antara item lain yang dilihat adalah kepada tempoh perkhidmatan dengan gred jawatan yang disandang. Tempoh perkhidmatan yang tinggi adalah pada 9 tahun hingga ke 16 tahun dengan gred jawatan DH44 pada purata umur lingkungan 30 tahun hingga 39 tahun. Umur juga memainkan peranan untuk lebih semangat ataupun bermotivasi tinggi bagi meningkatkan tahap pembelajaran. Oleh itu, pihak politeknik khususnya di Jabatan Kejuruteraan Mekanikal perlu mengadakan lebih banyak jaringan kolabrasi dengan pihak industri untuk membuka ruang dan peluang kepada pensyarah bagi mengikuti Program SIP ini serta mengutamakan kepada golongan pensyarah yang lebih lama berkhidmat di dalam skim pensyarah ini [3]. Selain itu, tempoh latihan di industri perlu dikaji semula supaya pengisian di industri menepati kehendak kemahiran yang diperlukan oleh pensyarah dalam meningkatkan aras kemahiran yang baik sekaligus dalam mempratikkannya didalam kuliah. Hasil dapatan membuktikan objektif telah tercapai dengan mengetahui tahap pengetahuan pensyarah di Jabatan Kejuruteraan Mekanikal serta faktor-faktor yang menpengaruhi penglibatan pensyarah dalam menjalani Program SIP.
Walau bagaimanapun kajian lanjut perlu dijalankan dan kumpulan populasi boleh diperluaskan bagi merangkumi kesemua staf Politeknik Port Dickson. Kajian lanjut juga boleh dilaksanakan untuk menentukan sama ada prestasi dan tahap kemahiran staf yang lebih baik selepas menjalani program ini melalui program kongsian ilmu.

Penghargaan

Di sini, saya ingin mengambil kesempatan untuk merakamkan ucapan terima kasih kepada rakan-rakan pensyarah yang sudi menjawab soal selidik kajian ini. Di samping itu, juga saya ingin mengucapkan setinggi-tinggi terima kasih kepada rakan-rakan yang membantu dan memberi sokongan kepada saya, pihak Kementerian Pendidikan Malaysia (KPM), Politeknik Port Dickson, ibu bapa saya serta suami dan anak-anak yang teleh memberi semangat dan peluang kepada saya untuk menyiapkan kajian saya ini.

Rujukan

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KEBERKESANAN PERLAKSANAAN LAWATAN TEKNIKAL BAGI PROGRAM KPI PENSYARAH PELAWAT INDUSTRI TERHADAP PELAJAR KEJURUTERAAN MEKATRONIK POLITEKNIK NILAI

H. Rosliza1, a, M.S. Shuharzi 2,b dan Z.R.N. Sarah Narimah Noorazyze3,c alieyzzzz@gmail.com , bshuharzi@gmail.com, csarah@polinilai.edu.my

Keywords: Politeknik; PPI; Industri; Pelajar; TVET.

Abstrak: Kajian ini melibatkan 41 orang pelajar semester 5 Jabatan Kejuruteraan Mekanikal bagi pelajar program Diploma Kejuruteraan Mekatronik (DEM) yang mengambil kursus Power Transmission Mechanism (DJM6122) bagi mendapatkan maklumbalas terhadap program Pensyarah Pelawat Industri (PPI) yang telah dijalankan. Program ini dijalankan di Pakar Kereta Suzuki (PKS) bertempat di Kajang. Tinjauan ini bertujuan melihat persepsi pelajar terhadap program dan penceramah kesesuaian program dengan silibus kursus dan kesediaan pelajar ke alam pekerjaan. Kajian kuantitatif digunakan di mana instrument kajian yang digunakan adalah soal selidik dan dianalisa menggunakan perisian Statistical Package For The Sosial Science (SPSS) version 20.0 bagi mendapatkan peratusan dan purata skor min. Nilai kebolehpercayaan soal selidik adalah pada tahap yang sangat baik (α = 0.981). Dapatan kajian menunjukkan persepsi tahap keberkesanan program PPI bagi aspek sikap pelajar, penceramah dan program yang sesuai, menepati silibus pembelajaran dan kesediaan pelajar ke alam pekerjaan berada pada tahap min yang tinggi (pelajar = 4.22, penceramah = 4.42, program = 4.49, silibus = 4.41 dan kesedian pelajar = 4.28). Keputusan analisis Korelasi Pearson pula mendapati bahawa terdapat hubungan yang signifikan antara semua aspek. Ini membuktikan tahap keberkesanan program PPI adalah penting dalam memupuk dan membina keyakinan pelajar dan memberi kesediaan pelajar ke alam pekerjaan dan latihan industri. Sekaligus menunjukkan pemilihan tempat dan penceramah amat memberi impak yang berkesan kepada pelajar serta membantu pelajar dalam mengadaptasikan ilmu yang dipelajari semasa program dan teori yang dipelajari ketika di bilik kuliah.

Pengenalan

Kerajaan berusaha membangunkan generasi pemimpin masa hadapan yang mampu melonjakkan Malaysia ke tahap yang lebih tinggi. Seiring dengan matlamat ini, sistem pendidikan Malaysia telah dibangunkan untuk memastikan generasi muda Malaysia dapat berkembang secara holistik, mempunyai nilai-nilai murni, ilmu, dan kemahiran yang diperlukan untuk meraih kejayaan dalam dunia yang penuh dengan cabaran, persaingan yang kian berubah [1].

Pelan Strategik Politeknik dan Kolej Komuniti (2018-2025) telah dilancarkan pada 12 Januari 2018 [2]. Hala Tuju Strategik ini bertujuan bagi melonjakkan reputasi Politeknik dan Kolej Komuniti menjadi institusi peneraju TVET yang unggul menjelang 2025. Ia mempunyai empat objektif utama, iaitu (i) menyediakan akses yang meluas kepada program TVET berkualiti dan diiktiraf; (ii) memperkasa komuniti melalui pembelajaran sepanjang hayat; (iii) melahirkan graduan holistik, berciri keusahawanan dan seimbang; (iv) memanfaatkan sepenuhnya perkongsian pintar dengan pihak berkepentingan[2].

Di antara tujuan transformasi ini dilancarkan adalah untuk menghasilkan graduan TVET yang diyakini dan menjadi rebutan pihak industri bagi menyumbang kepada pembangunan ekonomi negara. Ekoran dari itu setiap politeknik berazam untuk mengukuhkan lagi relevansi dan responsif program pengajian bagi memenuhi keperluan industri seiring dengan keharmonian serta kemakmuran global. Menurut Datuk Seri Idris Jusoh, di bawah Rancangan Malaysia Ke-11, 60 peratus daripada peluang pekerjaan memerlukan kelayakan berkaitan TVET [3]. Dengan itu, perlbagai usaha telah dilakukan oleh pihak kerajaan bagi mengarusperdanakan Pendidikan Teknikal dan Latihan Vokasional (TVET) untuk kemajuan pendidikan tinggi keseluruhannya.

Bagi menyahut cabaran ini salah satu daripada strategi dalam menambah baik program sedia ada dan menjadikannya lebih relevan adalah dengan melaksanakan kurikulum yang berlandaskan Industri. Aktiviti PPI merupakan sebagai salah satu pendekatan yang diperkenalkan bagi membantu politeknik mempelbagaikan kaedah Pengajaran dan Pembelajaran (PdP) untuk meningkatkan kefahaman pelajar dalam bidang pengajian yang diikuti [4]. Perlaksanaan PPI ini membolehkan para pelajar memperolehi pengetahuan dan berkongsi pengalaman serta teknologi terkini secara terus dari pengamal industri samada di bilik kuliah atau di industri [1]. Kaedah ini juga dapat memberi pendedahan awal kepada pelajar dan membuktikan akan kepentingan tenaga mahir dalam melaksanakan transformasi ekonomi nasional serta merapatkan jurang kemahiran yang berlaku dalam industri sekarang [11].

Dalam pada itu, tenaga pengajar politeknik juga tidak ketinggalan dalam menyahut seruan kerajaan yang ingin melebarluaskan (TVET) untuk menjadikannya lebih relevan adalah dengan melaksanakan kurikulum yang berlandaskan Industri. Program Sangkutan Industri Pensyarah (SIP) diwajibkan untuk kesemua pensyarah bagi mengatasi masalah kekurangan pengalaman industri dalam kalangan tenaga pengajar teknikal politeknik yang mana telah memberi kesan terhadap kualiti graduat politeknik [5].

Kajian yang dijalankan ini adalah untuk melihat persepsi pelajar terhadap beberapa aspek keberkesanan selepas menjalani program PPI ini. Dapatan kajian ini diharap dapat memberi input dan maklumat yang berguna kepada politeknik dalam meningkatkan mutu pengajaran dan pembelajaran di Politeknik.

Sorotan Kajian Dan Pembinaan Hipotesis

Kursus Power Transmission Mechanism (DJM6122) adalah antara kursus wajib yang perlu diambil oleh pelajar DEM pada semester lima. Terdapat lapan topik yang perlu difahami dan dikuasai dari segi teori dan pengiraan. Jelas menunjukkan ia agak luas dan banyak yang perlu di kuasai. Ini turut dibuktikan daripada keputusan pelajar yang agak suam-suam kuku bagi kursus ini. Pendedahan secara teori dan pengiraan di bilik kuliah dilihat tidak dapat menyumbang pengukuhan yang lebih menyeluruh kepada pelajar. Segala bentuk video pembelajaran juga didapati tidak mencukupi untuk membantu pelajar mengaitkan dengan keadaan dan mekanisme pergerakan sebenar bagi setiap sistem peghantaran kuasa yang dipelajari di bilik kuliah.

Di samping itu, ilmu dalam industri yang agak cetek telah membataskan tenaga pengajar dalam menghuraikan aspek teori dengan lebih efektif serta mengaitkan aspek teori dengan perkembangan

teknologi di industri terkini dengan baik [6]. Oleh yang demikian penglibatan guru dengan pihak industri, program PPI secara amnya secara langsung dapat membangunkan kemampuan pensyarah, yang seterusnya membolehkan mereka meningkatkan peluang untuk mempelajari ilmu di alam pekerjaan sebenar yang boleh dikaitkan dengan silibus pembelajaran yang telah dilakukan pada kelas kepada pelajar-pelajar secara amnya. Ini bukan sahaja dapat meningkatkan mutu PdP di Politeknik, malahan mampu melahirkan pelajar yang dapat menyumbang tenaga bagi pembangunan negara sekaligus melahirkan modal insan yang berkemahiran dan berketrampilan.

TVET pada umumnya lebih mahal daripada pendidikan umum kerana faktor seperti kelas yang lebih kecil dan kos peralatan dan bekalan. Di Republik Rakyat China, sebagai contoh, sekolah menengah khusus dan kos sekolah vokasional $660 dan $350 setiap pelajar, berbanding $240 setiap pelajar secara teratur sekolah menengah [7]. Di Indonesia,sekolah menengah vokasional menelan kos 25 peratus lebih setiap pelajar daripada umum sekolah menengah [8]. Kos unit pendidikan vokasional di India adalah kira-kira 60 peratus lebih tinggi daripada pendidikan menengah umum [9]. Oleh yang demikian pendekatan pembelajaran kurikulum yang berlandaskan Industri seperti PPI secara lawatan teknikal bukan sahaja dapat menjimatkan kewangan kerajaan malah pelajar memperolehi pengetahuan dan dan pengalaman serta teknologi terkini secara terus dari pengamal industri di industri yang sebenar.

Sejajar dengan itu, kajian ini adalah untuk mendapatkan maklumat tentang keberkesanan program ini dan perubahan tingkah laku responden setelah mengikuti kursus tersebut. Objektif khusus adalah:

i. Mengenal pasti faktor yang mempengaruhi keberkesanan lawatan teknikal bagi program PPI di PKS.
ii. Menilai persepsi pelajar dalam keberkesanan lawatan teknikal bagi program PPI dan kesediaan pelajar ke alam pekerjaan sebenar.

Metodologi Kajian

Kaedah yang digunakan dalam kajian ini berorientasikan pendekatan kuantitatif menggunakan kaedah soal selidik. Kajian soal selidik ini dijalankan berdasarkan sampel yang dipilih daripada pelajar di Politeknik Nilai. Sasaran kajian ini tertumpu kepada pelajar yang terlibat secara langsung dengan program PPI bagi kursus Power Transmission Mechanism, di bengkel Pakar Kereta Suzuki yang bertempat di Kajang. Pelajar-pelajar adalah seramai 51 orang daripada program DEM5A dan DEM5B. Pelajar-pelajar ini telah menjalani program PPI ini selama 13jam. Iaitu selama dua hari tidak termasuk waktu rehat. Kajian ini menyasarkan sampel saiz terhadap 41 responden.

Soal selidik bagi kajian ini adalah menggunakan perisian ‘Survey Monkey’ kerana ia lebih mudah dan cepat tanpa perlu berjumpa dengan responden dan dapat pengurangkan kos penyelidikan selari dengan arus kemodenan kini yang hanya menggunakan internet sebagai medium perhubungan.

Rajah 1: Kerangka teori

Format soal selidik membolehkan responden untuk menunjukkan pendapat mereka berdasarkan kepada lima (5) skala likert iaitu skala sangat setuju (VO = 5), setuju (O = 4), tidak pasti (SO = 3), tidak setuju (SE = 2) dan sangat tidak setuju (AN = 1).

Jadual 1: Susunataur soal selidik

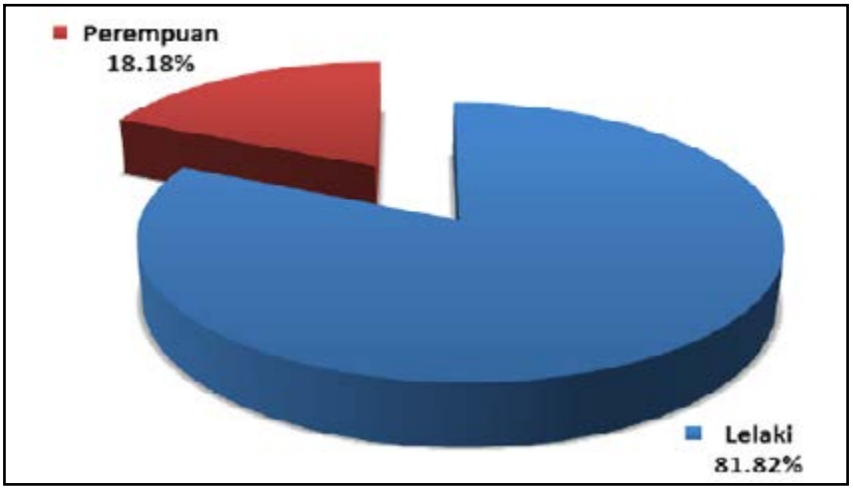
Bahagian	Perkara Yang Di Ukur	Bil Item	Kod Item
1	Demografi responden	4	1 - 4
2	Pelajar	6	S2, S4, S6, S7, S8, S19
3	Penceramah	5	S15, S16, S17
4	Program	4	S9, S10, S13, S14
5	Silibus	5	S1, S12, S20
6	Kesediaan	4	S3, S5, S11, S13, S18

Bagi melengkapkan kajian ini untuk mengetahui hasil yang konsisten, kaedah pengukuran yang digunakan ialah menggunakan alpha Cronbach, α. Kaedah alpha Cronbach ini telah digunakan sebagai satu anggaran kebolehpercayaan bagi ujian psikometrik. Ia telah dicadangkan bagi melihat sebagai hubungan daripada dua ujian yang mengukur konstruk yang sama [10]. Dapatan α lebih dekat kepada nilai 1.0, menunjukkan lebih ketekalan antara item dalam instrument soal seidik manakala sekiranya, α pekali kebolehpercayaan lebih dekat kepada nilai 0.70 atau lebih tinggi dianggap boleh diterima dalam situasi penyelidikan sains sosial.

Perkara antara item dan korelasi dapat membantu bagi penilaian prestasi soalan antara skor. Soalan dan penilaian markah keseluruhan boleh dijangka bahawa sekiranya responden mendapat soalan yang betul. Markah yang tinggi kepada setiap item soalan perlu diperolehi bagi mengetahui samada responden memahami berkaitan topik soal selidik atau sebaliknya. Dapatan hasil nilai korelasi 0.4 dan ke atas menunjukkan bahawa soal selidik dibina dengan baik.

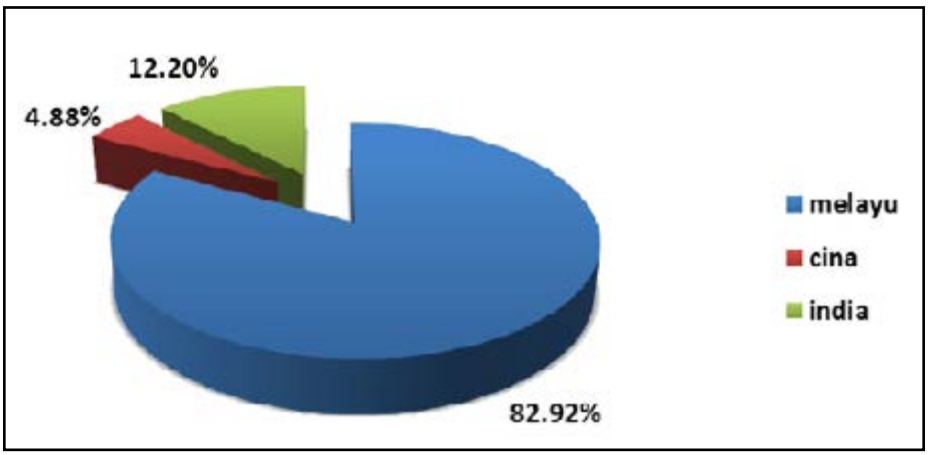
Analisis dan Keputusan

Maklumbalas terhadap kajian ini adalah mensasarkan 51 responden tetapi hanya 41 responden yang menjawab soal selidik. Berdasarkan latar belakang demografi responden maklumat yang didapati dari kajian ini merangkumi jantina, umur, bangsa dan responden kajian ini terdiri daripada pelajar DEM semester lima yang berumur diantara 20 hingga 21 tahun di politeknik nilai. Rajah 1 menunjukkan julat peratusan jantina responden. (81.82%) responden adalah lelaki dan (18.18%) adalah perempuan.



Rajah 1: Julat peratusan jantina responden

Rajah 2 menunjukkan julat peratusan bangsa responden. Majoriti responden adalah dari pelajar yang berbangsa melayu (82.92%), india (12.2%) dan cina (4.88%) dan. Komposisi ini memberikan signifikan bahawa majoriti responden adalah dari pelajar berbangsa melayu.



Rajah 2: Julat peratusan bangsa responden

Jadual 1 menunjukkan ringkasan ujian kebolehpercayaan bagi kajian ini. Keseluruhan Cronbach Alpha, α ialah 0.961 dengan 21 item soalan. Ia menunjukkan bahawa item mempunyai ketekalan dalaman yang sangat kuat.

Jadual 1: Ringkasan ujian kebolehpercayaan

Bahagian	Jumlah Item	Cronbach's Alpha, α actual
Keseluruhan	21	0.961
Pelajar	6	0.925
Penceramah	3	0.857
Program	4	0.963
Silibus	3	0.830
Kesediaan	5	0.929

Jadual 2 menunjukan, min bagi faktor pelajar yang mendorong kepada keberkesanan program iaitu sikap pelajar selepas menjalani program PPI di PKS. Hasil kajian menunjukkan kebanyakan responden berpuas hati selepas menjalani program ini. Skor min bagi faktor pelajar adalah 4.22 menunjukkan min yang paling rendah di antara yang lain.

Jadual 2: Statistik min bagi faktor pelajar

Bahagian	Min skor pelajar
Saya boleh berkomunikasi dengan orang luar.	4.26
Saya berjaya meningkatkan kreativiti diri.	4.34
Saya berkemahiran mendengar dengan baik.	4.30
Saya berupaya mengurus masa.	4.00
Saya berkemahiran membentangkan laporan/hasil.	3.90
Saya amat berminat untuk lebih mempelajari ilmu yang saya perolehi dari program ini	4.51
Kepuasan keseluruhan	4.22

Terdapat tiga item yang digunakan untuk mengukur faktor penceramah bagi program PPI untuk kursus PTM (DJM6122). Faktor penceramah ini boleh menunjukkan pemilihan penceramah yang bertepatan dan dapat memberi inspirasi dan semangat kepada pelajar-pelajar ini. Dari hasil analisa ini, min bagi persepsi pelajar terhadap penceramah adalah 4.42 seperti ditunjukan pada Jadual 3.

Jadual 3: Statistik min bagi faktor penceramah

Bahagian	Min skor pelajar
Penceramah PPI amat memberi inspirasi kepada saya	4.44
Suatu hari nanti, saya akan berjaya dan berada di tempat penceramah ini.	4.22
Saya amat teruja untuk berjaya seperti penceramah ini	4.61
Kepuasan keseluruhan	4.42

Terdapat empat item yang mengukur aspek keberkesanan program ini. Jadual 4 menunjukkan min bagi faktor pemilihan industri dengan lawatan teknikal yang bertepatan dan bersesuaian dengan kursus PTM DJM6122. Min keseluruhan bagi aspek ini adalah min paling tinggi antara yang lain iaitu 4.49.

Jadual 4: Statistik min bagi faktor program

Bahagian	Min skor pelajar
Saya berpendapat lawatan/latihan yang diterima di sini sesuai dengan bidang yang saya pelajari di politeknik.	4.41
Saya mengesyorkan organisasi ini sesuai untuk pelajar datang pada masa akan datang.	4.54
Saya mendapat gambaran sebenar apa yang berlaku di dalam industri disamping dapat memotivasikan pembelajaran saya.	4.46
Program PPI ini perlu diteruskan dan perlu di perbanyakkan bagi persediaan ke alam pekerjaan yang sebenar.	4.54
Kepuasan keseluruhan	4.49

Item-item untuk mengukur samada program PPI yang dipilih adalah mempunyai kaitan dengan silibus bagi kursus PTM (DJM6122) adalah dari soal selidik S1, S12 dan S20. Jadual 5 menunjukkan keputusan kepuasan silibus bagi program PPI ini. Hasil kajian menunjukkan min silibus untuk penyelidikan ini adalah 4.41 . Ini menunjukkan bahawa program lawatan secara teknikal ini amat menepati silibus PTM (DJM6122).

Jadual 5: Statistik min bagi faktor silibus

Bahagian	Min skor pelajar
Saya dapat mengadaptasi kemahiran kerja kepada hasil pembelajaran.	4.59
Program ini memang bersesuaian dengan silibus yang saya pelajari di kelas.	4.49
Pembelajaran secara teori di dalam kelas amat membantu saya untuk lebih memahami ilmu persekitaran pekerjaan sebenar di industri.	4.15
Kepuasan keseluruhan	4.41

Jadual 6 menunjukkan min item bagi mengukur kesediaan pelajar untuk ke alam pekerjaan yang sebenar dan latihan industri selepas menjalani program ini. Terdapat enam item pengukuran bagi

memperolehi persepsi pelajar bagi aspek ini. Min keseluruhan adalah 4.28, dilihat agak rendah berbanding yang lain

Jadual 6: Statistik min bagi faktor kesediaan

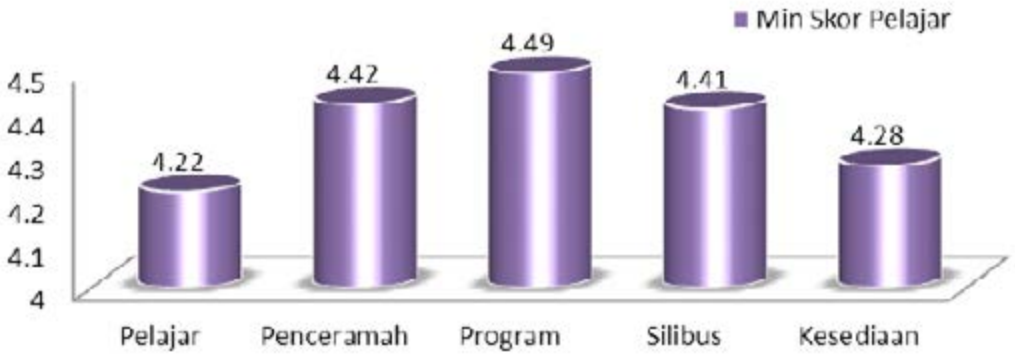
Bahagian	Min skor pelajar
Saya boleh bekerjasama dalam kumpulan dan orang luar.	4.27
Saya berkemahiran menggunakan peralatan (*tools*)..	4.15
Saya boleh menyumbangkan kepakaran/kemahiran yang saya perolehi kepada majkan dan organisasi saya kelak	4.39
Saya mendapat gambaran sebenar apa yang berlaku di dalam industri disamping dapat memotivasikan pembelajaran saya	4.46
Saya sudah cukup bersedia untuk memasuki alam pekerjaan yang sebenar.	4.12
Kepuasan keseluruhan	4.28

Kesimpulan

Dapatan maklumat daripada kajian ini adalah penting kerana ia dapat memperlihatkan keberkesanan program PPI yang telah dijalankan secara lawatan teknikal di PKS. Analisa dapatan mendapati bahawa pelajar menunjukkan sikap positif dalam kajian ini merujuk kepada kepuasan pembelajaran. Ini menunjukkan bahawa terdapat hubungan yang signifikan antara persepsi pelajar terhadap program dan penceramah, kepuasan perlaksanaan program yang bertepatan dengan silibus kursus Power Transmission Mechanism serta dapat dilihat pelajar agak lebih bersedia untuk menempuh alam pekerjaan .

Skor min bagi aspek pelajar, penceramah, program, silibus dan kesediaan menunjukan bahawa tahap kepuasan yang agak tinggi ditunjukkan selepas mejalani lawatan teknikal di PKS. Hasil kajian ini memberi signifikan bahawa kesemua faktor-faktor yang terlibat adalah menyumbang kepada keberkesanan program ini.

Min bagi aspek ketepatan program yang bersesuaian dengan kursus yang diambil oleh pelajar mempunyai nilai yang tinggi diikuti oleh penceramah atau pengamal industri yang sangat memberi inspirasi kepada pelajar. Dihampiri rapat oleh min bagi mengadaptasikan kursus yang dipelajari di kelas iaitu kursus PTM DJM 6122 dalam situasi sebenar industri automotif. Manakala min bagi kesediaan pelajar ke alam pekerjaan dan latihan industri dan min bagi sikap pelajar adalah 4.28 dan 4.22 masing-masing. Ini menunjukkan bahawa pelajar bersedia untuk menempuh dunia pekerjaan yang sebenar setelah menghadiri program PPI ini.



Rajah 3: Skor min pelajar ke atas item pengukuran

Secara kesimpulannya, penemuan utama bagi kajian ini boleh dirumuskan seperti berikut: i. Faktor yang mempengaruhi keberkesanan program PPI ini tidak berkaitan dengan demografi jantina ii. Aspek-aspek iaitu penceramah atau pengamal industri, program dan silibus didapati faktor utama keberkesanan kepada program lawatan tenikal PPI. iii. Aspek kesesuaian program menunjukkan nilai min tertinggi dari persepsi pelajar dan ini memberi signifikan bahawa pemilihan industri automatif bagi kursus PTM DJM6122 adalah sangat tepat iv. Strategi penambahbaikan perlu lebih menyiasat dengan model lain kerana soal selidik ini tidak boleh memberi jawapan yang terbaik bagi tujuan penambahbaikan.

Oleh yang demikian, program PPI ini perlulah diteruskan dan adalah lebih baik sekiranya semua pelajar dapat melibatkan diri, bukan sahaja untuk mendapat pendedahan awal ke alam pekerjaan malahan dapat memberi semangat dan memupuk minat yang lebih mendalam dalam bidang kejuruteraan. Sejajar dengan usaha kerajaan yang ingin melahirkan tenaga kerja berdaya saing bertaraf global. Seterusnya dapat membuka mata pelajar-pelajar akan kepentingan tenaga kerja berkemahiran tinggi dalam melaksanakan transformasi ekonomi nasional serta merapatkan jurang kemahiran yang berlaku dalam industri pada masa kini. Namun begitu keberkesanan PPI ini perlu dibuat lebih menyeluruh bukan sahaja ke atas lawatan teknikal sahaja. Perbandingan ke atas keputusan peperiksaan akhir pelajar juga boleh dibuat selepas menjalani PPI.

Penghargaan

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Penulis 1

Rosliza binti Hasan dilahirkan di Kota Bharu, Kelantan pada 21 Januari 1978. Beliau memulakan pengajian di Universiti Kebangsaan Malaysia (UKM) dalam bidang Ijazah Sarjana Muda Kejuruteraan Mekanikal (1996 - 2000). Beliau juga mempunyai kelayakan bagi Diploma Pendidikan (Kejuruteraan Jentera) dari Institut Perguruan Teknik Kuala Lumpur (2002 - 2003). Pada 2015 beliau melanjutkan pelajaran dalam sarjana Kejuruteraan Pengurusan di Universiti Putra Malaysia (UPM). Beliau mempunyai pengalaman sebagai tenaga pengajar di Politeknik Sultan Mizan Zainal Abidin, Dugun (2003 - 2004), Politeknik Port Dickson (2004 - 2015) dan sekaran mengajar di Politeknik Nilai.

Penulis 2

Shuharzi Bin Md Salleh dilahirkan di Felda Lubuk Merbau, Pendang, Kedah pada 13 Jun 1982. Beliau telah menamatkan pengajian di peringkat sijil di Politeknik Shah Alam dalam bidang Kerujuteraan Mekanikal (Pembungkusan) pada tahun 2001. Beliau kemudiannya melanjutkan pengajian ke Universiti Teknikal Malaysia Melaka (UTeM) dan memperoleh Ijazah Sarjana Muda Kejuruteraan Mekanikal (Struktur-Bahan) pada tahun 2006. Pengalaman beliau sebagai tenaga pengajar bermula di Politeknik Kota Kinabalu pada tahun 2008 dan kemudian sekali lagi melanjutkan pengajian di UTeM di peringkat Ijazah Sarjana dalam bidang Kejuruteraan Pembuatan (Sistem Pembuatan). Kini beliau bertugas di Politeknik Nilai di Jabatan Hal Ehwal Pelajar.

Penulis 3

Sarah Narimah Noorazyze dilahirkan di Johor pada 26 April 1981. Beliau memulakan pengajian di Kolej Universiti Tun Hussein Onn dalam bidang Ijazah Sarjana Muda Kejuruteraan Mekanikal (Pembuatan) (1999 - 2004). Beliau juga mempunyai kelayakan Diploma Pendidikan dari Institut Pendidikan Teknik Kuala Lumpur (2006 - 2007). Beliau juga dianugerahkan Sarjana Kejuruteraan Mekanikal (Pembuatan) dari Universiti Tun Hussein Onn (2011 - 2014). Beliau mula berkhidmat sebagai Pensyarah Kejuruteraan Mekanikal di Politeknik Kuching Sarawak dari tahun (2004-2014) dan Ketua Program Kejuruteraan Mekatronik Politeknik Nilai dari 2014 hingga kini.

Keberkesanan Kaedah Peer Group Dalam Proses Pengajaran Dan Pembelajaran Untuk Kursus Engineering Mechanics Bagi Pelajar Jabatan Kejuruteraan Mekanikal Politeknik Port Dickson

Siti Meriam binti Ibrahim [1, a], Nor Hafidzah binti Mohd Husni [2,b]

[1]Politeknik Port Dickson, Si Rusa, Malaysia

[2]Politeknik Port Dickson, Si Rusa, Malaysia

[a]sitimeriam.poli@1govuc.gov.my, [b]norhafidzah.poli@1govuc.gov.my

Keywords: Kaedah Peer Group; Proses Pengajaran & Pembelajaran; Kursus Engineering Mechanics

Abstrak. Kajian ini bertujuan untuk mendapat keberkesanan kaedah Peer Group dalam proses pengajaran dan pembelajaran untuk kursus Engineering Mechanics bagi pelajar-pelajar Jabatan Kejuruteraan Mekanikal, Politeknik Port Dickson. Kajian ini merupakan kajian tinjauan dan data dikumpulkan secara soal selidik secara talian yang mengandungi 20 item untuk mengukur pelajar-pelajar dari segi motivasi dalam pembelajaran secara Peer Group dan pembelajaran kendiri secara Peer Group. Seramai 51 orang responden terlibat dalam kajian adalah terdiri daripada pelajar dari Jabatan Kejuruteraan Mekanikal yang mengambil kursus Engineering Mechanics bagi semester Jun 2018. Manakala seramai 6 orang responden di kalangan pensyarah dari Jabatan Kejuruteraan Mekanikal yang sedang atau pernah mengajar kursus Engineering Mechanics. Data yang dikumpul dan dianalisis secara deskriptif menggunakan perisian SPSS. Statistik destriktif melibatkan pengukuran skor min untuk dapatan data kajian. Dapatan kajian ini menunjukkan para pelajar sangat berminat mengikuti pembelajaran dengan kaedah Peer Group kerana pelajar lebih cenderung melibatkan diri bersama-sama rakan sekelas.

Pengenalan

Outcomes Based Education (OBE) merupakan satu pendekatan yang terbaik untuk melihat pencapaian pelajar di dalam mengaplikasikan pengetahuan pembelajaran dan turut memudahkan pengajaran pensyarah. Oleh itu, kajian ini dijalankan untuk mengenalpasti tahap kesedaran dan tahap pemahaman pensyarah dalam pelaksanaan OBE. Selain itu, kajian ini juga bertujuan untuk mengenalpasti halangan yang dihadapi oleh pensyarah dalam melaksanakan OBE [2]. Sampel kajian ini adalah terdiri daripada 51 orang pelajar dan 6 orang pensyarah yang mengajar kursus Engineering Mechanics di Jabatan Kejuruteraan Mekanikal, Politeknik Port Dickson. Dalam kajian ini, rekabentuk kajian yang digunakan adalah tinjauan manakala instrumen yang digunakan pula adalah borang soal selidik secara talian. Data yang diperolehi dianalisis menggunakan skor min.

Salah satu konsep pembelajaran berasaskan Outcome Based Education adalah kaedah Peer

Group. Peer Group merupakan satu teknik pembelajaran dalam kumpulan kecil yang melibatkan kerjasama, interaksi, perbincangan dan penyertaan di kalangan rakan pelajar itu sendiri dalam aktiviti atau projek yang dijalankan. Tujuan kajian ini dibuat adalah untuk menganalisis kesan pembelajaran dalam mata pelajaran Engineering Mechanics dengan menggunakan kaedah pembelajaran secara Peer Group dalam perbincangan dan interaksi dalam kumpulan pelajar yang telah dipilih.

Pernyataan masalah

Oleh kerana kaedah pengajaran dan pembelajaran yang diamalkan pada masa kini lebih tertumpu kepada kaedah berpusatkan pensyarah iaitu keadah konvensional, menyebabkan pelajar cepat bosan dan membuatkan mereka kurang berminat untuk melibatkan diri dalam kelas. Pensyarah menggunakan kaedah tradisional dan penerangan sahaja dalam pengajaran akan menyebabkan pelajar tidak meminati kursus Engineering Mechanics seterusnya menjurus kepada kemerosotan dalam pencapaian pelajar. Dari segi pedagogi, perkembangan pendidikan kini memerlukan strategi pengajaran yang lebih menitikberatkan penglibatan pelajar [1].

Perlunya kaedah pembelajaran Engineering Mechanics yang baik yang dapat melatih pelajar dalam mentaksir maklumat dan memahami soalan dengan berkesan.

Sehubungan dengan itu, kami para pensyarah kursus Engineering Mechanics telah menggunakan kaedah Peer Group dalam proses pengajaran dan pembelajaran bagi menarik minat pelajar untuk belajar kaedah berpusatkan pelajar.

Objektif kajian

Kajian ini bertujuan untuk :

i. Mengenalpasti kaedah pembelajaran secara Peer Group dapat menyumbang kepada peningkatan pencapaian akademik pelajar.

ii.Mengkaji tahap keberkesanan pengajaran dan pembelajaran secara Peer Group.

Skop kajian

Skop kajian ini melibatkan pensyarah yang mengajar kursus DJJ3053 - Engineering Mechanics. Pensyarah ini terdiri daripada pensyarah yang telah menggunakan kaedah Peer Group di dalam proses pengajaran dan pembelajaran. Responden merupakan pensyarah yang sedang atau pernah mengajar kursus DJJ3053 - Engineering Mechanics dan yang pernah atau tidak menggunakan kaedah Peer Group dalam proses pengajaran dan pembelajaran.

Kajian literatur

Pengajaran dan pembelajaran merupakan elemen yang penting untuk menyampaikan dan mengembangkan ilmu pengetahuan. Pengajaran adalah suatu proses yang berkaitan dengan memindahkan ilmu dari seorang kepada orang yang lain. Secara umumnya, kaedah pengajaran bermaksud tindakan-tindakan yang dilakukan oleh pensyarah dalam mengendalikan

proses pengajaran dan pembelajaran. Proses ini dapat memperkembangkan potensi individu dan membolehkan individu mengaplikasikan ilmu yang diperolehi dalam kehidupan sehariannya. Menurut Mok (2010), pengajaran boleh ditakrifkan sebagai sesuatu tugasan dan aktiviti yang diusahakan bersama-sama oleh pengajar dan pelajarnya. Pengajaran ini dirancang oleh pengajar secara sistematik dan teliti serta perlaksanaannya dengan kaedah dan teknik mengajar yang sesuai bertujuan, membimbing, menggalak dan memotivasikan pelajar supaya mengambil inisiatif untuk belajar, demi memperolehi ilmu pengetahuan dan menguasai kemahiran yang diperlukan. Pensyarah-pensyarah terlatih haruslah bijak memilih dan menggunakan kaedah yang paling sesuai bagi membantu pelajar-pelajar dan diri mereka dalam usaha mencapai objektif pengajaran yang telah dirancang. Pengajaran boleh dijelaskan proses menyampaikan maklumat, menyediakan peluang dan memberi pengalaman serta memupuk nilai-nilai yang boleh mendatangkan perubahan dari segi tingkah laku dan meningkatkan kebolehan kognitif pelajar (Sulaiman, 2004). Oleh itu, pemilihan sesuatu kaedah atau strategi haruslah berasaskan kepada kriteria tertentu seperti gaya pembelajaran pelajar, tajuk pembelajaran, jenis pengetahuan atau kemahiran yang hendak disampaikan, tahap pencapaian pelajar, persekitran pembelajaran, nilai dan sikap yang ingin dipupuk. Tugas utama tenaga pengajar adalah untuk memudahkan pembelajaran para pelajar. Untuk memenuhi tugas ini, pensyarah bukan sahaja perlu menyediakan suasana pembelajaran yang dapat merangsang minat para pelajar di samping sentiasa memikirkan kebajikan dan keperluan pelajar.

Pembelajaran adalah proses memperolehi ilmu pengetahuan atau kemahiran dan merupakan proses interaktif, iaitu hasil aktiviti pensyarah dan pelajar yang menjadi elemen utama dalam suasana pembelajaran yang spesifik. Sulaiman (2004), pembelajaran ialah proses dalaman yang dialami oleh pelajar melalui pengalaman, pengetahuan dan kemahiran yang diberikan dan membawa perubahan kognitif dan tingkah laku pelajar yang kekal. Ia melalui beberapa peringkat yang diperolehi secara sistematik, bermula dari penerimaan rangsangan melalui organ deria, diikuti oleh pembentukan konsep dalam fikiran dan diakhiri dengan perubahan tingkah laku (Mok, 2010). Bentuk interaktif dalam pembelajaran berkait rapat dengan kefahaman guru tentang sifat setiap individu pelajarnya. Gregore dan Ward (2006), menyatakan bahawa pendidik yang mahukan kejayaan tugasnya ke atas individu pelajar haruslah memahami makna ‘individu’ dan mereka mesti menghubungkan cara pengajaran dan cara pembelajaran invididu berkenaan. Dalam sesi pembelajaran, pensyarah kerap berhadapan dengan pelajar yang berbeza dari segi kebolehan mereka. Hal ini memerlukan kepakaran pensyarah dalam menentukan strategi pengajaran dan pembelajaran yang bersesuaian dengan kebolehan pelajar. Ini bermakna pensyarah boleh menentukan pendekatan, memilih kaedah dan menetapkan teknik-teknik tertentu yang sesuai dengan perkembangan dan kebolehan pelajar. Strategi yang dipilih itu, selain potensi merangsang pelajar untuk belajar secara aktif, ia juga harus mampu membantu menganalisis konsep atau idea dan berupaya menarik perhatian pelajar serta dapat menghasilkan pembelajaran yang bermakna. Tujuan pengajaran adalah untuk melahirkan aktiviti pembelajaran. Melalui pengajaran, ia dapat merangsang pembelajaran dan mewujudkan situasi pembelajaran yang berkesan. Pembelajaran haruslah berlaku atas usaha sendiri dan mengikut motif motivasi.

Berdasarkan sorotan kajian di atas satu tinjauan dijalankan oleh penyelidik untuk mendapatkan maklum balas hasil dari penggunaan kaedah Peer Group oleh beberapa orang pensyarah di dalam proses pengajaran dan pembelajaran di dalam kelas. Kajian ini bertujuan mendapat impak keberkesanan kaedah Peer Group dalam proses pengajaran dan pembelajaran bagi kursus

Engineering Mechanics.

Metodologi kajian

Metodologi kajian yang digunakan adalah merupakan satu kajian deskriptif dengan pendekatan kuantitatif. Kajian deskriptif bertujuan untuk mengkaji dan menerangkan tentang sesuatu fenomena yang sedang berlaku dengan menganalisis data deskriptif yang diproses daripada soal selidik atau mana-mana media lain (Ghafar, 2000). Menurut Sabitha Marican (2005), Soal selidik merupakan satu alat yang dibentuk secara khusus untuk mengumpul maklumat untuk tujuan analisis yang dapat menjawap persoalan kajian. Malah Sherri L. Jackson (2006) juga menyatakan ianya juga merupakan kajian mendalam tentang satu atau lebih individu dengan harapan mendedahkan hal-hal yang benar. Kaedah kajian yang digunapakai bagi kajian ini adalah kajian kes di mana dengan kaedah ini ia dapat merangkumi skop kajian yang lebih luas.

Kajian ini memfokuskan kepada kaedah Peer Group dalam proses pengajaran dan pembelajaran untuk kursus DJJ3053 - Engineering Mechanics. Sampel kajian ini terdiri daripada 51 orang pelajar Jabatan Kejuruteraan Mekanikal, Politeknik Port Dickson. Pemilihan terhadap pelajar-pelajar tersebut adalah kerana mereka merupakan pelajar yang mengambil kursus DJJ3053 - Engineering Mechanics dan melaksanakan proses pengajaran dan pembelajaran secara Peer Group bagi Sesi Jun 2018.

Oleh kerana kajian ini berbentuk kajian soail, maka instrument yang digunapakai adalah kaedah soal selidik yang dibina sendiri oleh penyelidik. Pengumpulan maklumat bagi kajian ini adalah melalui borang soal selidik secara atas talian. Kaedah soal selidik adalah lebih praktikal dan berkesan digunakan kerana penggunaannya dapat meningkatkan ketepatan dan kebenaran maklumat yang diberikan oleh responden (Wiersma, 2000). Soal selidik ini terdiri dari tiga bahagian. Bahagian A terdiri dari maklumat demografi respondan, manakala bahagian B merujuk kepada motivasi terhadapa kaedah pembelajaran secara Peer Group. Dan terakhir, bahagian C merujuk kepada pembelajaran kendiri secara Peer Group bagi kursus DJJ3053 - Engineering Mechanics ini.

Penggunaan Skala Likert adalah amat sesuai bagi menjalankan kajian tinjauan ini. Ini kerana Skala Likert membolehkan pengkaji mengawal maklum balas yang berat sebelah. Skala diberikan bermula daripada no 1 hingga no 4. Perincian skala tersebut seperti dalam Jadual 1.

Jadual 1 : Skala Likert

Skala	Tafsiran
1	Sangat Tidak Setuju
2	Tidak Setuju
3	Setuju
4	Sangat Setuju

Sekiranya item yang dianalisis berada dalam julat 3.68 – 5.00, ia menunjukkan tahap kecenderungan kepuasan pelajar adalah berada pada tahap yang tinggi. Manakala keputusan sederhana pula merangkumi nilai julat skor min antara 2.34 – 3.67, dan nilai julat skor min 1.00 – 2.33 pula menunjukkan tahap kepuasan yang rendah terhadap kaedah pengajaran dan pembelajaran secara Peer Group bagi pelajar Jabatan Kejuruteraan Mekanikal, Politeknik Port Dickson yang mengambil kursus DJJ3053 - Engineering Mechanics ini. Skala pengukuran skor min ini dirujuk berdasarkan interpretasi skor min bagi Skala Likert seperti Jadual 2 di bawah.

Jadual 2 : Tahap Kecenderungan Skor Min

Skor Min	Tahap Kecenderungan
1.00 – 2.33	Rendah
2.34 – 3.67	Sederhana
3.68 – 5.00	Tinggi

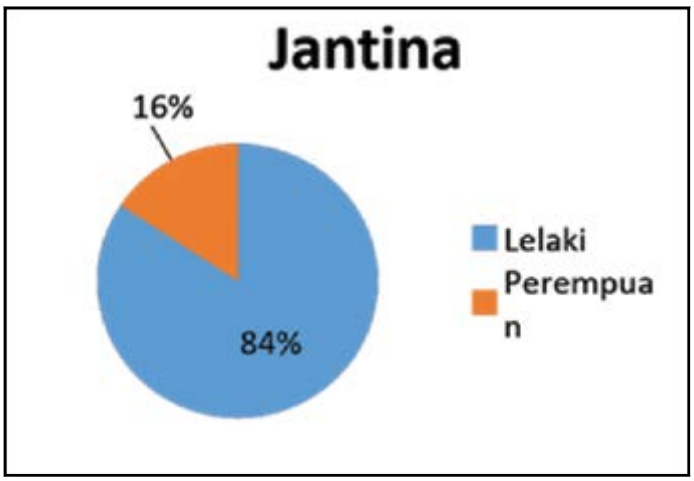
(Sumber : Landell, 1977)

Dapatan kajian

Kajian ini bertujuan untuk mengenalpasti keberkesanan kaedah Peer Group dalam proses pengajaran dan pembelajaran untuk kursus Engineering Mechanics bagi pelajar jabatan Kejuruteraan Mekanikal Politeknik Port Dickson. Hasil dari 51 responden yang diperolehi, pecahan responden mengikut jantina adalah seperti yang ditunjukkan dalam Rajah 1 dan Jadual 3.

Jadual 3 : Bilangan Respondan Lelaki dan Perempuan

Perkara	Lelaki	Perempuan
Bilangan	42	8

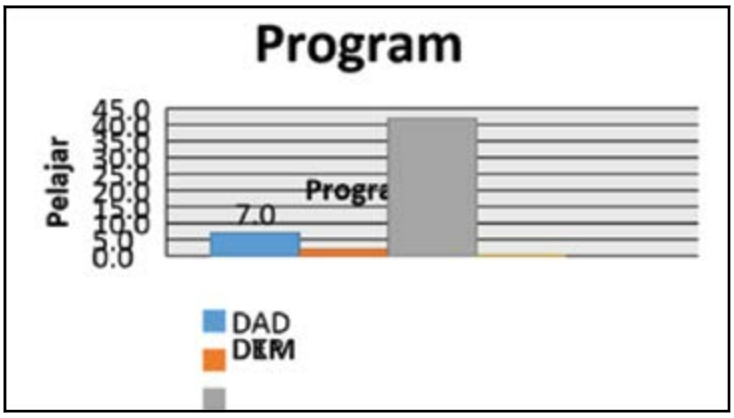


Rajah 1 : Taburan Responden Mengikut Jantina

Daripada taburan dapatan kajian yang diperolehi, jumlah bilangan responden perempuan adalah kurang iaitu sebanyak 16 peratus sahaja berbanding jumlah bilangan responden lelaki sebanyak 84 peratus.

Jadual 4 : Bilangan Respondan Mengikut Program

Program	Bilangan Pelajar
DAD	7
DEM	2
DKM	41
DTP	0



Rajah 2 : Taburan Mengikut Program yang Diambil oleh Pelajar

Hasil dapatan kajian ini menunjukkan, bilangan responden kebanyakannya terdiri daripada pelajar dari program DKM iaitu 82 peratus diikuti program DAD sebanyak 14 peratus dan program DEM sebanyak 0.04 peratus sahaja. Perbezaan yang ketara ini disebabkan oleh kadar bilangan pelajar DKM adalah lebih ramai berbanding program yang lain.

Hasil daripada analisis yang dijalankan, tahap keberkesanan kaedah Peer Group dalam proses pengajaran dan pembelajaran dari segi motivasi pelajar untuk kursus Engineering Mechanics bagi pelajar Jabatan Kejuruteraan Mekanikal Politeknik Port Dickson berada pada tahap sederhana dengan purata skor min ialah 3.52. Jadual 3 menunjukkan skor min yang diperolehi mengikut elemen penilaian yang dikaji.

Jadual 3 : Motivasi dalam pembelajaran secara PEER GROUP dalam kursus Engineering Mechanics

No Item	Item	Skor Min	Tahap
4	Saya sangat meminati aktiviti pengajaran dan pembelajaran secara "Peer Group".	3.61	Sederhana
5	Kegiatan aktiviti P&P dalam kelas dapat membina sikap dan personality saya.	3.51	Sederhana
6	Aktiviti "Peer Group" ini dapat meningkatkan pemahaman saya dalam kursus ini.	3.55	Sederhana
7	Saya aktif dalam P&P ini kerana ingin terlibat bersama-sama rakan sekelas.	3.51	Sederhana
8	Saya amat berminat dalam mempelajari teknik dan kemahiran baru dalam P&P ini.	3.59	Sederhana
9	Saya amat sesuai bagi menjalani aktiviti yang seperti ini.	3.45	Sederhana
10	Saya amat berminat dengan kaedah yang digunakan oleh pensyarah kerana ia dapat menyelesaikan masalah dalam kursus ini	3.57	Sederhana
11	Kaedah pengajaran yang digunakan oleh pensyarah dapat meningkatkan pencapaian pemahaman pelajar dalam kursus ini.	3.59	Sederhana
12	Saya lebih selesa bertanya dikalangan rakan-rakan kumpulan berbanding bertanya dengan pensyarah.	3.31	Sederhana
13	Apabila saya membuat kesilapan, saya suka menyelesaikannya dengan bertanya dengan rakan-rakan sekelas.	3.51	Sederhana
	Keseluruhan	**3.52**	**Sederhana**

Manakala hasil dapatan bagi tahap keberkesanan kaedah Peer Group dalam proses pengajaran dan pembelajaran yang merujuk dari segi pembelajaran kendiri pelajar untuk kursus Engineering Mechanics bagi pelajar Jabatan Kejuruteraan Mekanikal Politeknik Port Dickson pula berada pada tahap sederhana dengan purata skor min ialah 3.42. Jadual 4 menunjukkan skor min yang diperolehi mengikut elemen penilaian yang dikaji.

Jadual 4 : Pembelajaran Kendiri secara Peer Group dalam kursus Engineering Mechanics

No Item	Item	Skor Min	Tahap
14	Saya merancang strategi belajar sendiri untuk mencapai matlamat pembelajaran yang telah saya buat.	3.45	Sederhana
15	Saya menentukan sendiri bahan-bahan apa yang perlu saya pelajari dengan berpandukan pada bahan-bahan yang diajar oleh pensyarah.	3.49	Sederhana
16	Saya melaksanakan strategi belajar yang sudah saya tetapkan untuk mencapai matlamat pembelajaran	3.47	Sederhana
17	Dalam belajar saya juga memantau kemajuan yang sudah saya perolehi secara berkala.	3.55	Sederhana
18	Saya menentukan sendiri target yang harus saya capai dalam kegiatan pembelajaran saya.	3.49	Sederhana
19	Bila menghadapi masalah dalam belajar saya berusaha menyelesaikannya sendiri.	3.39	Sederhana
20	Saya cuba untuk mengkaitkan pelajaran yang saya perolehi di kelas dengan situasi sebenar di luiar kelas.	3.45	Sederhana
21	Saya mengakses internet dalam mendapatkan maklumat tambahan dalam mengukuhkan kemahiran saya dalam kursus ini.	3.43	Sederhana
22	Saya boleh menguasai kursus ini tanpa mendapatkan bantuan orang lain.	3.12	Sederhana
23	Saya selalu membuat ulangkaji dalam pembelajaran secara bersendirian dengan merujuk jawapan yang telah disediakan dalam buku modul.	3.37	Sederhana
	Keseluruhan	**3.42**	**Sederhana**

Kesimpulan

Berdasarkan hasil kajian yang telah dijalankan, tahap keberkesanan kaedah Peer Group dalam proses pengajaran dan pembelajaran untuk kursus Engineering Mechanics bagi pelajar Jabatan Kejuruteraan Mekanikal Politeknik Port Dickson berada pada tahap yang sederhana. Majoriti pelajar berminat dalam kepenggunaan kaedah pembelajaran secara Peer Group yang telah dijalankan. Ia dipengaruhi oleh faktor fisiologi di mana kebanyakan individu lelaki lebih cenderung kepada kaedah pembelajaran secara berkumpulan yang menggalakkan mereka bertukar-tukar maklumat antara satu sama lain.

Namun begitu mutu pengajaran dan pembelajaran haruslah ditingkatkan ke skor min yang lebih tinggi kerana hasil nilai keseluruhan skor min adalah 3.52 dimana ia sangat hampir dengan nilai

keseluruhan skor min tinggi iaitu 3.68. Selain itu kepelbagaian pengajaran dan pembelajaran juga perlu ditingkatkan kerana kepuasan pengguna merupakan satu elemen terpenting dalam menentukan kualiti perkhidmatan yang disediakan oleh sesebuah organisasi.

Diharapkan kajian ini dapat memberi manafaat kepada pihak pensyarah untuk memperbaiki sistem pengajaran dan pembelajaran sedia ada supaya kepuasan belajar dapat ditingkatkan sekaligus dapat memperbaiki mutu dan prestasi pelajar di dalam kursus Engineering Mechanics.

Sebagai usaha meningkatkan tahap kepuasan pelajar, pihak pengurusan terutama Jabatan Kejuruteraan Mekanikal Politeknik Port Dickson perlu bekerjasama dalam memastikan kepuasan pelajar dipenuhi. Sekiranya kepuasan pelajar ini dipandang remeh oleh pihak pengurusan, maka pelbagai impak negatif yang akan berlaku dan akan merosakkan organisasi.

Penghargaan

Di sini, kami ingin mengambil kesempatan untuk merakamkan ucapan terima kasih kepada rakan-rakan pesnyarah dan pelajar-pelajar dari Jabatan Kejuruteraan Mekanikal, Politeknik Port Dickson kerana sudi menjawab soal selidik kajian ini. Di samping itu juga, kami ingin mengucapkan setinggi-tinggi terima kasih kepada rakan-rakan kami, pihak Kementerian Pendidikan Malaysia (KPM), Politeknik Port Dickson, ibu bapa kami serta suami kami yang telah memberi semangat dan peluang kepada kami untuk menyiapkan kajian kami ini.

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STRATEGI PEMBELAJARAN KOPERATIF BAGI KURSUS DBM3013 –MATEMATIK KEJURUTERAAN 3: SATU KAJIAN TINDAKAN

Noorazlina Binti Abd.Karim

[1]Jabatan Matematik, Sains dan Komputer , Politeknik Port Dickson, Malaysia

Email: noorazlina@polipd.edu.my

Kata Kunci : Pembelajaran Koperatif, DBM3013 –Matematik Kejuruteraan 3 , Topik 3 -Linear Programming,

Abstrak. Politeknik Malaysia sememangnya komited dalam agenda untuk mengubahsuai bentuk Pembelajaran dan Pengajaran (PdP) selari dengan kehendak abad ke 21. Pembelajaran koperatif merupakan satu kaedah alternatif di dalam PdP dan ia mempunyai dasar atau prinsip khusus yang dapat meningkatkan pembelajaran di dalam kelas disamping berupaya memupuk nilai-nilai murni yang berguna kepada pelajar [1]. Kajian ini bertujuan untuk melihat keberkesanan strategi pembelajaran koperatif ke atas pelajar-pelajar yang mengambil kursus DBM3013 –Matematik Kejuruteraan 3 bagi menyelesaikan masalah dalam memahami Topik 3- Linear Programming dan seterusnya meingkatkan minat dan motivasi pelajar terhadap topik ini. Kajian ini melibatkan seramai 57 pelajar semester 3, Sesi Jun 2018. Data-data yang diperolehi, dianalisis menggunakan perisian IBM SPSS Statistical 19 bagi mendapatkan nilai purata skor min dan ujian-t. Dapatan kajian menunjukan pembelajaran koperatif dapat meningkatkan minat dan motivasi pelajar terhadap topik 3 Linear Programming berada pada tahap tinggi (min= 4.15). Hasil kajian juga menunjukkan terdapat perbezaan pencapaian antara kumpulan kawalan dan kumpulan rawatan iaitu sebanyak 25%, signifikan ($p<0.05$). Justeru itu, startegi pembelajaran koperatif ini mampu dilihat sebagai salah satu kaedah PdP yang efektif dan dapat membantu meningkatkan pencapaian pelajar dalam topik 3- Linear Programming.

Pengenalan

Kursus DBM3013 - Matematik Kejuruteraan 3 adalah merupakan salah satu kursus teras bidang bagi pelajar semester 3, Jabatan Kejuruteraan Mekanikal di Politeknik. Terdapat 4 topik yang dipelajari dalam kursus ini iaitu Statistik dan Kebarangkalian (Statistic And Probability), Kaedah Berangka (Numerical Method), Pengatucaraan Linear (Linear Programming) dan Persamaan Pembezaan Berperingkat (Ordinary Differentiation Equation). Topik Linear Programming merupakan topik yang paling sukar untuk dikuasai oleh pelajar semasa ujian dan peperiksaan akhir. Berdasarkan kajian lepas, penguasaan pelajar terhadap topik 3 dalam peperiksaan akhir adalah sangat lemah iaitu sebanyak 19% [2]. Pembelajaran Matematik seringkali dianggap sebagai sesuatu yang sukar dan membosankan. Ini kerana dalam struktur bilik darjah tradisional, proses PdP Matematik lebih menekankan penghafalan formula dan latihan tubi, kemahiran menjawab soalan peperiksaan dan pengajaran yang berpusatkan pensyarah [7]. Keadaan ini menyebabkan pelajar sukar untuk menguasai topik 3- Linear Programming kerana pelajar tidak mempunyai kemahiran

dalam penyelesaian masalah dan tidak dapat menterjemahkan soalan ke dalam bentuk persamaan Matematik. Isu permasalahaan ini telah menyebabkan pelajar kurang berminat untuk memahami topik ini dan menyebabkan peratus pencapaian pelajar terhadap topik 3 sangat rendah [2]. Cabaran utama dalam pendidikan Matematik adalah untuk memberi kefahaman kepada setiap pelajar terutamnya dari segi konsep-konsep penting. Justeru itu, pengkaji merasakan satu perubahan kaedah PdP dalam Kursus DBM3013 - Matematik Kejuruteraan diperlukan bagi meningkatkan minat dan motivasi pelajar dan seterusnya meningkatkan pencapaian pelajar dalam topik 3- Linear Programming.

Objektif Kajian

i. Melihat keberkesanan pembelajaran koperatif dalam meningkatkan minat dan motivasi pelajar terhadap topik 3 Linear Programming.
ii. Melihat perbandingan pencapaian pelajar dalam tutorial 3-Linear Programming bagi kumpulan kawalan dan kumpulan rawatan.

Persoalan Kajian

i. Adakah pembelajaran secara koperatif dapat meningkatkan minat dan motivasi pelajar terhadap topik 3 Linear Programming?
ii. Adakah terdapat perbezaan pencapaian pelajar dalam tutorial 3-Linear Programming bagi kumpulan kawalan dan kumpulan rawatan?

Tinjauan Literature

Dalam sistem pendidikan secara konvensional, kecerdasan akal, kepakaran dan kreativiti para pelajar biasanya diabaikan. Hal ini akan menyebabkan pembelajaran atau pemikiran para pelajar akan terbatas dan sukar untuk berkembang. Kaedah pengajaran secara tradisional biasanya adalah berpusatkan guru iaitu guru terlibat secara aktif di mana guru sahaja yang menguasai sesi PdP dan sebaliknya bagi pelajar iaitu pelajar akan menjadi pasif [3]. Pemilihan kaedah dan teknik mengajar yang sesuai akan menjamin keberkesnan penyampaian sesuatu pengajaran serta pencapaian objektif secara optimum. Ini termasuklah amalan pembelajaran yang berpusatkan pensyarah kepada amalan pembelajaran berpusatkan pelajar, misalnya dengan menggunakan pendekatan secara koperatif. Pendekatan ini mempunyai kelebihan kerana mereka berpeluang berinteraksi antara satu sama lain dan boleh belajar melalui pengalaman sendiri [7]. Pengajaran secara koperatif ini dapat meningkatkan kemahiran sosial serta memupuk semangat atau nilai positif seperti kerjasama, tolak ansur, bertanggungjawab dan kepimpinan [6]. Belajar Matematik secara koperatif berpotensi dikembangkan lagi perlaksanaannya untuk meningkatkan pencapaian pelajar, merapatkan jurang kefahaman antara pelajar cemerlang dan pelajar lemah selain mampu memupuk sifat kepimpinan dan keyakinan diri [4]. Dapatan kajian yang lepas mendapati kaedah pembelajaran koperatif dapat meningkatkan pencapaian akademik pelajar dalam subjek Matematik [9]. Berdasarkan kajian-kajian terdahulu menunjukkan pembelajaran koperatif memberi kesan positif dalam meningkatkan pencapaian pelajaran di sekolah mahupun di pusat pengajian tinggi.

Metodologi Kajian

Kajian ini berbentuk kajian tindakan yang melibatkan seramai 57 pelajar semester 3 dari dua program yang berbeza iaitu seramai 32 orang pelajar DAD3S2 dan 25 orang pelajar DKM3S3 yang sedang mengambil kursus DBM3013 di Jabatan Matematik, Sains dan Komputer, Politeknik Port Dickson. Pelajar dibahagikan kepada 2 kumpulan iaitu kumpulan kawalan (DKM3S3) dan kumpulan rawatan (DAD3S2). Kajian ini menggunakan pembelajaran koperatif model STAD dalam proses PdP [3]. Data diperolehi menggunakan dua cara iaitu melalui borang soalselidik dan markah tutorial 3. Berdasarkan kepada jadual penentuan saiz sample [10] seramai 50 orang pelajar telah berjaya dijadikan sebagai sample dalam kajian ini. Kadar respon ialah 95%. Satu kajian rintis telah dijalankan terhadap 7 orang pelajar yang tidak terlibat sebagai responden bagi menentukan kebolehpercayaan soal selidik dengan menggunakan perisian IBM SPSS Statistical 19. Hasil dapatan kajian rintis bagi instrument ini mempunyai nilai Alpha Cronbach 0.906. Soalan tersebut diukur menggunakan skala likert [11] seperti yang ditunjukan dalam Jadual 1.

Jadual 1:Markat Item-item Skala Likert [11]

Skor nilai	Skor
Sangat Tidak Setuju (STS)	1
Tidak Setuju (TS)	2
Tidak Pasti (TP)	3
Setuju (S)	4
Sangat Bersetuju (SS)	5

Analisis Data Dan Dapatan Kajian

Bahagian ini menghuraikan persoalan yang pertama iaitu adakah pembelajaran koperatif dapat meningkatkan minat dan motivasi pelajar terhadap topik 3-Linear Programming. Ke semua item soal selidik dianalisis bagi mendapatkan skor min. Tafsiran statistik min yang digunakan adalah seperti Jadual 2. Tahap kecenderungan min telah di diubahsuai dan di gunakan sebagai rujukan [5] [11].

Jadual 2: Penentuan Tahap Skor Min [5][11]

Skor Min	Tahap
1.00 – 2.33	Rendah
2.34 – 3.67	Sederhana
3.68 – 5.00	Tinggi

Jadual 3: Taburan Skor Min Bagi Setiap Item Soal Selidik.

Bil	Item	Min	Std. Deviation
1	Saya gemar belajar secara berkumpulan (koperatif).	4.26	0.527
2	Saya mendapati pembelajaran secara koperatif menarik.	4.24	0.517
3	Pembelajaran kumpulan membantu saya melibatkan diri secara aktif dalam kelas.	4.12	0.594
4	Saya memberi kerjasama terhadap aktiviti koperatif.	4.10	0.544
5	Saya lebih fokus terhadap apa yang dipelajari.	4.04	0.669
6	Saya mendapati rakan saya memberi kerjasama yang baik terhadap aktiviti koperatif.	4.06	0.586
7	Saya lebih memahami apabila rakan saya memberi penerangan dalam kumpulan.	4.06	0.55
8	Saya dan rakan saya saling membantu dalam menyiapakan tugasan yang diberi.	4.24	0.555
9	Kami mendengar pendapat orang lain semasa perbincangan dalam kelas.	4.20	0.495
10	Saya bebas menyuarakan pendapat saya.	4.14	0.452
11	Saya dapat mempelajari banyak perkara melalui sesi perbincangan .	4.16	0.51
12	Aktiviti dalam kelas adalah menarik dan berguna.	4.32	0.513
13	Ahli dalam kumpulan bekerjasama dengan baik.	4.18	0.596
14	Kaedah pembelajaran kumpulan dapat meningkatkan kefahaman saya berkaitan topik *Linear Programming, Graphical Method.*	4.12	0.558
15	Saya boleh mencari jalan untuk meningkatkan penguasaan saya dalam topik *Linear Programming, Graphical Method.*	4.04	0.533
16	Ahli kumpulan saya dapat membantu saya untuk menguasai topik *Linear Programming.*	4.12	0.48
MIN KESELURUHAN		**4.15**	

Dapatan kajian yang diperolehi menunjukan purata min keseluruhan bagi persoalan kajian pertama iaitu pembelajaran koperatif dapat meningkatkan minat dan motivasi pelajar terhadap topik 3- Linear Programming berada pada tahap tinggi iaitu sebanyak 4.15 seperti Jadual 3. Secara keseluruhannya, pelajar memberikan nilai positif dan menerima baik startegi pembelajaran koperatif dalam pengajaran topik 3 ini. Pelajar juga merasakan kaedah ini dapat meningkatkan lagi kefahaman mereka terhadap topik 3. Bagi menjawab persoalan ke dua kajian ini, ujian-T (independent T-test) digunakan untuk melihat perbandingan pencapaian antara pelajar yang mempelajari topik 3 Linear Programming dengan kaedah tradisional dengan pelajar yang mempelajari PdP secara koperatif. Seramai 40 orang responden dari 2 kumpulan terlibat dipilih secara rawak dengan mengambil markah Tutorial 3 sebagai perbandingan.

Jadual 4: Ujian T-test

One-Sample Test						
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Markah_tutorial3	8.156	30.272	.000	25.000	18.742	31.258

Berdasarkan jadual 4 di atas, nilai signifikan p < .000 adalah lebih kecil daripada 0.05 dengan ini nilai min pemboleh ubah markah tutorial 3 bagi kumpulan kawalan iaitu sebanyak 70.20 dan kumpulan rawatan sebanyak 95.20 menunjukan perbezaan pencapaian yang ketara iaitu sebanyak 25% . Ini menunjukan pelajar yang menggunakan kaedah pembelajaran koperatif dalam PdP mempunyai pencapaian dan penguasaan yang lebih baik terhadap topik 3- Linear Programming.

Perbincangan

Dapatan kajian telah membuktikan bahawa kaedah pembelajaran koperatif memberi kesan yang positif ke atas minat dan motivasi pelajar dalam mempelajari topik 3-Linear Programming. Ini disokong oleh Kagan, menyatakan kebaikan pembelajaran koperatif kepada pelajar mempunyai motivasi yang lebih tinggi untuk berjaya kerana seseorang bukan sahaja mencapai kejayaan untuk diri sendiri, tetapi untuk rakan-rakan sekumpulan juga [8]. Dari kajian yang dijalankan, didapati pembelajaran koperatif mempunyai lebih kesan positif ke atas pelajar yang menggunakan kaedah ini untuk menyelesaikan masalah pembelajaran mereka. Di antara kesan yang telah dikenalpasti seperti pelajar melibatkan diri secara aktif dalam aktiviti pembelajaran secara langsung dengan ahli kumpulan [14]. Keadaan ini akan meningkatkan lagi minat dan motivasi pelajar untuk belajar. Melalui pembelajaran secara koperatif, pelajar belajar cara berinteraksi, dan bersosial dengan lebih baik, kerana pelajar digalakan untuk mengeluarkan idea dan pendapat secara berani dan terbuka melalui proses kemahiran berfikir. Selain itu, kaedah ini juga dapat membantu pelajar berfikir secara analitikal dan kritis. Hasil dapatan kajian ini menunjukan kesan yang positif terhadap pencapaian markah tutorial pelajar dalam penguasaan topik 3-Linear Programming. Ini disokong dengan kajian yang telah dilakukan oleh Suhana Matlin dan Chai Chang Yeah mendapati peningkatan pencapaian min yang lebih tinggi bagi kumpulan yang diajar dengan kaedah pembelajaran koperatif berbanding dengan peningkatan pencapaian min bagi kumpulan yang diajar melalui kaedah pembelajaran tradisional [7]. Selain itu dapatan kajian ini juga selari dengan dapatan Effandi Zakaria yang turut menyatakan bahawa menerusi kaedah pembelajaran koperatif dapat meningkatkan pencapaian akademik pelajar [13].

Cadangan Untuk Kajian Lanjutan

Dicadangkan agar kajian kaedah pembelajaran koperatif dapat dilanjutkan bagi kursus Matematik lain yang ditawarkan di Politeknik. Ini bukan sahaja akan meningkatkan pencapaian pelajar sekaligus dapat melahirkan graduan yang holistik dan berkemahiran. Selain itu, dicadangkan pada masa akan datang, kajian dapat dilakukan untuk mengkaji mengenai keberkesanan kaedah pembelajaran

koperatif yang lain seperti teknik Jigsaw.

Penutup

Secara keseluruhannya, dapat disimpukan bahawa kedua-dua objektif kajian ini tercapai. Dapatan kajian yang diperolehi memberikan satu implikasi yang amat baik terhadap perkembangan pendidikan masa kini. Melalui kaedah pembelajaran koperatif, pelajar mempunyai motivasi dan minat yang tinggi terhadap sesuatu topik yang dipelajari dan semakin berkeyakinan di dalam memberikan idea, pendapat serta melibatkan diri secara aktif di dalam sesi PdP. Banyak kajian telah menunjukan, apabila pelajar digalakan belajar secara berkumpulan atau bersama-sama, pengetahuan mereka akan meningkat dan mereka juga mampu menyelesaikan masalah dengan baik. Oleh yang demikian kaedah ini juga mampu meningkatkan prestasi keseluruhan proses PdP di dalam kelas.

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TINJAUAN ISU DAN CABARAN DALAM PERLAKSANAAN PROGRAM WORK BASE LEARNING (WBL) SARJANA MUDA POLITEKNIK MALAYSIA

Aziyati Ibrahim, Muhammad Nafi' Rezani Tahrir, Mohd Syahrizad Elias

Bahagian Perancangan Program dan Institusi, Jabatan Pendidikan Politeknik dan

Kolej Komuniti aziyati.ibrahim@moe.gov.my, nafi.tahrir@moe.gov.my,

syahrizad.elias@moe.gov.my

Key Word: politeknik, vokasional, work based learning

Abstrak. Pendekatan Work Based Learning (WBL) merupakan gabungan teori dan amali di tempat kerja sebenar dengan tujuan untuk melahirkan graduan yang memiliki nilai kebolehkerjaan. Institusi Politeknik Malaysia telah melaksanakannya bermula pada tahun 2007 dengan melibatkan 10 program pengajian diperingkat Sarjana Muda. Walaubagaimanapun, terdapat pelbagai isu pelaksanaan WBL Politeknik terutamanya melibatkan sokongan daripada pihak-pihak berkepentingan seperti industri bakal pelajar dan pensyarah. Oleh itu, tinjauan ini dijalankan bagi meneroka, memahami isu serta cabaran dalam pelaksanaan WBL politeknik. Tinjauan ini dilaksanakan melalui kaedah temubual terhadap Ketua Program pengajian yang terlibat dalam melaksanakan program WBL Sarjana Muda ini. Hasil kajian mendapati kejayaan pelaksanaan WBL politeknik adalah sangat bergantung kepada kerjasama dan kefahaman industri terhadap perlaksanaan WBL Sarjana Muda. Dapatan kajian menunjukkan JPP dan Politeknik perlu lebih giat mempromosikan program WBL melalui penubuhan pusat rujukan WBL di Politeknik sebagai pusat rujukan pihak-pihak berkepentingan khususnya industri, insentif seperti sijil penghargaan dan majlis penghargaan dan menyediakan pelbagai saluran untuk mendapatkan maklum balas pelanggan dan pelajar untuk memperbaiki mutu penawaran program.

PENGENALAN

Pendidikan dan latihan di politeknik bermula dengan penubuhan Politeknik Ungku Omar pada tahun 1969. Di awal penubuhannya, politeknik menjalankan program sijil dan diploma untuk beberapa bidang pekerjaan terpilih seperti kejuruteraan, perakaunan, teknologi galian, perancang bandar dan kampung, pengajian tanah, perkapalan dan trengkas. Seiring dengan perkembangan pesat dalam sektor industri negara, politeknik mula menawarkan program peringkat diploma lanjutan pada tahun 2009. Pada tahun 2013, politeknik telah menawarkan program di peringkat sarjana muda bagi memberi lebih banyak peluang kepada pelajar lepasan politeknik untuk melanjutkan pelajaran ke peringkat yang lebih tinggi dalam bidang tujahan/ niche dengan pendekatan WBL . Terdapat 10 program sarjana muda yang ditawarkan sehingga 2016. Tujuh daripadanya adalah program sarjana muda homegrown dan tiga lagi adalah program usahasama dengan universiti awam.

WBL merupakan satu pendekatan pembelajaran yang dipelopori oleh Jabatan Pengajian Politeknik dan Kolej Komuniti (JPKK) dan semakin mendapat tempat di dalam bidang latihan teknik dan vokasional di semua peringkat pengajian. Pendekatan WBL menggabungkan kerjasama antara

penyedia pendidikan tinggi dan organisasi kerja atau industri dalam bentuk peluang pembelajaran di tempat kerja (Boud dan Solomon, 2001). Tujuan utama pembelajaran melalui WBL ialah belajar untuk bekerja. Belajar untuk bekerja hanya dapat diperoleh melalui pembelajaran di tempat kerja dan skop kerja tersebut perlu memenuhi kehendak semasa pekerjaan (Billet dan Choy,2013). Ramage (2014) pula menyatakan bahawa WBL adalah kaedah pembelajaran untuk belajar cara memahirkan diri dalam bidang pekerjaan. Pembelajaran tersebut perlu dinilai dan penilaian adalah berdasarkan prestasi kerja di tempat kerja.

Kerangka WBL yang digunakan di politeknik merupakan aktiviti pengajaran dan pembelajaran berstruktur yang melibatkan pengalaman kerja dan persekitaran industri berasaskan tiga teras utama iaitu pelajar, institusi dan industri seperti mana Rajah 1 (JPP, 2014). Ketiga-tiga teras ini akan saling bekerjasama bagi mencapai objektif dalam melahirkan pelajar berpengetahuan dan berkemahiran tinggi dalam memenuhi kehendak industri masa kini.



Rajah 1 : Kerangka WBL Politeknik . (JPP, 2014)

Tiga teras utama iaitu pelajar, institusi dan industri seperti mana yang dinyatakan di atas adalah selari dengan pandangan Brennan dan Little (1996) yang menyatakan bahawa untuk menzahirkan kejayaan program WBL, tiga kelompok yang berkepentingan ini iaitu institusi, industri dan pelajar perlu diintegrasikan secara berkesan. Pihak Politeknik mendefinisikan WBL sebagai satu aktiviti pengajaran dan pembelajaran berstruktur yang melibatkan pengalaman kerja dalam persekitaran kerja sebenar dan hands-on di industri bagi memenuhi piawaian akademik di samping membangunkan kemahiran kebolehpasaran dan kesedaran dalam kerjaya.

Pelaksanaan pendekatan WBL di politeknik bergantung kepada peringkat dan jumlah kredit yang ditawarkan bagi setiap program pengajian. Tempoh pengajian secara konvensional dan pengajian secara WBL bergantung kepada keperluan program yang dikenal pasti melalui maklum balas daripada penggubal kurikulum, panel penasihat kurikulum, industri berkaitan dan rakan industri. Pelaksanaan WBL pada akhir pengajian merupakan kesinambungan daripada pengajian di politeknik dengan alam pekerjaan di industri seperti Rajah 2.

Tahun	1		2		3		4	
Semester	1	2	3	4	5	6	7	8
PdP	PdP di Politeknik						WBL di Industri	

Rajah 2 : Kerangka Pelaksanaan Program Sarjana Muda Politeknik

Pelaksanaan program peringkat sarjana muda Politeknik, ia adalah berganting kepada kesesuaian program pengajian dan persetujuan pihak industri. Pelajar mengikuti pengajian secara konvensional selama enam semester di politeknik, kemudian mengikuti pembelajaran dan latihan secara WBL di industri selama dua semester. Penilaian sebenar dalam WBL adalah perkara yang dipelajari dan dilakukan setiap hari di tempat latihan, di mana penilaian dikaitkan dengan kriteria yang dinyatakan dalam standard kecekapan. Perkara yang dinilai merangkumi orientasi berasaskan pengetahuan dan kemahiran. Kejayaan pendekatan WBL ini dilihat pada pengukuran pencapaian kognitif, psikomotor dan afektif ketika pelajar berada di industri (JPP, 2014).

Program Latihan Teknikal dan Vokasional (TVET) akan menjadi platform penting bagi meningkatkan tenaga kerja mahir sebagai persediaan Malaysia Negara maju menjelang 2020 (RMK11, 2016). Sebanyak 1.5 juta pekerjaan baharu akan diwujudkan melalui Rancangan Malaysia ke 11 dan 60 peratus daripadanya memerlukan tenaga kerja mahir dalam bidang berkaitan TVET. Industri memerlukan lepasan TVET yang kompeten dan mempunyai pelbagai kemahiran di industri (RMK 11, 2016). Sehubungan dengan itu, Politeknik memainkan peranan yang besar dalam menghasilkan graduan yang berkemahiran. Konsep pendekatan WBL secara keseluruhannya adalah antara penyelesaiannya yang mempu memacu negara ke arah negara maju, sistem pendidikan dalam bidang kemahiran terutamanya bidang teknik dan vokasional perlu dijadikan pilihan utama.

PENYATAAN MASALAH

Kejayaan pendekatan WBL amat bergantung kepada komitmen daripada penggerak-penggerak utama iaitu industri, pensyarah dan pelajar serta memahami dengan jelas tentang objektif dan hasil latihan. Program kerjasama yang dibentuk dalam menjalinkan perhubungan rapat secara berkolaborasi dengan industri merupakan teras kepada kejayaan program pengajian berkonsepkan WBL dalam memenuhi keperluan semasa industri di negara ini. Kriteria pemilihan industri untuk bekerjasama dengan pihak politeknik perlu diambil kira dalam menentukan kelestarian pelaksanaan program pengajian dengan pendekatan WBL politeknik.

Hasil temubual yang dijalankan keatas Ketua Program WBL Sarjana Muda, tinjauan mendapati terdapat isu dan cabaran utama dalam perlaksanaan WBL Sarjana Muda yang boleh dikategorikan sebagai kolaborasi industri dan ketidakfahaman konsep WBL. Penyelidik mendapati penyelia industri WBL menghadapi masalah ketidakjelasan tentang peranan sebenar terutamanya melibatkan penyeliaan pelajar, penilaian pelajar serta proses pengajaran dan pembelajaran. Oleh itu, pelaksanaan WBL politeknik bersama industri merupakan satu fenomena yang memerlukan kajian secara mendalam terutamanya melibatkan isu pelaksanaan program WBL khususnya semasa dalam industri meliputi isu dan cabaran dalam pelaksanaan WBL dan mengapa isu dan cabaran tersebut berlaku.

Pemilihan responden adalah di kalangan pelaksana iaitu Ketua Program WBL Sarjana Muda. Isu dan cabaran yang diperolehi daripada pensyarah di lima Politeknik yang menawarkan program Sarjana Muda WBL adalah seperti berikut:

1. Kolaborasi industri

Kolaborasi industri diwujudkan melalui kerjasama dengan persatuan atau badan profesional yang memayungi industri tersebut. Kaedah ini diyakini dapat melebarkan jaringan kerjasama dengan syarikat-syarikat yang bergabung dengan badan industri. Selain daripada menerima pelajar untuk ditempatkan bagi program WBL, politeknik juga dapat memanfaatkan kerjasama ini dengan melantik ahli badan induk sebagai penasihat program seperti yang diungkapkan dalam petikan di bawah,

"…kita nampak untuk kita go through setiap industri personally nak pergi A, nak pergi B agak sukar jadi kita…apa yang kita lakukan kita LOI dulu dengan kita collaborate dengan kita punya body Malaysia Associate of Facilities Management. Ok tu first step kita buat….so bawah MAFM ni actually dia banyak corporate members…so bila kita dah..dia dengan MAFM dah kenal then MAFM punya committee ada yang jadi penasihat program kita… jadi untuk kita dapatkan tiga industri tadi kita buat satu teamworklah dengan MAFM kita buat macam talks on kita punya program degree, on wbl punya ni so dapatlah tiga". (R1)

Keperihatinan responden terhadap kelangsungan program WBL ditunjukkan dalam petikan di bawah,

"…sebab kita menggerakkan program kita sehingga habis empat tahun tu bersama dengan industrilah walaupun tiga tahun kita di institusi kitakan tapi setahun tu adalah sangat penting pada kitalah…industri tu yang penting kita punya rakan kolaborasi untuk sustain sustain untuk kita dapatkan industri bukan senang untuk dapatkan industri ni … " (R2)

Isu ini tidak mudah ditangani. Walaupun politeknik dan industri telah menandatangani nota persefahaman, ada syarikat di bawah badan induk tidak mahu mengambil pelajar untuk menjalani WBL di syarikat. Responden R3 ini menegaskan,

"…Malaysia Automotive Institute sepatutnya bila kita ada buat MOU dengan MAI dengan syarikat-syarikat tu dia orang willinglah untuk ambik pelajar kita tapi apa yang berlaku ada banyak company yang tak nak ambik..kita call banyak kali... (R3)

Sehubungan dengan ini, bagi memudahkan pelaksanaan WBL yang berstruktur di industri disarankan agar pelaksanaan WBL lebih fleksibel mengambil kira keperluan industri sebagaimana yang diungkapkan oleh responden R4 di bawah:
"…kita kena susun semula the WBL program to be more flexible is not kerana industri itu bukan industri kita, we are attach to the industri, we have to be flexible according what the industry need... (R4)

Imbuhan kepada syarikat dalam bentuk pengurangan cukai berganda atau double tax deduction

atau melalui mekanisme geran HRDF juga dicadang untuk menggalakkan syarikat terlibat dalam pogram WBL. Maka pemberian imbuhan ini dirasakan dapat meningkatkan lagi kelestarian program WBL ini. Responden R5 mengungkapkannya seperti berikut:

"…company dia nakkan sesuatu daripada kita so sekurang- kurangnya kalau kita boleh buat satu supaya dia boleh keluar duit HRDF untuk digunakan sebagai latihan staf digunakan untuk program sebab dia jadi isu bila dia dapatkan bila dia ambik student kita dapat sesuatulah daripada pihak kerajaan…" (R5)

2. Ketidakfahaman konsep WBL

Pelaksanaan WBL di industri berhadapan dengan cabaran disebabkan oleh ketidakfahaman konsep WBL sama ada di peringkat Jabatan Pendidikan Politeknik (JPP), pelajar dan industri. Ketidakfahaman ini ditunjukkan dengan contohnya saranan pemantauan secara zoning yang dicadangkan oleh pihak JPP. Saranan ini tidak praktikal seperti mana yang dijelaskan oleh responden R7,

"…Saranan ini tidak praktikal kami tak bersetujulah dengan kaedah pemantauan secara zoning sebab benda ni WBL adalah mengikut kursus dan kursus yang ada adalah final year projek jadi itu perlukan kepada permanent supervision daripada seorang supervisor nilah polytechnic supervisor yang sama tak boleh tukar…" (R7)

Bagi pihak pelajar pula ketidakfahaman itu berlaku apabila mereka tidak merujuk kepada pensyarah politeknik apabila berhadapan dengan sesuatu masalah. Mereka hanya berbincang dengan rakan sekelas.

"…Jadi pelajar ni dia lebih mengikut arahan ataupun persefahaman sesama pelajar daripada dia merefer kepada pensyarah. So bila dia refer kepada pensyarah dia dapat info dia tak faham dia tak refer balik kepada pensyarah. Dia berbincang sesama dia..at the end dia akan dapat satu benda yang tak sama seperti apa yang kita mohon. Isu ni kalau bendanya maknanya kalau benda ni dah lama tak jadi isu…sebab semakin tahun semakin kita akan improve sistem tu…tapi disebabkan sistem ni sistem baru…jadi dia akan refer kepada kawan- kawan dia..so apa yang kawan dia buat, itu yang dia akan buat..so bila kita pergi observe, "Ai kenapa kamu buat macam ni?..kami faham macam ni…OK itu ada sikitlah kelemahan tapi saya rasa benda tu tak lah major…" (R8)

Di pihak indusri pula, masalah berlaku apabila pihak di lokasi kerja tidak memahami konsep WBL dan menganggap program WBL sebagai program latihan industri yang biasa. Responden R9 menjelaskannnya begini,

".. company yang kita assign tu dia kata dia faham WBL kita..tapi bila sampai turun dekat site dia train pelajar kita macam LI Li yang lain.. itu cerita dia…" (R9)

PERBINCANGAN

Penawaran program sarjana muda dengan mod WBL perlu diteruskan kerana menyumbang

terhadap visi dan misi politeknik. Namun beberapa kekangan seperti kolaborasi industri dan ketidakfahaman dengan WBL perlu diatasi. JPP dan politeknik perlu bekerjasama untuk mempromosi program WBL untuk menarik pihak industri bekerjasama dalam menjalankan program WBL. Untuk itu insentif seperti sijil penghargaan dan majlis penghargaan wajar dibuat untuk memberi motivasi dan mengekalkan industri dalam kolaborasi tersebut. JPP dan politeknik juga harus meningkatkan persefahaman dan kerjasama dalam memastikan kualiti penawaran program tercapai. Pelbagai saluran perlu disediakan bagi mendapatkan maklum balas pelanggan/pelajar untuk memperbaiki mutu penawaran program. Politeknik perlu mengambil serius dan tindakan pantas ke atas setiap maklum balas pelanggan.

Oleh kerana Politeknik telah dilihat sebagai peneraju dalam WBL maka dicadangkan penubuhan WBL Centre of Excellence yang bertujuan untuk menjadi pusat rujukan kepada institusi lain bagi tujuan penandarasan dan juga kajian bagi penuntut-penuntut dalam WBL. Kewujudan pusat ini akan membina reputasi politeknik dalam kalangan industri dan akademia sebagai pusat kecemerlangan pendidikan yang dipacu industri. Pusat ini boleh diletakkan di JPP atau di salah sebuah politeknik premier.

RUMUSAN

Secara keseluruhannya kajian ini telah dapat memberikan gambaran awal terhadap perlaksanaan program sarjana muda di Politeknik Malaysia. Bagi mendapatkan gambaran yang lebih jelas, dapatan kajian perlu di triangulate dengan laporan lain yang telah dihasilkan oleh bahagian-bahagian lain seperti Bahagian Hubungan Industri dan Kebolehpasaran, Bahagian Pembangunan Pelajar, Bahagian Pengambilan Pelajar, Bahagian Pembangunan Kurikulum, Bahagian Peperiksaan dan Penilaian dan Bahagian Instruktional dan Pembangunan Digital. Kajian ini terbatas kepada persepsi warga politeknik sahaja. Oleh itu kajian lanjutan dicadangkan melihat persepsi pihak Jabatan Pendidikan Politeknik dan Kolej Komuniti, bakal majikan dan pihak industri yang terlibat dengan pendekatan WBL. Justeru maklumat yang menyeluruh berkaitan isu dan cabaran program ijazah sarjana muda di Politeknik Malaysia dapat diperoleh. Hasil kajian menyeluruh ini akan membantu untuk kajian terperinci bagi penambahbaikan program pendekatan WBL Politeknik.

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Billet, S. and Choy

AUTOMATIC SWITCHING EARTH LEAKAGE CIRCUIT BREAKER USING GSM CONTROLLED BY PIC MICROCONTROLLER

K. Kamarudin1, a,M.N Rizuan2,b M.N Nor'Ashikin3,c

1Electrical Engineering, Politeknik Ibrahim Sultan

2 Electrical Engineering, Politeknik Ibrahim Sultan

3 Electrical Engineering, Politeknik Ibrahim Sultan

akamaruddinkamit@gmail.com, bm_rizuan@pis.edu.my, c n_shikin@pis.edu.my

Keywords: GSM, Earth Leakage Circuit Breaker (ELCB), PIC18F4550

ABSTRCT: Automatic Switching Earth Leakage Circuit Breaker Using GSM Controlled by Pic Microcontroller is a project undertaken to give earlier noticed to residential when the electricity trip happened in especially when they were not at home. Earth Leakage Circuit Breaker (ELCB) will be controlled automatically ON again after it OFF for a few seconds The development of this innovation involved the integration communication between PIC type 18F4550 to control the entire system and the GSM, which is used to communicate between the owner and also the control system at home.By this project residential owner will be notified on their mobile phone as soon as the power supply is cut off in their homes. GSM will be programmed so as to produce a signal in the form of orders and sent directly to the mobile phone owner. And when homeowners agreed to reactivate ELCB, they will answer a short message and at the same time the solenoid will function and act to reactivate the ELCB.

Introduction

In the 21th century, electrical energy is very important for a human life. However, some electrical appliances needs continous power electric to function such as refrigerator, water pump for aquarium, alarm system and so on.It will not work properly if the electricity is not supplied well for example when lightning or short circuit occurred. This situation will cause electrical device known as ELCB or the control and protection of electrical home from damage will break automatically tripped.

Therefore, this project is an initiative of the situations mentioned earlier. Earth Leakage Circuit Breaker (ELCB) will be controlled automatically ON again after it OFF for a few seconds. The target of this project is to residents or owner of the house who are away from home on vacation for a few project residential owner will be notified on their mobile phone as soon as the power supply is cut off in their homes. In addition, a key component in this project is GSM, which is used to communicate between the owner and also the control system at home. GSM will be programmed so as to produce a signal in the form of orders and sent directly to the mobile phone owner. And when homeowners agreed to reactivate ELCB, they will answer a short message and at the same time the solenoid will function and act to reactivate the ELCB. This system can only function as long as the owner's

residence is located in the coverage area of the signal line has subscribed.

Block Diagram and Working

In general, the project is fully hardware configuration and categorized into two parts: The electronics and telecommunications. This project used the transmitter, which sends a signal to a receiver that links to the controller system operated through the PIC microcontroller. The Microcontroller PRO Compiler is used to monitor and control signals to the modem by connecting the RS232 serial port communication between GSM modem and hardware. The commands are simple standards to control the modem function. This system involves tracking the fault systems associated with the PIC and GSM modem. When a fault is detected, a signal is immediately sent to the PIC. The status is shown in the LCD display. Next, the PIC will process the data and send a signal to the GSM modem. After that, the GSM modem will immediately send an SMS to the control room through the mobile phone. The Microcontroller is the key elements that control the entire operation, including the real time taken to process the SMS data to be sent.

This project is based on hardware and software. And the most important thing to doing this project is to develop a PIC microcontroller board. Illustration below shown the overall process of the project.

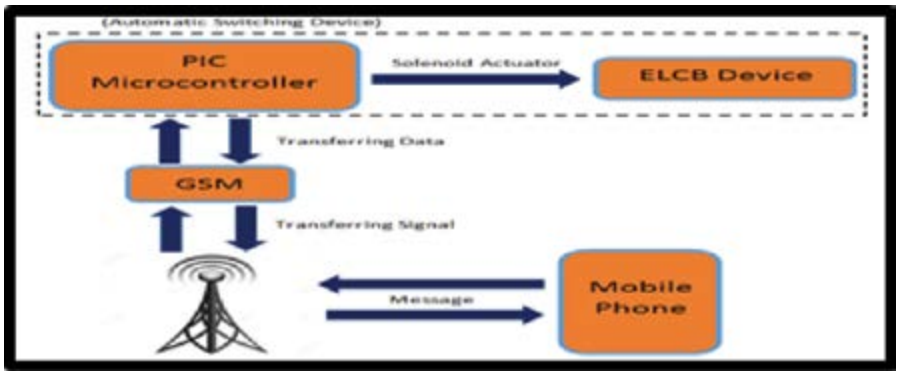


Figure 1: Automatic Switching Earth Leakage Circuit Breaker Using GSM Controlled by PIC Microcontroller block diagram.

Based on Figure 1 when short circuit from appliances or over current from lightning occur, ELCB will switch off automatically. So when the owner not at home or maybe outstation for the long time,problem can happen to the electrical home appliances which need power supply to function for example refrigerator,alarm system,automatic lamp and so on. And we try to solve this problem with embed a programming use PIC microcontroller to switch on ELCB automatically eventhough user not at home. The tools that we use is GPRS MODEM. This tools functions with send a message to the owner mobile phone that her/his house don't have electricity at that time. So the owner received the message and at the same time the timer turn on to make ELCB automatically switch on by DC

motor. Finally the electrical power supply can function again and all the electrical appliances at home will works as usual.

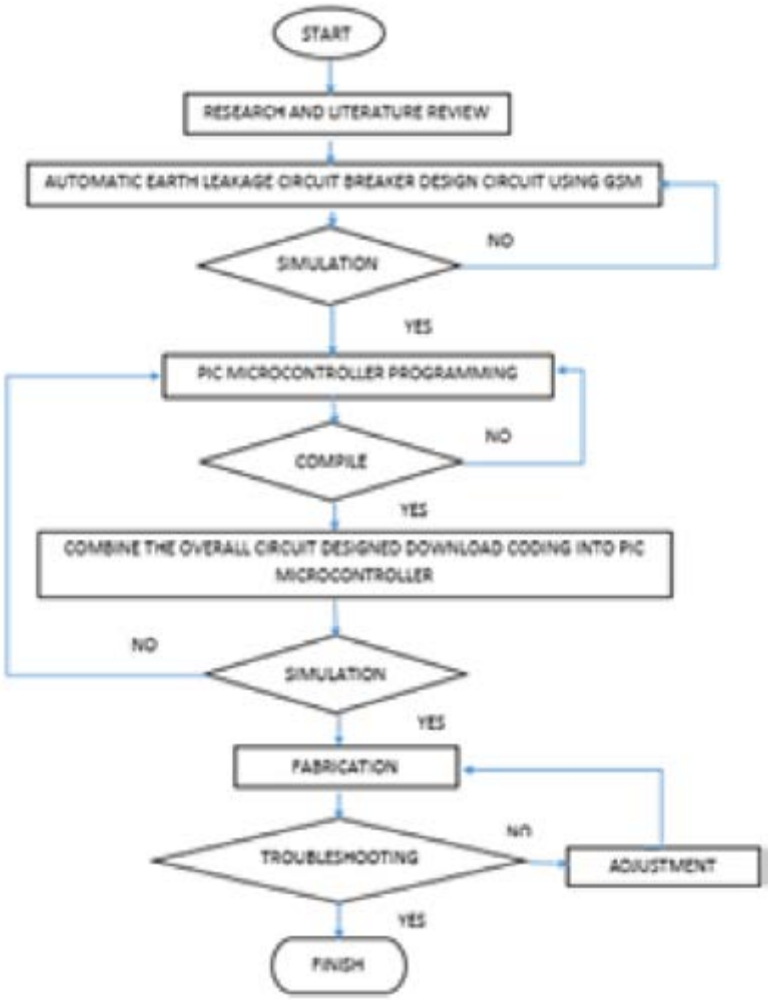


Figure 2: Automatic Switching Earth Leakage Circuit Breaker Using GSM Controlled by PIC Microcontroller flow chart

Flow chart shows in figure 2 is the operation system of the Automatic Earth Leakage Circuit Breaker using GSM controlled by pic microcontroller. Firstly we developed a source code for trigger a GSM device. This project use a PIC C compiler for write a code. For this project GSM is similar like alarm system function, which is tell the owner of the house through a text already programmed at the PIC C compiler.

And this project require to use PIC 18F4550 as a microcontroller. Another software that we used to developed this project are PROTEUS 8. This software function to draw a complete circuit and combined with the no error source code (hex file).

RESULT

This section will discuss about the results of the system. First of all, the CCS program code is studied and compiled to obtain the Hex file.. If there is no error in the simulation process, the testing part can be proceeding by constructing, soldering and troubleshooting process.

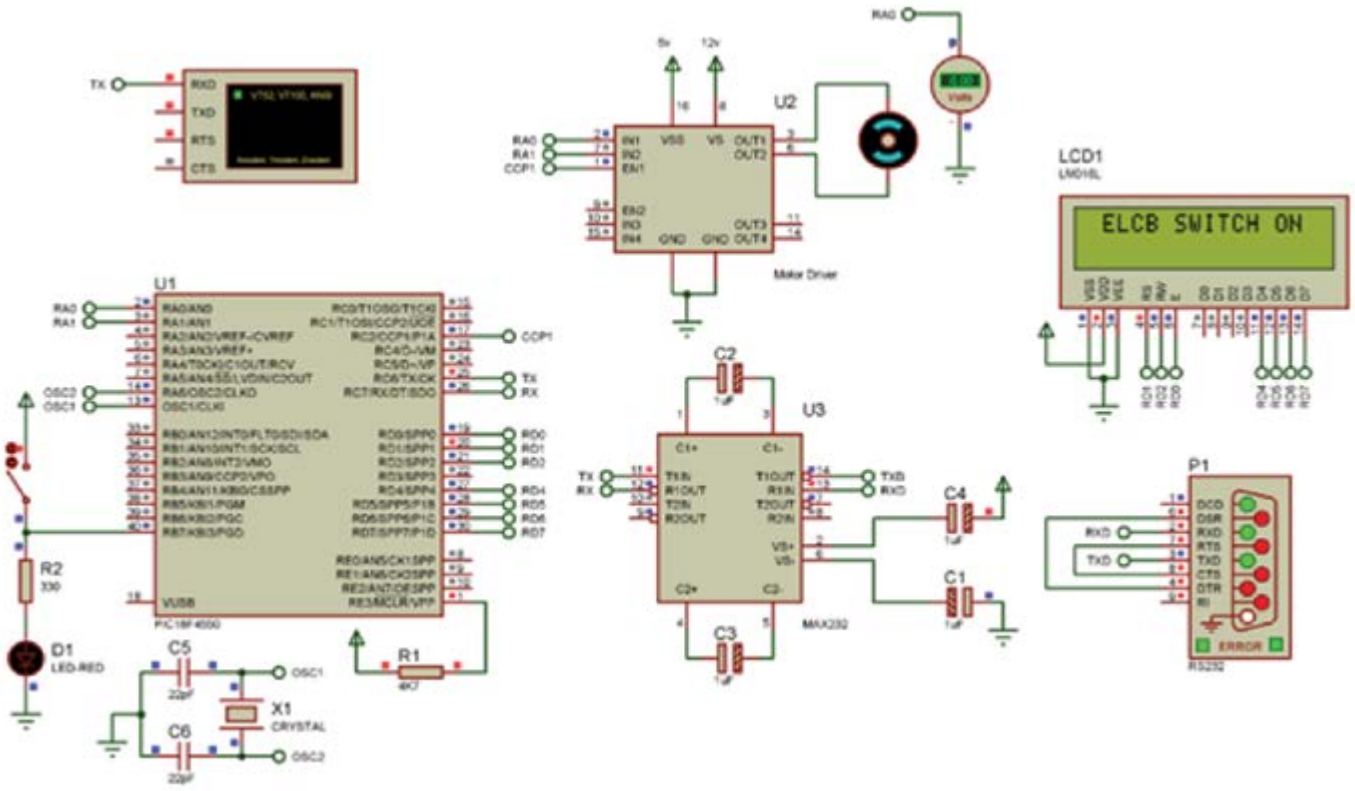


Figure 3 : Overal circuit

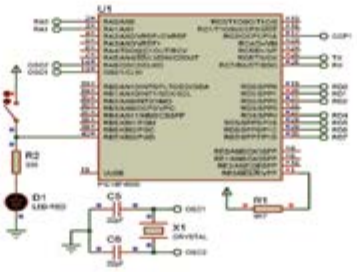
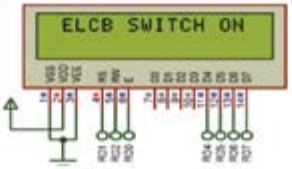
No	Type of result	picture	output
1	When the ELCB is trip (OFF Condition)limit switch will turn ON		ELCB OFF LIMIT SWITCH ON
2	The signal sent to PIC 18F4550 Microcontroller to run the coding.		CODING RUN
3.	From the PIC coding signal sent to GSM Module through RS232 driver		GSM ON
4.	The user mobile phone will receive text message from GSM module that stated ELCB was trip. Then the order given from GSM to text SWITCH ON the ELCB.		ELCB TRIPP NEED SWITCH ON
5.	After text switch on the ELCB, coding for running the motor was function. The dc motor will energized to pull the ELCB switch ON through a wire.		MOTOR CODING RUN AND PULL THE SWITCH ELCB ON

Table 1 Result for overall circuit

Hardware

In this section we are interfacing microcontroller and GSM modem. Text message may be sent through the modem by interfacing only three signals of the serial interface of modem with microcontroller

i.e.,TxD,RxD and GND. In this scheme RTS and CTS signals of serial port interface



Figure 4: Automatic Switching Earth Leakage Circuit Breaker Using GSM Controlled by PIC Microcontroller hardware circuit.

CONCLUSION

This project was succesfully developed and three objective of the project achieved. Based on the project, PIC microcontroller is very powerful devices nowdays. The variety function to control any system, easy to understand make this devices suitable to beginner student study a fundamental of microcontroller. We also get new knowledge how GSM system can interface with the PIC microcontroller.

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TAHAP KOMPETENSI KEUSAHAWANAN DALAM KALANGAN PELAJAR POLITEKNIK NILAI

Seri Nian Akmad1, , Zaiton Yusok2, Mohd Ghafran Mohamed3.

Politeknik Nilai, Nilai, Malaysia

seri_nian@polinilai.edu.my, zaiton_yusok@polinilai.edu, my, mohd.ghafran@polinilai.edu.my

Keywords: Kompetensi; Keusahawanan; Kotmitmen; Melihat Peluang; Mutu Kerja.

Abstrak. Pembelajaran dan pembudayaan keusahawanan di kalangan pelajar di instutusi pengajian tinggi adalah salah satu inisiatif kerajaan bagi mengurangkan kadar pengangguran dalam tempoh masa yang panjang. Kajian lepas menyatakan pelajar yang memulakan perniagaan lebih awal semasa di alam kampus berpotensi untuk meneruskan perniagaannya sebagai salah satu kerjaya pilihan bahkan boleh meningkatkan taraf ekonomi negara dengan cara menyumbang dari sudut pendapatan serta dapat menawarkan peluang pekerjaaan. Tujuan kajian ini untuk mengenalpasti empat tahap kompetensi keusahawanan dalam kalangan pelajar di Politeknik Nilai dan melihat hubungan kompetensi keusahawanan dengan minat pelajar ke arah meneruskan perniagaan mereka selepas tamat pengajian. Seramai 507 orang pelajar mengambil subjek DPB2012 Entreprenuership di Politeknik Nilai pada sesi Jun 2018 dan telah dipilih secara rawak seramai 232 orang pelajar sebagai responden kajian ini. Instrumen kajian yang digunakan adalah kaedah soal selidik. Data dianalisis secara statistik deskriptif dengan menggunakan perisian Statistical Package for Social Science (SPSS Versi 20.0). Dapatan kajian terhadap empat elemen kompetensi keusahawanan dalam pelajar iaitu komitmen , menitik beratkan mutu kerja, melihat peluang dan perancangan strategik adalah tinggi dengan nilai purata min 3.92, 4.06, 3.76 dan 4.13 dengan nilai purata keseluruhan min kompetensi keusahawanan tersebut berada di tahap tinggi iaitu 3.97. Ini bermakna pelajar di Politeknik Nilai mempunyai tahap yang tinggi terhadap empat elemen kompetensi keusahawanan dalam kalangan pelajar. Didapati juga bahawa purata nilai min bagi minat di kalangan pelajar untuk meneruskan aktiviti keusahawanan selepas tamat pengajian adalah tinggi iaitu 3.94. Ini membawa maksud usaha kerajaan untuk menerapkan beberapa elemen kompetensi keusahawanan di kalangan pelajar di Politeknik Nilai adalah berjaya.

Pendahuluan.

Mengikut Bank Negara Malaysia (BNM), kadar pengangguran global yang tinggi dicatatkan iaitu pada tahun 2013 ialah sebanyak 13.2 peratus dan ia kekal padar kadar tinggi pada 2016 iaitu 13.1 peratus melalui laporan Alya Ilyana (2018, Januari 18). Isu pengangguran dalam kalangan graduan bukan perkara baru dan menjadi masalah kepada negara. Peningkatan budaya keusahawanan menurut Zakiyah & Norzalinda (2017) di kalangan masyarakat kita, dilihat mampu membantu kerajaan dalam menangani isu pengangguran malah meningkatkan ekonomi negara serta membuka ruang pekerjaan kepada masyarakat. Menurut Suraiya, Ahmad Raflis, Fahruddin & Lokman (2017) kerajaan juga menerapkan aktiviti keusahawanan di kalangan pelajar bagi meningkatkan pengetahuan dan kemahiran pelajar mengenai perniagaan.

Di peringkat tertiari, Kementerian Pendidikan Malaysia (KPM) sebagai sebuah kementerian yang menerajui pendidikan tinggi negara, KPM sentiasa berusaha untuk mempertingkat dan memajukan hubungan dan gabungan di antara keusahawanan dan pendidikan bagi menghasilkan satu kuasa pembangunan insan yang kental, berdaya keusahawanan, holistik dan seimbang daripada segi aspek ilmu dan akhlak seperti yang dihasratkan di bawah Pelan Pembangunan Pendidikan Malaysia 2015-2025 (2015).

Kajian lepas turut menekankan betapa pentingnya kompetensi keusahawanan terhadap perkembangan usahawan dan juga kejayaan sesebuah perniagaan (Affzalina & Nor Aishah, 2017). Secara tidak langsung, instrumen-instrumen dalam kompetensi keusahawanan bukan sahaja menentukan tingkat minat responden terhadap keusahawanan, tetapi turut memainkan peranan penting sebagai pemacu dan penghubung kepada prestasi usahawan dan kejayaan sesebuah organisasi.

Dapatan pengkaji Isteti murni, Noviarti & Wahyudi (2016) menyatakan tahap pemikiran dan tingkah laku keusahawanan jika berada pada tahap yang sederhana ini akan menyebabkan usahawan yang dilahirkan adalah usahawan yang kurang inovatif dan tidak berminat untuk meneroka bidang perniagaan dan keusahawanan dengan lebih mendalam. Dapatan kajian lepas Affzalina & Nor Aishah (2017) menyatakan mahasiswa Universiti Kebangsaan Malaysia dan Universiti Sains Islam Malaysia terutamanya bagi mahasiswa jurusan Sains masih belum menguasai ciri-ciri keusahawanan secara sepenuhnya seperti yang dikehendaki dalam Pelan Pembangunan Pendidikan Malaysia (PPPM) 2013-2025 yang ingin melahirkan mahasiswa yang berciri keusahawanan. Ini tidak seiring dengan matlamat negara iaitu mengurangkan kadar pengangguraan melalui bidang keusahawanan.

Sorotan Kajian.

Kompetensi keusahawanan dalam pelajar adalah kemampuan atau kecekapan pelajar untuk melaksanakan fungsi-fungsi keusahawanan dengan berkesan. Kompetensi keusahawanan boleh dimiliki melalui amalan-amalan perilaku hasil daripada pengaruh nilai-nilai hidup seseorang, sikap juga desakan dalaman untuk melakukan tugas dengan cemerlang (Siti Syuhada, Muhammad Firdaus, & Suhaila, 2015).

Hasil kajian Mc Clelland dan Mc Ber & Co. (1985) terhadap usahawan yang berjaya di Malawi, India dan Ecuador, mereka telah menyenaraikan 13 ciri-ciri kompetensi keusahawanan yang membantu kejayaan usahawan-usahawan ini (Norita, 2017) Tiga belas ciri kompetensi keusahawanan tersebut adalah inisiatif, melihat dan merebut peluang, kecekalan, mencari maklumat, penumpuan mutu kerja yang tinggi, komitmen terhadap kontrak kerja, berorientasikan kecekapan, perancangan yang sistematik, penyelesaian masalah secara kreatif, keyakinan diri, ketegasan, meyakinkan orang lain dan kemampuan menggunakan strategi-strategi pengaruh (Hanim Sulaiman,Mohd Hassan & Mohd Lutfi, 2010).

Empat daripada tiga belas elemen kompetensi keusahwanan iaitu, komitmen, membuat perancangan yang sistematik, melihat dan merebut peluang dan menitikberatkan mutu kerja mempunyai purata min yang tinggi iaitu 4.15, 3.82, 3.70 dan 3.76 di kalangan pelajar Falkulti Pengurusan dan Muamalah yang mengambil kursus keusahawanan di Kolej Universiti Islam

Antarabangsa Selangor (Siti Syuhada et al, 2015). Dapatan ini juga seiring dengan kajian Man, Lau & Chan (2002) mengenalpasti kompentasi yang ada pada seorang usahawan iaitu komitmen, melihat peluang, menyusun strategi, pengurusan organisasi dan hubungan.

Secara keseluruhannya, dapatan daripada kajian lepas Siti Syuhada et al (2015) , menyatakan bahawa penguasaan pelajar terhadap empat tahap kompentasi keusahawanan iaitu komitmen, membuat perancangan yang sistematik, melihat peluang dan menitikberatkan mutu kerja di kalangan pelajar pada tahap yang tinggi di universiti awam iaitu di Kolej Universiti Islam Antarabangsa Selangor. Oleh hal yang demikian, kajian ini untuk melihat empat tahap kompetensi keusahawanan tersebut di kalangan pelajar di Politeknik Nilai yang mengambil subjek keusahawanan.

Aktiviti keusahawanan yang pelbagai diadakan sepanjang pengajian pelajar di peringkat pengajain awam dan swasta sedikit sebanyak memberi pendedahan kepada pelajar mengenai dunia sebenar perniagaan dan keusahawanan. Pendapat ini disokong oleh Mimi Mohaffyza, Simah & Adnan (2016) menyatakan penglibatan pelajar dalam aktiviti keusahawanan di pengajian awam boleh memperkembangkan kompetensi atau sifat keusahawanan pelaj**ar,** meningkatkan kawalan diri, keyakinan diri yang tinggi dan mempertingkatkan inovasi.

Objektif

1. Mengenal pasti tahap komitmen berasaskan kompetensi keusahawanan dalam kalangan pelajar.
2. Mengenal pasti tahap melihat peluang berasaskan kompetensi keusahawanan dalam kalangan pelajar.
3. Mengenal pasti tahap menitik berat mutu kerja yang tinggi berasaskan kompetensi keusahawanan dalam kalangan pelajar.
4. Mengenal pasti tahap perancangan yang sistematik berasaskan kompetensi keusahawanan dalam kalangan pelajar.
5. Mengenal pasti tahap minat pelajar meneruskan aktiviti keusahawanan selepas tamat pengajian.

Reka Bentuk Kajian. Kajian yang dilakukan adalah berbentuk deskriptif tinjauan bagi mendapatkan maklum balas daripada responden tentang empat tahap kompetensi keusahawanan dalam pelajar di Politeknik Nilai dan tahap minat pelajar untuk meneruskan bidang keusahawan selepas tamat pengajian.

Persampelan Kajian. Populasi kajian terdiri daripada 507 orang pelajar Politeknik Nilai yang mengambil kursus DPB2012 Entreprenuership pada sesi Jun 2018. Daripada jumlah itu, seramai 232 orang pelajar dipilih secara rawak pada pada minggu ke-13 penggajian iaitu pada 2 minggu terakhir sesi perkuliahan pada semester tersebut sebagai responden kajian. Untuk kajian ini, jumlah responden diperolehi daripada jadual Krejcie dan Morgan dalam buku (Chua Yan Piaw, 2006).

Instrumen Kajian. Instrumen yang digunakan untuk kajian ini adalah instrumen kompetensi keusahawanan dan beberapa soalan diadaptasi daripada kajian (Nurazlinda & Suaiza, 2017) . Daripada jumlah keseluruhan iaitu tiga belas kompetensi keusahawanan, hanya empat kompetensi diambil untuk melihat kompetensi keusahawanan pelajar. Secara keseluruhannya, jumlah soalan adalah sebanyak 20 soalan. Responden diminta menjawab soalan dengan mengisi borang

soalselidik kompetensi keusahawanan berdasarkan skala Likert 1 hingga 5 (1 sangat tidak setuju, 2 tidak setuju, 3 kurang setuju, 4 setuju, 5 sangat setuju). Borang soalselidik dianalisa secara deskriptif menggunakan perisian Statistical Package for Social Science (SPSS Versi 20.0).

Borang soal selidik merangkumi 4 elemen kompetensi keusahawanan. Menurut Siti Syuhada et al (2015) 4 elemen tersebut memberi maksud ;

1. **Komitmen** yang bermaksud seorang individu yang sanggup melakukan pergorbanan bagi sesuatu penyelesaian, terutamanya bagi memenuhi kepuasan pelanggan. Pekerja yang mempunyai komitmen yang tinggi lebih cenderung untuk kekal bersama organisasi walaupun mereka berhadapan dengan tekanan.

2. **Melihat dan merebut peluang** seorang individu yang sentiasa melihat suatu masalah sebagai suatu peluang untuk menjana atau mewujudkab perniagaan.

3. **Menitik beratkan mutu kerja yang tinggi** iaitu individu yang cuba sedaya upaya menghasilkan perkhidmatan mahupun produk setanding dengan pesaing. Dalam menjalankan sesuatu tugasan, mereka akan menyelesaikan tugas dengan cemerlang dan bermutu demi menjamin kepuasan pelanggan dan meningkatkan imej perniagaan.

4. **Membuat perancangan yang sistematik** merupakan seorang individu yang mempunyai sikap melakukan kerja dengan teratur mengikut prosedur yang telah ditetapkan dan mampu **membuat perancangan yang terliti serta logik akal untuk mencapai sesuatu matlamat.**

Manakala berkaitan minat pelajar meneruskan aktiviti usahawan dalam soal selidik ini bermaksud sikap yang positif memainkan peranan dalam mempengaruhi seseorang itu untuk menjadi usahawan dan kebanyakan sikap-sikap positif ini lahir daripada individu itu sendiri. Sikap dan minat jelas menunjukkan peranan yang penting dalam menjadi pendorong bagi seseorang yang bergelar belia menceburi bidang keusahawanan (Wan Mohd Zaifurin, Nor hayati, Sabri & Ibrahim, 2006).

Analisis dan Keputusan. Jadual 1, menunjukkan tahap interpretasi skor min secara purata daripada analisis secara statistik deskriptif dengan menggunakan perisian SPSS Versi 20.0 yang akan digunakan untuk kategorikan nilai purata min.

Jadual 1: Interpretasi skor min

Korelasi antara	Interpretasi
1.00 – 2.33	Rendah
2.34 – 3.66	Sederhana
3.67 – 5.00	Tinggi

Sumber: Jamil (2002).

Hasil analisis ditunjukkan dalam Jadual 2 yang memaparkan jumlah purata min, peratus dan

sisihan piawaian terhadap empat tahap kompetensi keusahawanan dalam pelajar.dan minat pelajar bagi meneruskan aktiviti keusahawanan.

Jadual 2: Jumlah purata min keseluruhan, peratus dan sisihan piawasi empat kompetensi keusahawanan minat.

Perkara	Item	Rendah	Sederhana	Tinggi	Min	SP
Kompetensi Keusahawanan Pelajar	Komitmen	1.2%	21.3%	77.5%	3.9246	0.6446
	Melihat peluang	4.5%	28.3%	67.2%	3.7586	0.7632
	Menitik berat mutu kerja	1.9%	16.1%	82%	4.056	0.6730
	Perancangan yang sistematik	1.1%	13.5%	85.4%	4.1315	0.6690
Minat	Minat meneruskan berniaga	9%	21%	70%	3.944	0.7538
			Purata min kompetensi		**3.9677**	**0.6875**

Hasil kajian ini menyatakan ke semua tahap kompetensi keusahawanan dalam pelajar adalah tinggi iaitu kompetensi perancangan strategik (4.13) diikuti elemen menitik beratkan mutu kerja (4.06), komitmen (3.92) dan melihat peluang (3.76). Ini bermakna pelajar di Politeknik Nilai mempunyai tahap yang tinggi terhadap empat elemen kompetensi keusahawanan dalam pelajar. Jika dilihat dari segi keperatusan untuk melihat taburan pelajar membuat pilihan setuju juga adalah tinggi. Manakala nilai purata min bagi minat pelajar yang akan meneruskan aktiviti keusahawanan adalah tinggi iaitu min purata 3.94.

Perbincangan dan Impak Kajian. Dapatan hasil kajian terhadap tahap kompetansi keusahawanan pelajar di Politeknik Nilai adalah tinggi setanding dengan hasil yang diperolehi di universiti tempatan. Ini menunjukkan kesan pembelajaran dan pengajaran di Politeknik Nilai berkaitan subjek keusahawanan telah memberi impak positif terhadap 4 elemen utama kompetensi keusahawanan dalam kalangan pelajar. Dapatan ini juga boleh dirumuskan telah mencapai objektif kursus subjek tersebut dengan jayannya. Dapatan ini seiring dengan kajian daripada Farliyanna & Nor Aishah (2017) mendapati bahawa semua pelajar menunjukkan kecenderungan yang tinggi terhadap bidang keusahawanan apabila didorong dengan ilmu pengetahuan mengenai keusahawanan sejak awal remaja.

Dapatan hasil kajian ini juga menunjukkan pelajar berminat untuk meneruskan aktiviti keusahawanan selepas tamat pengajian dan menjadikan bidang keusahawanan sebagai suatu kerjaya pilihan mereka. Ini memberi nilai kepada Negara kerana dapat melahirkan bakal graduan yang berkebolehan menjadi keusahawanan dan mampu mengurangkan kadar pengganguran graduan selepas tamat belajar.

Cadangan Kajian. Kajian ini hanya menjalankan 4 kompetensi keusahawanan. Oleh hal demikian adalah dicadangkan pengkaji akan datang menilai 9 lagi kompetensi keusahawanan dalam kalangan pelajar Politeknik Nilai bagi menilai keberkesanan tahap keusahawanan secara

menyeluruh.

Kesimpulan.

Hasil kajian ini menunjukkan empat tahap kompetensi keusahawanan pelajar telah dicapai dengan jayanya, malah pelajar berminat untuk meneruskan aktiviti keusahawanan selepas tamat pengajian seiring dengan kehendak Negara. Namun terdapat sembilan lagi kompetensi keusahawanan yang harus dinilai untuk melihat dapatan tahap kompetensi pelajar secara keseluruhan. Aktiviti keusahawanan yang telah disediakan oleh Politeknik Nilai haruslah dikekalkan agar momentum tahap kompetensi pelajar sentiasa pada aras yang tinggi. Penerapan budaya keusahawanan telah memberikan sumbangan besar kepada pelajar. Sama ada di universiti mahupun di politeknik peningkatan kesedaran pelajar akan bidang keusahawanan ini mampu membantu mereka mencari pendapatan selepas tamat pengajian.

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4Ps MARKETING MIX AND ARIANI'S CUSTOMERS PURCHASE DECISION

F.S. Salmi Nordin1,a, N.F. Ismail2,b and M.A. Abd. Wahab3,c

1Politeknik Nilai, Negeri Sembilan, Malaysia

2Politeknik Sultan Haji Ahmad Shah, Pahang, Malaysia

3Jabatan Pendidikan Politeknik & Kolej Komuniti, Putrajaya, Malaysia

asyahira@polinilai.edu.my , bnorfauziah@polisas.edu.my , casnawi@moe.gov.my

Keywords: 4Ps marketing mix; customer; purchase decision.

Abstract: Marketing mix is one of the main variables that often become the reason consumers in making decisions of a product or service. Therefore, the aim of this study is to investigate the relationship between 4Ps marketing mix and customer's purchase decision of ARIANI Kuantan Branch. Total respondents in this study are only 120 customers by employed convenience sampling method in the process of data collection. Data analysis carried out by using software SPSS version 22 in order to examine the data which included reliability test, descriptive analysis, and correlation analysis. The results of hypotheses testing show that all hypotheses are supported.

Introduction

The word "hijab" (ﺏﺎﺠﺣ) derived from the Arabic word "hajib" meaning hide from view or conceal or cover [1,2]. The English words "scarf" and "headscarf" and the Arabic term "hijab" have been used interchangeably for clothing worn by Muslim women worldwide [3]. Hijab considered as important in Muslim culture; apparently distinguishes between Muslim women and non-Muslim women, also visibly shows women's religious and gender identity. Hijab varies in style, design and practice from one country to another depending on the custom and culture of the country [4]. The globalization of Islamic countries has changed the way of Muslim women styling their hijab; currently considered as a new trend in fashion industry. Wearing the hijab is not compulsory in Malaysia despite Islam being made the nation's official religion. Muslim women are given the freedom to choose whether they favor to wear the hijab or not [5]. Thus, wearing of the hijab, or "tudung" as it is more generally known in the Malay language, remains an option among Malay-Muslim women [6]. The growth of the hijab fashion industry has given the opportunity to redefine the symbol of Muslim women. The hijab fashion is associated with the increasing number of the hijabistas; Muslim women who dress fashionable and design fashionable clothes, while orienting towards modest dress and behavior [7].

ARIANI is a Malaysia-based premium brand. A prominent brand that has started off with the iconic "awning tuning" and was built on a strong foundation among the headscarf-wearing crowd. Not only that, ARIANI has also been a pioneer in headscarf fashion due to the new trend and customer who seek for new fashion in town. ARIANI is able to provide quality and tailor-made fabrics that are specially designed for hijab manufacturing, as the brand under the largest Malaysian textile

company; Jakel. According to InTrend magazine on the 15 list of hijab brands that have fanatic followers in social media, and even the most influential in the fashion hijab industry, ARIANI is in the fifth place with 291 thousand followers [8]. Furthermore, based on the list made by Hijabista regarding 10 brands of hijab that should be in the wardrobe by every fan of the hijab; ARIANI is number four with 352 thousand followers [9]. Although ARIANI has been in the hijab industry in Malaysia since 2008, it is still not the main brand and has become trending among hijab fans in Malaysia. For these reasons, this study intends to investigate the relationship between variables of 4Ps marketing mix; product, price, promotion and place, and purchasing decision in the hijab industry; specifically among ARIANI customers in the Kuantan Branch. In this analysis, the hypotheses are also tested to determine significant relationships between the dependent and independent variables.

Literature Review

4Ps Marketing Mix. The concept of the marketing mix of 4Ps of price, product, promotion and place were introduced by Niel. H. Borden in 1964; marketing mix is an important element in helping marketers to formulate effective marketing strategies. Marketing mix as a set of tactical marketing tools of product, price, place, and promotion which the firm mix together to produce the response they want in their target market as well as one of the main variables that often become the reason for consumers in making decisions of a product or service [10]. Previous results of relevant study had explained there is a significant positive influence of marketing mix towards consumer decisions [11,12,13].

Price. In previous study indicates price is the only factor that produces revenue and gives a clear signal of product success and failure [14]. Price and quality influence consumer buying decisions [15,16]. In addition, price is directly affecting the consumer's purchase amongst the variables, which has a significant and strongly positive influence on purchasing a product or hiring a service [17,18]. H1: There is a significant relationship between price and purchase decision.

Product. The brand image has a positive and significantly influences the purchase decision of consumers as further revealed that a majority of the consumers prefer to purchase branded products as a brand represents a symbol of quality, confers status and confidence [19]. Another suggestion that brand image has a positive and significant influence on customers purchase behavior [20]. Product value is positively correlated to purchase behavior [21]. It can be concludes that price and product significantly and positively influence customer decision-making [22].
H2: There is a significant relationship between product and purchase decision.

Place. Place is for the producer to channel their products to consumers. Consumers will not have access to the products without place [23]. Location was found can be a consumer consideration in making purchasing decisions [24,25]. Furthermore, price and place are the most influential marketing mix that has significant relationship with consumer intentions to purchase [26].
H3: There is a significant relationship between place and purchase decision.

Promotion. A part of that, consumers buying behavior and sales promotion can be motivated through various kinds of elements, including promotion techniques such as free samples, price discounts, social surroundings and physical surroundings [27]. Prior literature has revealed that

social media marketing plays an important role in forming consumers' purchase decisions [28,29] Sales promotion has a significant positive effect on purchase decision as supported by [25].
H4: There is a significant relationship between promotion and purchase decision.

Methodology

Research Design. This study was quantitative in nature as it generates quantifiable data in order to achieve the research objectives and to test the hypotheses of a study [30]. Descriptive survey design has been adopted as a high degree of representativeness and obtaining the participants' opinions [31]. The population of this survey is all individual consumers of the ARIANI Kuantan Branch; those who ever purchased and consumed the ARIANI product at ARIANI Kuantan Branch's within time period; Mei till July 2018. Total respondents in this study are only 120 customers by employed convenience sampling method; perhaps the best way of data collection rapidly and efficiently [32]. The respondents (self-administered) participated in this study on a voluntary basis.

Data Collection. The researchers adopted the survey instrument using a structured questionnaire, were distributed both by hand and via an online survey as the primary data collection; which containing a URL which allowed them to access the survey more easily. The survey was conducted by distributed questionnaires mainly at ARIANI Kuantan Branch, also in private offices and government offices. Software IBM SPSS Statistics V22 used to analyzed the data.

Research Instrument. The questionnaire was developed based on the research objective and numerous previous studies, then modified to fit the present study regarding the 4Ps marketing mix and customers purchase decisions of ARIANI's products. A five-point Likert scale was used as it works well to gauge consumers' responses based on their degree of agreement with a particular statement [33]. The scales ranged from strongly disagree to strongly agree.

Finding

Reliability analysis was conducted to ensure the consistency and stability of the items by using Cronbach's alpha values [34]. The items used in this study are as recommended by [35]; price (C.alpha= 0.666, N=4), product (C.alpha= 0.846, N=4), place (C.alpha= 0.823, N=4), promotion (C.alpha= 0.902, N=4), purchase decision (C.alpha= 0.925, N=4) and for the total items (C.alpha= 0.887, N=20).

Form the demographics profile of the respondents; three questions were developed to determine monthly income, age, and highest education level, as summarizes below;

Table 1. Demographic Profile of Respondents

Demographic Item		Frequency	Percentage
Monthly Income	Below RM3000	27	22.5%
	RM3001 – RM6500	60	50%
	Above RM6501	33	27.5%
Age Group	Below 25	11	9.2%
	26 - 35	33	27.5%
	36 - 45	53	44.2%
	46 - 55	18	15%
	Above 56	5	4.1%
Highest Education	SPM, STPM & Diploma	39	32.5%
	Degree	42	35%
	Master	34	28.4%
	Ph.D	5	4.1%

Respondents were also asked to select one out of five mediums of purchase to determine the most favored medium in purchasing ARIANI's products among customers in the Kuantan Branch;

Table 2. Medium of Purchase

Medium of Purchase	Frequency	Percentage
At boutique	99	83%
Via ARIANI's website	4	3%
Via social media; Facebook and Instagram	9	8%
Personal shoppers	2	1%
Friends and family	6	5%
Total	**120**	**100%**

Table 2 shows a majority of ARIANI's customers at 99 respondents (83%) were preferred to purchase ARIANI's product at a boutique. This is consistent with the claims that women customers in general spend a longer time shopping and prefer to purchase the products at a shop or store for a greater sense of satisfaction and stronger feeling of enjoyment instead of online purchase [36,37].

Pearson correlation analysis is used to answer the objective of this study, which is to investigate the relationship between 4Ps marketing mix and purchase decision of ARIANI's customer in Kuantan Branch.

Table 3. Pearson Correlation between 4Ps Marketing Mix and Purchase Decision

Variable		Purchase Decision
Price	*Pearson Correlation*	0.553**
	Sig(2-tailed)	0.000
Product	*Pearson Correlation*	0.560**
	Sig(2-tailed)	0.000
Place	*Pearson Correlation*	0.258**
	Sig(2-tailed)	0.004
Promotion	*Pearson Correlation*	0.398**
	Sig(2-tailed)	0.000

**Correlation is significant at the 0.01 level (2-tailed).

The Table 3 clearly show moderate positive and significant relationships between the two variables of marketing mix and ARIANI's customers' purchase decision; price (r=0.553, p=0.000, n=120), product (r=0.560, p=0.000, n=120). Nevertheless, little positive and significant relationship were found between place (0.258, p=0.004, n=120), and promotion (0.398, p=0.000, n=120) with purchase decision. The result of this research are consistent with [38], found that product has the most significant relationship with customer purchase decision. The results of hypotheses testing show that all hypotheses are supported.

Conclusion

It cannot be denied that the marketing mix is one of factors influence the purchasing decisions of ARIANI's consumers, since the 4Ps marketing mix; price, product, place and promotion were found statistical positively and significantly related with purchase decision. Therefore, 4Ps marketing mix is incorporated into a modern marketing system and is also a set of marketing tools used by companies to achieve marketing objectives [11,39]. For future research, suggested should be undertaken on other several dimensions that influence customer purchase decision. For example, brand image, the motivation factor, personal factor, social factors and psychological factors.

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Keberkesanan Program Rehab Dalam Meningkatkan Prestasi Pembelajaran Bagi Kursus Matematik Kejuruteraan Dan Sains Kejuruteraan

Zahril Harun1, a, Syafarizan Nasroddin2,b and Nur Hafezah Md Yasin3,c

1,2,3 Politeknik Port Dickson, Port Dickson, Malaysia

azahril@polipd.edu.my, bsyafarizan@polipd.edu.my, c afisza@polipd.edu.my

Keywords: Keberkesanan; Program Rehab; Mengulang Kursus; Prestasi Pembelajaran

Abstrak: Kajian ini bertujuan untuk melihat keberkesanan Program Rehab dalam meningkatkan prestasi pembelajaran bagi Kursus Matematik Kejuruteraan dan Sains Kejuruteraan di Jabatan Matematik, Sains dan Komputer di Politeknik Port Dickson. Terdapat dua objektif dalam kajian ini iaitu membantu dan mengenalpasti pelajar yang lemah di dalam kursus matematik dan sains dan meningkatkan motivasi pelajar dalam menguasai kursus tersebut. Ujian pra menggunakan Kaedah Kuantitatif dijalankan untuk menilai pencapaian setiap pelajar sebelum Program Rehab dijalankan. Manakala ujian pasca pula dijalankan untuk menilai perbezaan pencapaian pelajar selepas bimbingan latihan dan motivasi diberikan. Pengumpulan data kajian dibuat melalui ujian pra dan pasca serta edaran borang soal selidik kepada kesemua 25 orang responden yang terdiri daripada pelajar yang mengulang kursus kali kedua bagi kursus DBM1013, DBS1012 dan DBM2013. Hasil kajian bagi dapatan objektif yang pertama menunjukkan terdapat perbezaan peratus bagi kursus DBM1013 iaitu sebanyak 40.5%, DBS1012 sebanyak 36% dan DBM2013 sebanyak 19.92%. Manakala dapatan bagi objektif kedua, mendapati seramai 24 responden (96%) bersetuju dengan pelaksanaan Program Rehab. Secara keseluruhannya, dapatan kajian menunjukkan keberkesanan pelaksanaan Program Rehab terhadap pelajar yang mengulang kursus kali kedua.

Pengenalan

Pelajar merupakan generasi negara di masa hadapan. Golongan ini pemangkin kepada pembangunan ekonomi negara. Perkembangan pesat dalam bidang sains dan teknologi memberi cabaran kepada pelajar untuk sentiasa berusaha menambah ilmu supaya tidak tercicir dalam arus perubahannya. Kementerian Pendidikan menerusi Pelan Pembangunan Pendidikan Malaysia (PPPM) bagi tempoh 2013 antara 2025 merancang pelbagai strategi bagi mengukuhkan mata pelajaran sains, teknologi, kejuruteraan dan matematik (STEM) menerusi pendekatan baharu seperti memantapkan kurikulum dan menggabungkan kemahiran berfikir aras tinggi. Pihak kerajaan dan swasta telah menyediakan pelbagai tabung pinjaman kewangan kepada pelajar yang berminat supaya dapat melanjutkan pelajaran kearah yang lebih tinggi. Kerajaan telah membelanjakan hampir RM5000 setahun ada dinyatakan dalam Buku Panduan Pendaftaran Politeknik[1] dan Jadual Kutipan Yuran Pelajar Baharu[2] manakala perbelanjaan tanggungan sendiri sebanyak RM3690 untuk setiap pelajar sepanjang pengajian mereka, Buku Panduan Pendaftaran Politeknik[3]. Ini merupakan satu pengaliran wang yang besar. Dalam pembentangan bajet 2017 menyatakan bagi melahirkan tenaga kerja tempatan untuk memenuhi keperluan industri, kerajaan akan memperuntukkan 4.6 bilion ringgit kepada institusi-institusi TVET.

Jabatan Matematik, Sains dan Komputer (JMSK) merupakan jabatan sokongan yang memberikan pengetahuan dalam bidang matematik, sains dan komputer kepada pelajar jurusan kejuruteraan. Terdapat 4 jabatan induk di Politeknik Port Dickson iaitu Jabatan Kejuruteraan Awam, Jabatan Kejuruteraan Elektrik, Jabatan Kejuruteraan Mekanikal dan Jabatan Perdangangan yang mana jumlah keseluruhan pelajar adalah seramai 5011 (Statistik Sesi Jun 2016) dan seramai 4450 pelajar (Statistik Sesi Disember 2016). Bilangan pelajar ini merupakan pelajar yang aktif di kampus dan tidak termasuk pelajar yang sedang menjalani latihan Industri atau penangguhan. Terdapat 5 kursus matematik yang dipertanggungjawabkan kepada JMSK iaitu Matematik Kejuruteraan 1 (DBM1013), Matematik Asas (DBM1032), Matematik Kejuruteraan 2 (DBM2013), Matematik Kejuruteraan 3 Mekanikal (DBM3013) dan Matematik Kejuruteraan 3 Elektrik (DBM3023) dan Sains Kejuruteraan (DBS1012). Statistik Peperiksaan Akhir menunjukkan seramai 268 (Sesi Jun 2016) dan 261 (Sesi Dis 2015) pelajar telah gagal untuk semua kursus matematik dan sains yang ditawarkan. Kurangnya minat murid terhadap mata pelajaran matematik berpunca daripada sikap mereka yang beranggapan matematik adalah mata pelajaran yang susah[4]. Terdapat pelajar yang mengatakan bahawa matematik merupakan matapelajaran yang susah dan membosankan[5]. Pelajar yang tidak dapat membuat perkaitan di antara matematik dan sains untuk aplikasi kejuruteraan akan menghadapi masalah dalam penyelesaian masalah kerana ia menjadi objektif asas dalam pengajaran matematik dan sains. Kesukaran pensyarah dalam mengesan pelajar yang lemah disebabkan bilangan pelajar yang terlalu ramai serta kurang daya tumpuan dari pensyarah menyebabkan pelajar kurang motivasi diri dalam meningkatkan pelajaran. Terdapat hubungan yang signifikan dan positif antara sikap dan motivasi pelajar dengan kemahiran abad ke-21[6].

Oleh itu bagi mengelakkan peratusan pelajar gagal berhenti meningkat di mana merugikan masa, usaha dan perbelanjaan, satu program perlu difikirkan bagi membantu pelajar meningkatkan motivasi dalam menguasai kursus matematik dan sains. Sebuah program yang berbentuk pengajaran dengan menerapkan budaya motivasi penting dalam meningkatkan mutu pembelajaran pelajar[7]. Tinjauan telah dibuat menerusi data pelajar yang mengulang kali kedua dan gagal berhenti mengikut kursus (Jadual 1). Faktor utama yang menyebabkan pelajar gagal berhenti disebabkan mengulang kursus (maksimum 3 kali), gagal 4 atau lebih kursus teras, mendapat himpunan nilai mata (HPNM) kurang daripada 1.6 dan purata nilai mata (PNM) kurang daripada 1.0, Buku Arahan-Arahan Peperiksaan[8].

Jadual 1. Bilangan pelajar yang mengulang kali kedua dan gagal berhenti mengikut sesi

Kursus	Dis 2015 C2	Dis 2015 GB	Jun 2016 C2	Jun 2016 GB	Dis 2016 C2
DBM1013	10	18	11	20	15
DBM1032	1	1	20	1	
DBM2013	13	12		9	13
DBM3013		1			1
DBM3023					
DBS1012			6	17	
Jumlah	24	32	37	47	29

Pengisian program berbentuk slot motivasi akan menerangkan mengenai kepentingan penguasaan matematik dan sains di dalam bidang kejuruteraan dimana merupakan pra syarat kepada semua jurusan di institusi pengajian tinggi. Motivasi diri merupakan usaha dan daya

ketahanan seseorang untuk mencapai matlamat hidup, kebolehan seseorang membina dorongan pencapaian yang tinggi, komitmen terhadap tugas, berinisiatif, optimistik dan berminat terhadap apa yang dilakukannya[9]. Slot pembelajaran berkumpulan juga dilaksanakan bagi membincangkan penyelesaian soalan matematik atau sains disamping memperbaiki tugasan dan tutorial dalam penilaian berterusan. Pembelajaran berkumpulan boleh mewujudkan rasa tanggungjawab terhadap peranan ahli kumpulan dalam mencapai matlamat pembelajaran[10]. Pembelajaran berkumpulan juga merupakan salah satu elemen yang diterapkan di dalam perlaksanaan Outcome Based Education (OBE)[11]. Pensyarah lebih bertindak sebagai fasilitator dalam mengendalikan pengajaran di dalam kumpulan kecil.

Pernyataan Masalah

a.Kesukaran pensyarah dalam mengesan pelajar yang lemah disebabkan bilangan pelajar yang terlalu ramai.
b.Kurang tumpuan dari pensyarah menyebabkan pelajar kurang motivasi dalam meningkatkan Pelajaran.

Objektif Kajian

a.Membantu dalam meningkatkan prestasi pelajar yang lemah di dalam kursus matematik dan sains.
b.Meningkatkan motivasi pelajar dalam menguasai kursus matematik dan sains.

Metodologi

Kajian ini melibatkan 25 orang pelajar yang mengulang kali kedua bagi kursus DBM1013, DBM2013 dan DBS1012. Ujian pra diberikan kepada responden untuk menguji sejauh mana kefahaman dan penguasaan mereka terhadap topik yang telah dipelajari selama 14 minggu sebelum program ini dijalankan. Item ujian pra merangkumi semua topik yang ada dalam kursus Matematik 1 dan Matematik 2 serta sebahagian topik Sains Kejuruteraan. Setelah diperiksa, kertas jawapan tidak dipulangkan dan tidak dibincangkan jawapannya. Selepas 2 hari program dijalankan, ujian pasca yang menggunakan set soalan yang sama dengan ujian pra dijalankan. Satu ujian pasca sahaja tidak mencukupi untuk menguji keberkesanan program yang dijalankan, oleh itu kefahaman dan pemilihan topik yang dijawab di dalam ujian pra-pasca dianalisis. Tiga orang pensyarah dipilih secara rawak untuk ditemubual bagi mendapatkan data kualitatif yang dijangka dapat memberikan maklumat mengenai pemilihan topik yang dijawab dan tidak dijawab (Jadual 4). Keputusan peperiksaan akhir dengan penilaian berterusan juga dianalisi untuk mengukur keberkesanan program. Manakala peningkatan motivasi pelajar dianalisis menggunakan kaedah soal selidik. Item soal selidik dibahagi kepada 3 iaitu penilaian penceramah, perlaksanaan program dan keberkesanan program terhadap pelajar. Kajian ini dijalankan menggunakan pendekatan kaedah kajian gabungan (mixed method approach) iaitu secara kuantitatif (tinjauan) diikuti kaedah kualitatif (kaedah temubual).

Keputusan dan perbincangan

Berdasarkan pemerhatian selepas kajian dijalankan terhadap responden didapati, pelajar

lebih berkeyakinan untuk menjawab topik yang sebelum ini agak sukar difahami, pelajar berupaya membaiki dan membetulkan kesilapan yang telah dilakukan dalam tugasan dan tutorial yang telah dibuat sebelum ini, dengan bimbingan pensyarah dan suasana pembelajaran dalam kumpulan kecil sangat memberangsangkan dimana pelajar berinteraksi secara aktif semasa diskusi dijalankan.

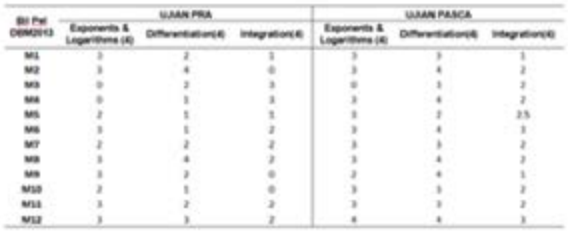
Jadual 2 menunjukkan purata peratus markah ujian pasca lebih tinggi berbanding ujian pra untuk kursus DBM1013, DBM2013 dan DBS1012. Hasil kajian menunjukkan skor min ujian pra bagi DBM2013 ialah 48.58% manakala ujian pasca 68.50%. Kursus ini mengalami peningkatan sebanyak 19.92%. Bagi kursus DBM1013, skor min ujian pra ialah 25% manakala ujian pasca 65.5% yang juga mengalami peningkatan sebanyak 40.5%. Bagi kursus DBS1012 pula, skor min ujian pra ialah 45.8% manakala ujian pasca 81.8%. Kursus ini juga meningkat sebanyak 36%. Ini adalah selaras dengan penyelidik-penyelidik lain yang melakukan kajian dengan kaedah eksperimen[12] dan [13] dimana hasil dapatan kajian mereka juga menunjukkan peningkatan skor setelah rawatan diberikan ke atas kumpulan sasaran.

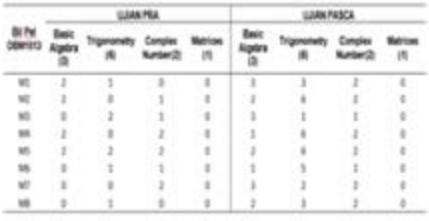
Jadual 2. Perbandingan Min Skor Ujian Pra dan ujian Pasca

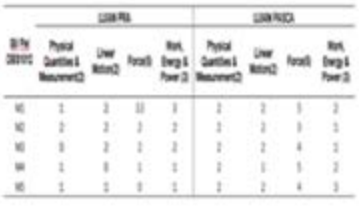
Sampel		Bil	Min Skor (%)	Peningkatan
DBM2013	Ujian Pra	12	48.58	19.92
	Ujian Pasca	12	68.50	
DBM1013	Ujian Pra	8	25.00	40.50
	Ujian Pasca	8	65.50	
DBS1012	Ujian Pra	5	45.80	36.00
	Ujian Pasca	5	81.80	

Jadual 3 menunjukkan markah yang diperolehi bagi topik yang diuji dalam ujian pra-pasca untuk tiga kursus yang dijalankan. Bagi DBM2013 didapati topik exponents & logarithms tidak mengalami banyak peningkatan dan ini berbeza dengan topik differentiation dan integration. “tempoh belajar exponents & logarithms terlalu singkat menyebabkan pelajar tidak boleh memahami konsep dengan baik. Sukar mengukuhkan konsep jika pelajar tidak faham asas. Integration adalah proses berbalik dari differentiation. Jika pelajar mahir differentiation maka dia akan kuasai integration… ”[P1]. Bagi DBM1013 didapati pelajar langsung tidak menjawab topik matrices.“jalan kerja serta langkah penyelesaian yang panjang dan banyak perlu diingati dan difahami, disamping tiada formula dibekalkan …”[P2]. Analisis DBS1012 pula menunjukkan topik linear motion tidak banyak perubahan markah.“Pelajar sukar memahami kehendak soalan serta tidak berupaya mentafsirkannya, terutama soalan berbentuk graf”[P3]

Jadual 3. Markah bagi setiap topik dalam Ujian Pra dan Ujian Pasca



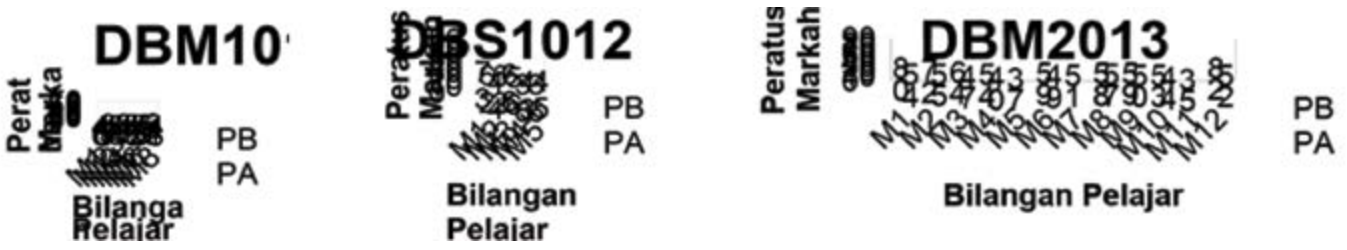




Latar Belakang	Pensyarah 1	Pensyarah 2	Pensyarah 3
Jantina	Perempuan	Perempuan	Perempuan
Umur	36 tahun	38 tahun	32 tahun
Tempoh Perkhidmatan	11 tahun	10 tahun	8 tahun
Kelulusan Akademik	Ijazah	Ijazah	Ijazah

Jadual 4. Latar belakang pensyarah

Rajah 1 menunjukkan peratus markah pelajar dalam peperiksaan akhir (Sesi Jun 2017) dan markah penilaian berterusan, yang secara keseluruhannya peratus markah bagi penilaian berterusan lebih tinggi berbanding markah peperiksaan akhir. Dengan memberi latihan kepada pelajar serta menolong memperbaiki markah tugasan dan tutorial agar mencapai nilai minimum, memberi impak yang positif kepada pelajar. Seramai 22 orang pelajar (88%) yang telah menghadiri Program Rehab lulus sepenuhnya bagi kursus yang mereka ikuti manakala selebihnya gagal berhenti. Kegagalan 3 orang pelajar disebabkan sikap mereka yang tidak menghantar tugasan walaupun diarahkan, kehadiran kuliah kurang 80% dan tidak hadir semasa peperiksaan akhir.



Rajah 1. Peratus Markah Peperiksaan Akhir dan Penilaian Berterusan

Jadual 5 menunjukkan data analisis keberkesanan program dimana peratus skor tertinggi adalah penilaian pelaksanaan kursus iaitu 96% yang terdiri dari item suasana tempat program yang kondusif, perancangan dan pelaksanaan yang dibuat lancar dan masa untuk setiap sesi. Elemen yang kedua tinggi adalah penilaian keberkesanan program terhadap peserta iaitu sebanyak 92% yang merangkumi item peningkatan motivasi diri, arah tuju dan matlamat dinyatakan lebih jelas dan program yang bermanfaat. Manakala penilaian penceramah mendapat 91% yang meliputi item pengisian program sesuai, penyampaian yang baik dan berkesan dan penggunaan alat bantuan yang berkesan.

Jadual 5. Analisis Keberkesanan Program Rehab

Bil	Elemen	Peratus Skor
1	Penilaian penceramah	91
2	Penilaian Pelaksanaan Kursus	96
3	Penilaian Keberkesanan Program Terhadap Peserta	92

Kesimpulan

Hasil dari penyelidikan yang dijalankan, pengkaji mendapati terdapat perubahan yang positif dari segi pembelajaran pelajar. Secara keseluruhannya, kajian ini telah mencapai keseluruhan objektif yang disasarkan iaitu membantu meningkatkan prestasi pembelajaran pelajar serta meningkatkan motivasi pelajar kerana pelajar berada di dalam kumpulan kecil dan mendapat perhatian secara khusus daripada pensyarah. Komitmen tinggi daripada pensyarah dan pelajar amat diperlukan dalam menjayakan program ini. Dengan adanya Program Rehab ini, ia berupaya mengurangkan peratus pelajar dari gagal berhenti dan seterusnya dapat mengurangkan kerugian kos pengajian. Berikutan kajian yang telah dilaksanakan, sewajarnya program ini diteruskan dengan membuat beberapa penambahbaikan kepada isi kandungan program. Ia juga sesuai digunapakai oleh institusi pendidikan lain dalam meningkatkan pencapaian pelajar di peringkat mereka.

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PROPOSED DESIGN AND DEVELOPMENT OF MOBILE LEARNING ENVIRONMENT FOR HIGHER EDUCATION 4.0

A.F. Rosmani[1,2,a], A. Abdul Mutalib[1,b] and S.M. Sarif[1,c]

[1]School of Multimedia Technology and Communication, Universiti Utara Malaysia, Sintok, Malaysia

[2]Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA, Arau, Malaysia

[a]arifah840@perlis.uitm.edu.my, [b]am.ariffin@uum.edu.my, [c]ctmahfuzah@uum.edu.my

Keywords: Mobile learning; Mobile application; Industrial Revolution 4.0; Higher Education 4.0.

Abstract. Malaysia is among the countries that carry out many innovative efforts to deal with Industrial Revolution 4.0 (IR4.0) at all levels of its training system and throughout the entire life cycle of its citizen especially in the academic fields as it is venturing into Higher Education 4.0. Therefore, mobile learning is an excellent initiative as Malaysia is shifting towards IR4.0 and the attention is on cyber-physical systems, that will benefit many parties, especially digital users, who enjoy more interactive and personalized experience through SMAC (social, mobile, analytics and cloud) technologies. Thus, merging mobile learning into everyday teaching and learning in IR4.0 era needs an efficient design of a mobile learning environment. This is to ensure all critical elements are comprised to produce effective interactions between students and mobile learning environment. For this study, Alessi and Trollip's Instructional Design Model (IDM) will be adapted, and three phases will be involved which are planning, design and development. This is to ensure that the proposed mobile app will be more practical, engaging and meaningful from the users' perspective so that it may lead to the achievement of this study. Furthermore, this study eventually will benefit society towards dueling into the IR4.0 educational era that is inclining towards knowledge, industry, and humanity, besides enhancing student outcomes which are the NKRA in the education area.

Introduction

Mobile learning plays a vital role in promoting student learning [1]–[4], it offers the opportunity to explore the real-world scientific phenomenon directly. Therefore, in merging mobile learning into everyday teaching and learning, there is a need for a design that could frame the discussions and the implementations. This is to ensure all critical elements are comprised to produce effective interactions between students and mobile learning environment. Malaysia is among the countries that carry out many innovative efforts to deal with Industrial Revolution 4.0 (IR4.0) at all levels of its training system and throughout the entire life cycle of its citizen especially in the academic fields as it is venturing into Higher Education 4.0 [5].

The IR4.0 has elevated the means for the current trend of automation and data exchange

in manufacturing technologies. It includes cyber-physical systems, the Internet of things, cloud computing and cognitive computing [6]. Massive Open Online Course (MOOC) is highlighted in this vast education as it offers flexibility, luxury and an effective way of learning for generation Y. MOOC is accessible via mobile phones, desktop computers, and laptops. Therefore, mobile learning is an excellent initiative as Malaysia is shifting towards IR4.0 and the attention is on cyber-physical systems, that will benefit many parties, especially digital users, who enjoy more interactive and personalized experience through SMAC (social, mobi**le**, analytics and cloud) technologies [7] and embrace the MOHE's vision for Higher Education 4.0. Following this, a new mobile learning environment is very crucial in ensuring the success of mobile learning in the IR4.0 era.

To adapt with mobile learning, the use of multimedia elements could elevate the usage and interest of users in using the applications for various reasons, and multimedia learning has become the primary learning method for formal and informal education. It is definite that better user experience concerning mobile devices is crucial to adapt to the rapid increase in mobile technology. The mobile learning design is essential to guarantee longevity and engagement and emphasizing the interactivity and positive learning experience of users in using mobile apps.

Methodology

Alessi and Trollip Instructional Design Model will govern the design and development phase in this study (see Fig. 1). The model envelopes three attributes and three phases encompassing issues to be addressed and actions to be taken, whereas, the attributes are standard, ongoing evaluation and project management.

Whereby, the three phases that will be involved are planning, design and development. It serves as a guideline in designing and developing the mobile application in this research. This model is elected because it is boasted to be flexible, and could be fashioned according to needs, working style, philosophy and environment [8]. Furthermore, this study eventually will benefit society towards dueling into the IR4.0 educational era that is inclining towards knowledge, industry, and humanity, besides enhancing student outcomes which are the NKRA in the education area.



Fig.1. Alessi and Trollip Instructional Design Model [8]

Planning

The first phase in developing the app is the planning phase. This phase consists of five main activities, namely: (a) define scope, (b) recognize learners' characteristics, and (c) determine and collect resources.

(a) Define the scope of the content

As to define the scope of the content, the researcher has carried out interviews with former lecturers from public universities who are the experts in the context chosen. According to the experts, knowledge, and awareness about the context's meaning, benefit and application in daily life is still infancy. Furthermore, the increasing social problems, games and video addictions are terrorizing the life of our new generations who are the prospects of future leaders; hence the embodiments of this context in this new generation are vital. The content of the mobile application will be based on established articles and sources. Content experts will be consulted upon the design and development of the mobile content to avoid any mistakes.

(b) Identify learner characteristics

The target audience of the mobile learning application is adolescents from the age of 18-24 years old who more likely would be university students ranging from diploma to degree students. This is to instill knowledge and awareness of this context in daily life for them as they will graduate and become the country's leader or at least leader to their own family.

(c) Determine and collect resources

Briefly, there are three kinds of resources needed in the study especially before the development processes which are: (i) content resources, (ii) instructional design resources and (iii) delivery system resources.

(i) Content Resources

The content source refers to information about the topic. The essential source of reference will be based mainly on the interview with content experts and together with other relevant materials such as printed and online materials. All the materials will be collected from a reliable and trusted party, such as articles as well as consultation from the experts.

(ii) Instructional Design Resources

The other essential reference is for the design and instruction and the learning materials are books titled: (i) Multimedia for Learning: Methods and Development [8] to ensure in the instructional design method, Multimedia Learning by [9], [10] to certify that the app is presented with the correct multimedia design principles especially signaling and cueing principle, and (iii) Nielsen's Design Guidelines for College Students by [11] to ensure the explicit guides have been adopted for the target user which is the adolescents.

(iii) Delivery System Resources

This includes tutorials and textbooks on the software that will be utilized in the development process of the mobile application, for example, JAVA programming tutorial and Eclipse user manual. The delivery resources will also include the documentation of the prototype, as well as the support manual of the software and hardware.

Design

The second phase in the development of the multimedia app is the design phase, in this phase, the idea is translated into the initial draft form. The activities involved in this phase are (i) develop content ideas, (ii) design flowchart (iii) create storyboards and (iv) prepare prototype.

(i) Development of content ideas

It is to develop ideas for content that generate concepts and learning approaches. For this study, brainstorming of content and learning approaches will be carried out with subject matter experts in the planning phase.

(ii) Design flowchart

Instead of a flowchart, a navigation map is needed to represent the sequence and flow of the mobile application. The navigation map will outline the program structure and depicts the connection between pages. This is to ensure the smoothness of the navigation and the user-friendliness of the mobile application.

(iii) Create storyboards

Storyboard is a graphic organizer in the form of illustrations or images displayed consecutively to pre-visualizing motion pictures, animations, graphic movements or interactive media sequences. It is the primary step to visualize and organize the ideas before developing the prototype. It is very crucial to determine all the information, principles and design guidelines that should be implemented and integrated. The storyboard will be depicted before the development process begins.

(iv) Prepare prototype

A prototype will be developed as an early intervention to validate the design which hybridizes Signaling principle and Nielsen's design guideline into the learning material. It is a representation of how the program looks and works, and illustrates the look and feel, methodology and metaphor that will be used [8]. Each successive prototype is meant to increase in fidelity (accuracy in the presentation of its products as visualized) until a final product is attained [12]. The development phase begins after all the storyboards and prototype are entirely designed.

Development

There are six steps in the development process altogether, (i) preparing text, (ii) creating graphics, (iii) assembling all the pieces, (iv) conducting an alpha test, (v) revising, and (vi) conducting the beta test.

(i) Prepare text

The text is related to the content of learning, and it is prepared based on interviews with content experts and references. This text will partially appear in the storyboard in the first place to review

the mobile app draft.

(ii) Create graphics

Graphics is one of the most critical multimedia elements in a mobile application. Suitable graphics will be used accordingly with the content. It will be produced using photo or graphics editor such as Adobe Photoshop or Adobe Illustrator.

(iii) Assemble pieces

When all required elements have been created, they will be combined, and for this study, the proposed software is Eclipse.

(iv) Conduct an alpha test

The alpha test is a crucial test involving the design and development team, in alpha test, content and user interface validation occurs at the end. Instructional design experts, user interface experts, and content experts are asked to go through apps and instruments to evaluate content, flow, appearance, function, and aspects of interaction. In this study, the alpha test will be done with a former lecturer with Ph.D. qualification from a public university who is also a motivator. She will participate as a content expert in this alpha test. Regarding the usability of the developed mobile applications, a senior lecturer with Ph.D. qualification will evaluate the usability of the apps. Each of the experts will be answering questionnaires on the content and usability of these applications.

(v) Make revisions

The mobile application will then revise based on recommendations by experts in alpha testing. It is recommended that the assessment makes at this stage as it helps to eliminate weaknesses and stabilize the program.

(vii) Conduct a beta test

After all the revisions have been made, the last step is to run a beta test. Beta testing refers to a final test of end products by target users. It is officially carried out in small groups in a natural setting, with clear procedures on what to do and what to follow. Application verification was conducted to find out how much learning material works to achieve the intended learning outcome. For this study, beta testing will be conducted as a pilot study where university students will be participants as they are the target audience. 30 participants will be involved in this test to ensure proper procedures are performed before the actual study is carried out.

Conclusions

Consequently, as to bridge the gap for mobile learning in the IR4.0 era especially focusing on Higher Education 4.0, a study on the proposed design and development of mobile learning is conducted. Therefore, it is hoped that the accomplishment of this mobile application will achieve the target of incorporating mobile learning into everyday teaching and learning in the IR4.0 era. The Impact of this study is on society, economy, and nation where it will assist in embracing MOHE's vision for Higher Education 4.0, which is to broaden the heutagogy learning style that can provide students with flexibility and generate broader access to high-quality education, and finally, actualizes the country's vision to become one of the hubs for open-education industry in the world.

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Tahap Kefahaman Konsep Pemakaian dan Aurat Pelajar Muslimah di Politeknik Ibrahim Sultan

Hajaratul Adhwa' Binti Ahmad Kuthi, Norhidayah Binti Md Saleh

Jabatan Pengajian Am, Politeknik Ibrahim Sultan

hajaratuladhwa@gmail.com, hidayahhjsaleh@gm

Abstrak : Tuntutan menutup aurat jelas kurang difahami bukan sahaja oleh masyarakat awam tetapi juga masyarakat kampus yang terdiri daripada pensyarah, pelajar, kakitangan serta pekerja sokongan. Objektif kajian ini ialah untuk mengenalpasti tahap kefahaman, amalan dan persepsi pelajar perempuan di Politeknik di Ibrahim Sultan. Seramai 130 orang responden yang terdiri daripada pelajar perempuan semeseter 2 di Jabatan Kejuruteraan Elektrik. Satu set soal selidik digunakan bagi menjawab persoalan kajian. Analisis data dilakukan menggunakan perisian *Statistical Package for Social Science, SPSS 16.0 for Windows* bagi mendapatkan tahap kefahaman, amalan dan persepsi pelajar terhadap konsep pemakaian dan aurat pelajar muslimah. Hasil kajian menunjukkan bahawa pelajar perempuan di Politeknik Johor Bahru mempunyai tahap kefahaman, amalan dan persepsi yang tinggi dalam konsep pemakaian dan penutupan aurat muslimah.

Katakunci : Aurat, Kefahaman, Amalan dan Persepsi

Pendahuluan

"Fesyen"merupakan satu seni yang berkaitan dengan pakaian atau tudung. Fesyen akan berubah mengikut arus dan adat sesuatu kawasan dan masa. Menurut Islam, fesyen termasuklah berkaitan tabarruj, kerana ia bertujuan untuk kecantikan. Islam tidak melarang umatnya mengenakan tudung yang pelbagai bentuk, atau fesyen untuk kelihatan cantik. Sememangnya dalam Islam mementingkan kecantikan (Haya, 2001)

Dengan perkembangan arus kemodenan fesyen, remaja juga tidak terkecuali dalam mengikut trend pemakaian bertudung yang pelbagai bentuk atau cara pemakaian masa kini. Ini adalah disebabkan gaya komersil yang diperagakan oleh personaliti di televisyen seperti Wardina, Waheeda, Bienda, dan ramai lagi sedikit sebanyak ia turut memberi impak yang berkesan kepada para remaja untuk mengikutinya, kebanyakan remaja menjadikan artis atau model sebagai idola mereka (Salina, 1999).

Islam telah menerangkan mengenai hukum serta hikmah pemakaian yang berlandaskan kepada syariat kerana ianya mampu menjaga kehormatan insan. Bertudung adalah bukan sekadar mengikut fesyen semata-mata atau menutupi kepala sahaja tetapi konsep pemakaian

tudung yang sebenar adalah menutupi seluruh anggota badan perempuan dari hujung rambut hingga ke paras dada mereka. Allah S.W.T memerintahkan umat Islam menutup aurat untuk menghindarkan mereka daripada mendapat dosa. (Ahmad Marzuki Mohamad : 2008) Firman Allah S.W.T:

> "Dan Katakanlah kepada perempuan-perempuan Yang beriman supaya menyekat pandangan mereka (daripada memandang Yang haram), dan memelihara kehormatan mereka; dan janganlah mereka memperlihatkan perhiasan tubuh mereka kecuali Yang zahir daripadanya; dan hendaklah mereka menutup belahan leher bajunya dengan tudung kepala mereka; (An Nuur :31)

Pengabaian terhadap penutupan aurat yang sempurna juga berlaku dalam kalangan pelajar di politeknik Mereka hanya mengenakan tudung dan berpakaian sopan semata-mata untuk memenuhi prasyarat dan etika pemakaian yang telah ditetapkan oleh pihak pentadbiran (Emma, 2004). Berbeza pula cara pemakaiannya ketika berada di luar kampus. Fenomena ini menjadi contoh kepada warga kampus yang merasakan mereka juga bebas untuk mendedahkan aurat. Melihat kemelut penerimaan dan pengamalan wanita Islam terhadap pensyariatan menutup aurat, maka penulis merasakan perlu dibuat pengkajian berkaitan kedudukan aurat wanita dari perspektif Islam dengan melihat sejauhmana pemahaman pelajar terhadap konsep pemakaian dan penutupan aurat. Kajian ini menjelaskan sejauhmanakah aurat wanita muslim menurut perspektif Islam.

Objektif Kajian

Objektif kajian dibentuk agar dapat mencapai matlamat kajian. Objektif kajian yang ingin dicapai dalam kajian ini adalah:

1. Mengenal pasti tahap Kefahaman Pelajar Terhadap Tuntutan Menutup Aurat.
2. Mengenal pasti tahap Amalan Pelajar Terhadap Tuntutan Menutup Aurat.
3. Mengenal pasti tahap Persepsi Pelajar Terhadap Tuntutan Menutup Aurat.

Metodologi Kajian

Kajian ini merupakan kajian deskriptif dan menggunakan kaedah tinjauan. Populasi kajian terdiri daripada pelajar perempuan di Politeknik Ibrahim Sultan. Pengkaji menggunakan teknik

persampelan bertujuan (Purposive Sampling) untuk mendapatkan sampel kajian. Sampel kajian terdiri daripada 130 orang pelajar perempuan semester dua (2) mewakili Jabatan Kejuruteraan Elektrik.

Berdasarkan kajian ini, kaedah soal selidik digunakan untuk mengumpul data. Soal selidik mengandungi 4 bahagian iaitu Bahagian A, Bahagian B, Bahagian C dan Bahagian D. Bahagian A bertujuan mengumpul maklumat latar belakang responden iaitu, Umur, Jantina, Bangsa dan Agama.

Bahagian B bagi mengukur Kefahaman Pelajar Terhadap Tuntutan Menutup Aurat. Soal selidik Amalan Pelajar Terhadap Tuntutan Menutup Aurat di ukur dalam bahagian C dan Bahagian D mengukur Persepsi Pelajar Terhadap Tuntutan Menutup Aurat. Jadual dibawah menunjukkan pembahagian bilangan item.

Jadual 1: Spesifikasi Instrument Soal Selidik

Bahagian	Spesifikasi item	Bilangan item
B	Kefahaman Pelajar Terhadap Tuntutan Menutup Aurat	16
C	Amalan Pelajar Terhadap Tuntutan Menutup Aurat	9
D	Persepsi Pelajar Terhadap Tuntutan Menutup Aurat	14
	Jumlah	**39**

Dapatan Kajian

Latar Belakang Responden

Bilangan responden yang terlibat dalam kajian ini ialah 130 orang pelajar yang terdiri daripada pelajar perempuan semester dua (2) yang beragama Islam daripada Jabatan Kejuruteraan Elektrik.

Kefahaman Pelajar Terhadap Tuntutan Menutup Aurat

Objektif kajian ini ialah untuk mengenalpasti tahap kefahaman pelajar terhadap tuntutan menutup aurat. Jadual 2 menunjukkan taburan bilangan, peratusan, sisihan piawai dan min berkaitan kefahaman pelajar.

Jadual 2: Tahap Kefahaman Pelajar Terhadap Tuntutan Menutup Aurat

Tahap	Julat Skor	Frekuensi (f)	Peratus (%)
Tinggi	3.68-5.00	65	50.0
Sederhana	2.34-3.67	64	49.2
Rendah	1.00-2.33	1	8
Jumlah		**130**	**100**

min 2.49 sd 0.517

Secara keseluruhan, dapatan menunjukkan skor min yang diperoleh adalah 2.49. Ini menunjukkan bahawa pelajar mempunyai tahap kefahaman yang tinggi tentang konsep menutup aurat berdasarkan syariat Islam. Hal ini disebabkan oleh begitu meluasnya penyebaran maklumat tentang konsep menutup aurat sama ada menerusi ceramah, media eletronik dan media cetak. Hasil kajian menunjukkan seramai 65 orang pelajar mempunyai tahap tinggi terhadap kefahaman tuntutan menutup aurat. Seramai 64 pelajar pada tahap sederhana dan hanya seorang pelajar pada tahap rendah

Jadual 3: Tahap Kefahaman Amalan Terhadap Tuntutan Menutup Aurat

Tahap	Julat Skor	Frekuensi (f)	Peratus (%)
Tinggi	3.68-5.00	112	86.2
Sederhana	2.34-3.67	18	13.8
Jumlah		**130**	**100**

min 2.86 sd 0.347

Dapatan menunjukkan skor min yang diperoleh adalah 2.86 dan nilai sd adalah 0.347. Ini menunjukkan bahawa seramai 112 pelajar mempunyai tahap amalan yang tinggi tentang konsep menutup aurat berdasarkan syariat Islam. Hal ini disebabkan oleh pelajar telah terdidik dari kecil mengenai amalan menutup aurat oleh ibu bapa.

Jadual 4: Tahap Persepsi Pelajar Terhadap Tuntutan Menutup Aurat

Tahap	Julat Skor	Frekuensi (f)	Peratus (%)
Tinggi	3.68-5.00	115	88.5
Sederhana	2.34-3.67	15	11.5
Jumlah		**130**	**100**
min 2.88	sd 0.321		

Dapatan menunjukkan skor min yang diperoleh adalah 2.88. Ini menunjukkan bahawa pelajar mempunyai tahap persepsi yang tinggi tentang konsep menutup aurat berdasarkan syariat Islam. Hal ini disebabkan oleh begitu meluasnya penyebaran maklumat tentang konsep menutup aurat sama ada menerusi ceramah, media eletronik dan media cetak. Hasil kajian menunjukkan seramai 113 orang pelajar mempunyai tahap tinggi terhadap persepsi tuntutan menutup aurat. Seramai 15 pelajar pada tahap sederhana.

Kesimpulan

Kajian ini mendapati tahap kefahaman, amalan dan persepsi pelajar perempuan di sebuah Politeknik Ibrahim Sultan tentang konsep pemakaian dan menutup aurat berada pada tahap yang tinggi. Dapatan kajian ini selari dengan kajian yang dijalankan oleh Roslinda Sabiran (2007) tentang `Persepsi pelajar darjah khas Sekolah Agama Bandar Penawar terhadap amalan menutup aurat` yang mendapati bahawa apabila seorang individu mengetahui sesuatu hukum dan melaksanakannya, mereka akan mempunyai kefahaman yang tinggi berbanding dengan individu yang hanya mengetahui tetapi tidak mengamalkannya. Pelajar didapati sangat tahu dan faham tentang aurat perempuan dan lelaki yang perlu ditutup dan dipelihara. Menurut Jaafar Salleh (2006) turut menjelaskan bahawa aurat wanita muslimah dengan wanita bukan Islam adalah muka dan tapak tangan sahaja serta mereka juga tidak boleh memperlihatkan anggota yang lain kepada lelaki yang boleh berkahwin dengannya.

Responden kajian ini menyedari bahawa menutup aurat adalah merupakan perintah Allah SWT, dan menutup aurat adalah wajib bagi setiap individu muslim yang telah baligh. Menurut Jaafar Salleh (2006) yang mengatakan bahawa tuntutan menutup aurat bagi setiap individu muslim yang telah baligh adalah wajib diikuti tanpa ragu-ragu kerana ianya merupakan tuntutan agama. Kesedaran pelajar dalam hal ini amat penting agar mereka dapat melaksanakan kewajipan menutup aurat secara tepat sebagaimana yang dituntut oleh syara'. Peraturan atau hukum ini tidak sepatutnya dipandang ringan kerana ia boleh menjejaskan amalan ibadah yang lain. Namun, realiti yang berlaku dalam kalangan terutamanya remaja dan belia memperlihatkan seolah-olah mereka tidak menghiraukan tuntutan ini. Tambahan lagi, terdapat juga yang berpakaian menutup aurat

tetapi tidak sepenuhnya lengkap seperti yang dikehendaki Islam. Bagaimanapun, tidak dinafikan bahawa terdapat ramai juga individu muslim yang sedar akan tuntutan ini dan mengamalkan dengan sebaiknya.

Pelajar juga tahu dan sedar bahawa individu yang membuka aurat adalah berdosa besar kerana tuntutan menutup aurat ini adalah wajib bagi setiap individu muslim. Bagaimanapun, masih berlaku amalan umat Islam yang berpakaian mengikut fesyen terkini yang mengabaikan kaedah sebenar tuntutan menutup aurat. Mereka seolah-olah beranggapan menutup aurat hanya perkara ringan sahaja. Lotfian Zainol Abdin (2004) yang mengatakan kewajipan menutup aurat ini diipikul oleh setiap individu islam yang baligh dan berakal dan apabila tuntutan ini tidak dipenuhi akan mengundang dosa kepada dirinya sendiri. Mahyuddin (1996) juga turut mengatakan tangunggjawab setiap muslim adalah wajib mengikuti perkara asas fardu ain tanpa alasan.

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Kajian Pelaksanaan e-Pembelajaran Melalui CIDOS Dalam Kalangan Pensyarah Jabatan Matematik, Sains dan Komputer di Politeknik Port Dickson

Sharifah Noor Anita Binti Syed Jaafar[1, a] dan Syafarizan Binti Nasroddin[2,b]

[1,2] Politeknik Port Dickson, Port Dickson, Malaysia

[a]sharifah@polipd.edu.my, [b]syafarizan@polipd.edu.my

Keywords: TVET; e-pembelajaran; CIDOS, pensyarah

Abstract. Usaha menjadikan politeknik sebagai peneraju pendidikan TVET di Malaysia memerlukan transformasi dalam pelaksanaan pengajaran dan pembelajaran. Pembelajaran Dalam Talian (e-pembelajaran) Tahap Global telah diangkat sebagai salah satu lonjakan dalam Pelan Pembangunan Pendidikan Malaysia 2015-2025 (Pendidikan Tinggi). Kajian ini dibuat adalah untuk menilai pelaksanaan e-pembelajaran melalui CIDOS dalam kalangan pensyarah politeknik. Objektif utama kajian adalah kefahaman pensyarah tentang e-pembelajaran melalui CIDOS, pelaksanaan e-pembelajaran melalui CIDOS dan faktor yang mempengaruhi pelaksanaan e-pembelajaran melalui CIDOS. Responden yang terlibat adalah 32 pensyarah di Jabatan Matematik, Sains dan Komputer, Politeknik Port Dickson. Metodologi kajian adalah gabungan kaedah kuantitatif dan kualitatif. Data kuantitatif diperolehi dengan menggunakan tinjauan atas talian menggunakan aplikasi Google Form. Enam orang pensyarah dipilih secara rawak untuk ditemubual bagi mendapatkan data kualitatif yang dijangka dapat memberikan maklumat yang lebih mendalam dan menyeluruh terhadap kajian yang dijalankan. Hasil kajian menunjukkan kefahaman pensyarah terhadap konsep e-pembelajaran melalui CIDOS adalah tinggi dengan purata skor min 4.43. Purata skor min untuk pelaksanaan e-pembelajaran melalui CIDOS adalah 3.37 menggambarkan pelaksanaannya masih pada tahap sederhana. Sementara itu arahan pelaksanaan e-pembelajaran melalui CIDOS oleh politeknik adalah faktor utama (skor min tertinggi, 4.50) yang mempengaruhi pelaksanaannya. Disamping itu pensyarah politeknik mempunyai pandangan positif terhadap penggunaan teknologi terkini dalam e-pembelajaran dengan skor min 4.13. Namun begitu, penyediaan peralatan yang sesuai bagi melaksanaan e-pembelajaran di bilik kuliah mendapat skor min paling rendah, 2.66. Hasil temubual pula menunjukkan pensyarah hanya mahir menggunakan fungsi-fungsi asas CIDOS. Walau bagaimanapun, interface CIDOS yang kurang mesra pengguna, sistem yang tidak stabil apabila diakses secara serentak oleh ramai pengguna serta penggunaan medium yang lebih mudah seperti whatsapp dan Facebook adalah cabaran utama e-pembelajaran melalui CIDOS. Disamping itu, kerjasama pelajar sukar diperolehi kerana hanya sebilangan kecil pelajar sahaja yang memuat turun bahan, kebanyakan pelajar tidak mempunyai data internet yang mencukupi dan bergantung kepada WiFi politeknik atau perkongsian hotspot pensyarah untuk aktiviti e-pembelajaran melalui CIDOS. Penambahan fungsi-fungsi untuk pengajaran matematik, wujudkan live video dan langkah penggunaan yang lebih ringkas adalah penambahbaikan yang diperlukan untuk meningkatkan pelaksanaan e-pembelajaran melalui CIDOS.

Pengenalan

Kualiti sistem pendidikan merupakan teras utama dalam membangunkan modal insan yang mampu menghadapi cabaran globalisasi pada masa hadapan. Kementerian Pendidikan Malaysia (KPM) telah memainkan peranan yang sewajarnya dalam memperkasakan dan memantapkan sistem pendidikan negara bagi memastikan Malaysia mampu bergerak dan berperanan seiring dengan perkembangan sistem pendidikan global. Langkah kerajaan dalam mengarusperdanakan Pendidikan Teknik dan Vokasional (TVET) adalah merupakan satu tindakan baharu yang bertujuan meningkatkan imej dan kualiti pendidikan sekaligus mengangkat martabat Malaysia ke arah status world class education [1]. Selaras dengan perubahan lanskap sistem pendidikan dunia, warga TVET perlu menyahut cabaran, berani melakukan perubahan dalam merealisasikan matlamat yang telah disasarkan. Dasar e-pembelajaran Nasional, Kementerian Pengajian Tinggi (KPT) telah diperkenalkan sejak 2011 lagi. Tiga fasa telah dilasanakan dalam tempoh lima tahun berakhir pada tahun 2015. Dasar ini merupakan kerangka dan halatuju e-pembelajaran bagi semua IPT termasuk Politeknik dan Kolej Komuniti. Fasa-fasa dalam Dasar e-pembelajaran Nasional dirancang sedemikian rupa bagi memastikan semua IPT berada dalam landasan betul supaya konsep pembelajaran teradun (blended- kombinasi antara kaedah konvensional dan pembelajaran dalam talian) menjadi satu budaya atau amalan pengajaran dan pembelajaran menjelang tahun 2015[2].

Menghadapi era Revolusi Industri 4.0 (IR 4.0) dirasakan sangat mencabar apabila perubahan yang sangat besar dan drastik berlaku dalam semua bidang secara global. Dalam pembentangan kertas Pelan Pembangunan Pendidikan Malaysia (Pendidikan Tinggi) 2015-2025, sepuluh lonjakan utama telah diketengahkan. Matlamat utama lonjakan dibuat adalah untuk membentuk sistem pendidikan yang holistic, progresif, bermoral dan bertaraf dunia [3]. Lonjakan yang sangat memerlukan kesediaan dan komitmen daripada semua IPT adalah Lonjakan ke-sembilan iaitu mewujudkan pembelajaran dalam talian tahap global. Penerapan inovasi dalam pengajaran dan pembelajaran (PdP) merupakan elemen baru yang perlu diterap dalam sistem pendididikan negara bagi melahirkan graduan yang mempunyai pengetahuan tinggi malah mampu mengaplikasikan pengetahuan dan kemahiran tersebut serta mampu berfikir secara kreatif dan inovasi yang lebih dinamik [4]. E-pembelajaran dapat menggabungjalin produktiviti, kreativiti dan inovasi di samping memastikan pengajaran dan pembelajaran dapat berlangsung dengan lebih berkesan. Konsep Pembelajaran Teradun di Politeknik Malaysia menggunakan pendekatan Flipped Classroom apabila semua pembelajaran teori (konsep) akan dipelajari oleh pelajar secara atas talian dan segala perbincangan pengukuhan berkaitan teori tersebut akan dilakukan secara bersemuka [5]. Menurut Idris Jusoh, Menteri Pendidikan Tinggi, PdP 4.0 perlu melihat konsep pembelajaran tanpa syarahan, penilaian tanpa peperiksaan dan ilmu tanpa sempadan kerana ia dilihat lebih efektif [6]

Di peringkat politeknik, e-pembelajaran dilaksanakan menggunakan Sistem Pengurusan Pembelajaran (LMS) yang dikenali sebagai Curriculum Information Document Online System (CIDOS). Blended Learning merupakan salah satu KPI yang perlu dicapai di setiap jabatan dalam politeknik dengan memastikan sekurang-kurangnya 70 peratus daripada platform pensyarah dalam CIDOS mencapai status blended. Namun pelaksanaan e-pembelajaran di politeknik dilihat masih belum menjadi budaya dan amalan seperti yang disasarkan dalam Dasar e-pembelajaran Nasional. Tahap persepsi pensyarah terhadap konsep e-pembelajaran CIDOS berada pada tahap sederhana[7]. Pelaksanaan e-pembelajaran dalam kalangan pensyarah di politeknik agak rendah

walaupun kefahaman mereka terhadap e-pembelajaran adalah tinggi [8]. Di samping itu, tahap kekerapan penggunaan CIDOS dalam kalangan pensyarah Politeknik Merlimau berada pada tahap rendah [9]. Pensyarah bukan sahaja perlu faham konsep dan kepentingan blended learning malah mempunyai tugas yang lebih berat untuk menjayakannya. Teachers should understand more thoroughly the appropriate pedagogical methods to implement blended learning [10]. Di samping itu, intitusi juga perlu memberikan ruang yang sebaiknya kepada pensyarah dan pelajar dengan menyediakan fasiliti yang diperlukan. Menurut kajian, kemudahan untuk menyediakan sokongan teknologi kepada ahli akademik dan pelajar adalah inisiatif penting kepada e-pembelajaran [11]. Di samping itu, tiada akses kepada internet serta talian akses yang perlahan merupakan cabaran untuk melaksanakan e-pembelajaran [12]. Kesemua aspek pelaksanaan e-pembelajaran perlu diambil kira dalam memastikan pelaksanaan e-pembelajaran berlaku dengan baik. Menurut kajian, sebahagian besar IPT hanya mencapai 0-50% pelan pelaksanaan e-pembelajaran masing-masing [13]. Sehubungan itu, kajian ini dilaksanakan adalah untuk melihat pelaksanaan e-pembelajaran melalui CIDOS di politeknik dengan mengambilkira tiga objektif iaitu kefahaman pensyarah terhadap e-pembelajaran melalui CIDOS, pelaksanaan e-pembelajaran melalui CIDOS dan faktor yang mempengaruhi pelaksanaan e-pembelajaran melalui CIDOS.

Metodologi

Kajian ini dijalankan menggunakan pendekatan kaedah kajian gabungan (mixed method approach) iaitu secara kuantitatif (tinjauan) diikuti kaedah kualitatif (kaedah temubual). Populasi kajian adalah 37 pensyarah di Jabatan Matematik, Sains dan Komputer, Politeknik Port Dickson yang mengajar kursus matematik dan sains. Peringkat pertama, pautan url soal selidik telah dihantar kepada semua pensyarah melalui aplikasi WhatsApp. Instrumen tinjauan yang digunakan diambil daripada instrument yang yang telah dibangunkan oleh pengkaji terdahulu [7] dengan sedikit ubahsuai. Peringkat kedua, enam orang pensyarah daripada kumpulan yang sama dipilih secara rawak untuk ditemubual bagi mendapatkan data kualitatif yang lebih jelas dan mendalam.

Tinjauan secara atas talian dibuat menggunakan aplikasi percuma atas talian Google Form. Sebanyak 32 maklumbalas telah berjaya diperolehi. Bilangan sampel yang diperlukan adalah mencukupi berdasarkan Jadual Penentuan Saiz Sampel Krejcie dan Morgan, 1970. Kaedah pengumpulan data menggunakan aplikasi ini lebih mudah kerana respon yang diberikan oleh responden terus dianalisis menggunakan Google Sheet. Analisis data yang diperlukan adalah frekuensi, peratusan dan min. Respon daripada temubual dianalisis bagi mendapatkan penjelasan yang lebih baik.

Keputusan dan Perbincangan

Jantina	Kekerapan	Peratus (%)
Lelaki	10	31.3
Perempuan	22	68.8

Rajah 1

Umur	Kekerapan	Peratus(%)
31 – 35 Tahun	4	12.5
36 – 40 Tahun	15	46.9
41 – 45 Tahun	8	25
Lebih 46 Tahun	5	15.6

Rajah 2

Tempoh Perkhidmatan	Kekerapan	Peratus(%)
1 – 5 Tahun	0	0
6 – 10 Tahun	6	18.8
7 – 15 Tahun	14	43.8
Lebih 16 Tahun	12	37.5

Rajah 3

68.8% responden adalah perempuan manakala 31.3% lelaki (rujuk Rajah. 1). Manakala hampir separuh responden, 46.9% berumur diantara 36-40 tahun dan 15.6% berumur melebihi 46 tahun (rujuk Rajah 2). Peratus tertinggi, 43.8% responden telah berkhidmat 7-15 tahun dan tiada responden yang berkhidmat kurang daripada 5 tahun (rujuk Rajah 3).

Item	Min Dapatan
E-pembelajaran ada kaitan dengan pembelajran berpusatkan pelajar	4.41
E-pembelajaran merupakan satu keperluan masa kini	4.50
E-pembelajaran bergantung kepada fasiliti internet untuk pelaksanaannya	4.75
E-pembelajaran memberi kefahaman yang baik berbanding kaedah pengajaran secara konvensional (chalk and talk)	3.47
Pengaplikasian e-pembelajaran memerlukan komitmen yang tinggi dari pensyarah dan pelajar	4.59
E-pembelajaran memerlukan kerjasama yang baik daripada pensyarah dan pelajar bagi mendapat hasil pembelajaran yang berkualiti	4.53
E-pembelajaran dapat menghubungkan pelajar dan pensyarah diluar bilik kuliah	4.56
E-pembelajaran merupakan satu teknik pengajaran dan pembelajaran (PdP) yang menggunakan kemudahan internet	4.66
Purata min dapatan	4.43

Rajah 4: Kefahaman e-Pembelajaran

Item	Min Dapatan
Saya melaksanakan e-pembelajaran melalui CIDOS dalam PdP	3.72
Saya melaksanakan e-pembelajaran melalui CIDOS kerana ia mampu meningkatkan keyakinan diri dalam melaksanakan proses PdP	3.44
Saya melaksanakan e-pembelajaran melalui CIDOS sahaja	3.16
Saya melaksanakan e-pembelajaran melalui CIDOS sejak 3 tahun kebelakangan ini	3.63
Saya melaksanakan e-pembelajaran melalui CIDOS sebanyak 3-4 jam seminggu	2.94
Saya melaksanakan e-pembelajaran melalui CIDOS untuk setiap topik dalam kursus yang saya ajar	3.09
Saya melaksanakan e-pembelajaran melalui CIDOS disebabkan faktor pengetahuan dan fasiliti yang sediada	3.50
Saya telah menghasilkan pelbagai aktiviti interaktif dalam e-pembelajaran melalui CIDOS	3.25
Saya melaksanakan e-pembelajaran melalui CIDOS kerana ia dapat menjimatkan kos dan masa	3.61
Purata min dapatan	3.37

Rajah 5: Pelaksanaan e-Pembelajaran

Item	Min Dapatan
Saya suka mencuba sesuatu yang baru terutama berkaitan e-pembelajaran	3.78
Saya mempunyai minat yang tinggi dalam bidang teknologi maklumat dan komunikasi (ICT)	3.72
Saya sentiasa positif terhadap penggunaan teknologi terkini dalam pembelajaran	4.13
Saya mempunyai pengetahuan dan kemahiran untuk melaksanakan e-pembelajaran melalui CIDOS	3.91
Saya suka menggunakan laman sesawang pembelajaran yang sedia ada di internet berbanding CIDOS	3.91
Saya bergantung dengan fasiliti internet yang disediakan oleh politeknik untuk melaksanakan e-pembelajaran	3.88
Saya mempunyai kesedaran yang tinggi tentang kelebihan CIDOS dalam proses PdP	3.59
Saya mempunyai masa yang mencukupi untuk melaksanakan e-pembelajaran melalui CIDOS	3.38
Pihak politeknik ada mengeluarkan arahan pelaksanaan e-pembelajaran melalui CIDOS	4.50
Pihak politeknik banyak menganjurkan kursus berkaitan CIDOS	3.97
Pihak politeknik mempunyai rangkaian internet yang baik	3.44
Pihak politeknik mempunyai rangkaian Wi-fi yang baik untuk diakses	2.88
Pihak politeknik mempunyai peralatan ICT yang mencukupi untuk pelaksanaan e-pembelajaran	3.09
Pihak politeknik ada menyediakan peralatan yang sesuai bagi melaksanaan e-pembelajaran di bilik kuliah	2.66
Purata min dapatan	3.63

Rajah 6: Faktor mempengaruhi Pelaksanaan e-Pembelajaran

Rajah 4 menunjukkan kefahaman responden terhadap e- pembelajaran adalah baik dengan purata min 4.43. Walau bagaimanapun, satu item yang mendapat skor min sederhana iaitu e-pembelajaran memberi kefahaman yang baik berbanding kaedah pengajaran secara konvensional (chalk and talk) dengan skor min 3.47. Daripada aspek pelaksanaan e-pembelajaran melalui CIDOS (rujuk Rajah 5), purata skor min adalah sederhana iaitu 3.37. Item melaksanakan e-pembelajaran melalui CIDOS sebanyak 3-4 jam seminggu memperolehi skor min terendah iaitu 2.94. Sementara itu, faktor yang paling mempengaruhi pelaksanaan e-pembelajaran melalui CIDOS adalah politeknik

ada mengeluarkan arahan melaksanakan e-pembelajaran melalui CIDOS dengan skor min tertinggi, 4.50. Manakala skor min terendah, 2.66 ialah item pihak politeknik ada menyediakan peralatan yang sesuai bagi melaksanaan e-pembelajaran di bilik kuliah.

Daripada temubual pula, kesemua enam responden hanya mahir menggunakan fungsi-fungsi asas yang terdapat dalam CIDOS. Manakala daripada aspek cabaran responden 1, 3, 4 dan 5 menyatakan sistem CIDOS kurang mesra pengguna berbanding aplikasi yang lebih mudah dan ringkas seperti WhatsApp dan Facebook. Di samping itu responden 2 menyatakan bahawa terdapat format video yang tidak boleh dimuat naik ke dalam sistem. Responden 6 pula menyatakan CIDOS kurang sesuai dengan kandungan pengajaran matematik yang memerlukan simbol, equation, jadual dan graf. Responden 1 juga menyatakan sistem CIDOS menjadi kurang stabil apabila diakses serentak oleh ramai pengguna pada satu-satu masa. Di samping itu, cabaran yang dikemukakan responden 1 dan 2 adalah hanya sebahagian kecil pelajar log-in CIDOS dan memuat turun bahan e-pembelajaran manakala selebihnya hanya akan membuat salinan bahan tersebut. Tambahan pula semua responden menyatakan kurang mendapat kerjasama daripada pelajar dan akses Wifi di politeknik kurang baik. Responden 1,2,3,4,5 memaklumkan kebanyakan pelajar bergantung kepada Wi-fi politeknik manakala responden 6 menyatakan kebanyakan pelajar tidak mempunyai data yang mencukupi dan memerlukan perkongsian hotspot daripada pensyarah dalam melaksanakan e-pembelajaran melalui CIDOS. Walau bagaimanapun, responden responden 5 berpendapat CIDOS mempuyai fungsi yang membolehkan pemantauan aktiviti pembelajaran dapat terus dilakukan oleh pensyarah.

Pelaksanaan e-pembelajaran melalui CIDOS di politeknik dilihat masih pada tahap yang kurang memberansangkan apabila kebanyakan pensyarah melaksanakan e-pembelajaran melalui CIDOS kurang daripada 4 jam iaitu 25 % daripada jumlah jam pengajaran dalam seminggu. Di samping itu, pensyarah masih merasakan kaedah konvensional masih relevan dan mampu memberi kefahaman yang baik terutama untuk pembelajaran matematik. Fasiliti internet dalam premis politeknik dan peralatan yang bersesuaian bagi melaksanakan e-pembelajaran dalam bilik kuliah perlu diberi perhatian serius dalam menjayakan matlamat dan aspirasi menjadikan Malaysia hab pembelajaran antarabangsa. Seterusnya pengurusan politeknik juga perlu memberi pertimbangan untuk memperluaskan penggunaan semua medium online lain yang lebih mudah dan tidak terhad dengan CIDOS sahaja sebagai kriteria e-pembelajaran untuk blended learning.

Kesimpulan

Sebagai peneraju institusi TVET, politeknik perlu bekerja dengan lebih efisyen bagi memperkasakan e-pembelajaran. Kerjasama erat di antara pensyarah, pelajar dan institusi sangat diperlukan. Kajian ini menunjukkan pensyarah politeknik faham konsep, kepentingan dan keperluan e-pembelajaran dalam PdP masa kini. Namun kaedah konvensional dirasakan masih relevan terutama dalam pembelajaran matematik. Tahap pelaksanaan e-pembelajaran di politeknik perlu dipertingkatkan selari dengan keperluan pendidikan global masa kini. Pensyarah perlu lebih berinisiatif dan berusaha dalam menjayakan perancangan yang telah ditetapkan oleh kementerian. Politeknik boleh mamainkan peranan dalam memberi pengiktiran dan sokongan yang berterusan bagi meningkatkan dan mengekalkan motivasi pensyarah dalam melaksanakan e-pembelajaran melalui CIDOS. Di samping itu, pihak pengurusan politeknik perlu bersungguh-sungguh menangani

isu-isu yang boleh memperlahankan perkembangan e-pembelajaran melalui CIDOS di politeknik. Kajian lanjut dicadangkan untuk pengkaji akan datang melihat perkaitan status blended learning yang dicapai dengan pelaksanaan sebenar e-learning. Kajian ini diperlukan bagi melihat ruang penambahbaikan dalam memastikan pelaksanaan e-learning berlaku dengan lebih telus.

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KUALITI DAN PENCEMARAN AIR TASIK REKREASI TAMAN BANDAR INDERA MAHKOTA

Nurul Izza Binti Abdul Ghani 1, Norika Karim²

1, Jabatan Kejuruteraan Awam,

²Politeknik Sultan Hj. Ahmad Shah,

Izza.ghani.poli@1govuc.gov.my, norika@polisas.edu.my

Abstrak: Taman Tasik Bandar, adalah sebuah taman bandar yang diwujudkan oleh pihak Majlis Perbandaran Kuantan (MPK) sekaligus tasik tersebut menjadi kawasan tebatan banjir. Kajian mengenai kualiti air di Taman Tasik Bandar, Indera Mahkota dijalankan untuk menentukan kualiti air dan nilai indeks kualiti air (IKA) serta pengkelasannya berdasarkan piawaian National Water Quality Standard (NWQS). Kajian ini bertujuan untuk mengenalpasti tahap pencemaran air tasik, selain berfungsi sebagai kawasan tebatan banjir turut digunakan untuk aktiviti penyiraman pokok di kawasan sekitar bandar Kuantan. Parameter-parameter yang dicerap bagi setiap stesen ialah pH, oksigen terlarut (DO), kekeruhan, jumlah pepejal termpai(TSS), permintaan oksigen biokimia (BOD), permintaan oksigen kimia (COD), dan nitrogen ammonia (NH3-N). Kaedah analisis dilakukan mengikut garis panduan yang dicadangankan dalam American Public Health Association (APHA). Satu temubual telah dijalankan bagi mendapatkan segala informasi yang diperlukan. Pihak yang ditemubual ialah Ketua Bahagian Penyelenggaraan Landskap. Selain itu, kajian eksperimental telah dijalankan bagi memenuhi keperluan kajian ini. Dua makmal digunakan iaitu makmal Alam Sekitar di Polteknik Sultan Haji Ahmad Shah (POLISAS) dan makmal berpusat di Universiti Malaysia Pahang (UMP). Setiap keputusan ujikaji dikelaskan mengikut piawaian National Water Quality Standard (NWQS). Secara keseluruhannya semua stesen pensampelan dikategorikan sebagai Kelas III, iaitu sedikit tercemar tetapi jika tidak diatasi masalah kualiti air dibimbangi akan bertambah teruk. Pencemaran yang berlaku banyak disumbangkan daripada aktiviti manusia hingga menjejaskan kualiti air yang terdapat di tasik ini.

Kata kunci: Tasik Bandar, indeks kualiti air, temubual,NWQS

Pengenalan

Tasik Taman Bandar merupakan sebuah taman rekreasi yang diwujudkan oleh pihak Majlis Perbandaran Kuantan (MPK) bagi memenuhi ciri-ciri bandar di mana setiap bandar perlu mempunyai sebuah taman bandar. Taman Bandar ini mempunyai keluasan kira-kira 3 hektar yang dikelilingi dengan trek 'jogging' dan beberapa kemudahan senaman. Fokus kajian ini ialah tasik yang digunakan sebagai kawasan rekreasi. Selain berfungsi sebagai kawasan tebatan banjir dan tempat aktiviti pertandingan memancing.

Oleh itu , sewajarnya kualiti air tasik ini dipantau bagi memastikan tasik tersebut selamat untuk digunakan. Hal ini kerana taman bandar ini adalah tumpuan para penduduk sekitarnya. Justeru itu , wajarlah analisa dan kajian dibuat di tasik ini bagi menentukan kualiti air dan tahap

pencemaran

Keputusan ujian air boleh dijadikan rujukan oleh pihak Majlis Perbandaran Kuantan (MPK) sebelum melakukan sebarang aktiviti yang melibatkan tasik. Usaha pengurusan kawasan tasik buatan ini perlu dilakukan bagi memastikan tasik terus berada di dalam keadaan baik dan selamat. Selain daripada sudut estetik, di mana persekitaran tasik digunakan untuk kawasan rekreasi, keadaan air di dalam tasik juga perlu selamat untuk mengadakan aktiviti air seperti kayak (Othman, 2005).

Pernyataan masalah

Kepesatan aktiviti pembangunan di kawasan bandar menyebabkan kehadiran air masuk ke tasik berpunca dari longkang kedai yang berhampiran atau berpunca dari saliran sisa buangan dari bangunan yang terdekat. Hal ini menyebabkan air tasik tercemar dari segi mutu kualiti air, mengeluarkan bau yang kurang menyenangkan dan perubahan warna titik kemerosotan kualiti air dikenalpasti melalui ujian kandungan air. Dengan ini, kajian terhadap kualiti dan pencemaran air Tasik Taman Bandar Indera Mahkota perlu dijalankan agar dapat dijadikan rujukan bagi pihak yang berkenaan. Pertambahan penduduk bandar turut menyumbang kepada terjejasnya sistem tasik dan ekosistemnya. Hal ini terjadi apabila sikap dan norma penduduk bandar serta pengusaha restoran yang membuang sisa seperti sampah sarap dan minyak sewenang-wenangnya ke dalam tasik yang berhampiran. (Atikah, 2011)

Objektif kajian

Objektif utama kajian ini adalah:

- Menentukan kualiti air mengikut piawaian (NWQS).
- Mengenalpasti tahap pencemaran air berpandukan Indeks Kualiti Air (IKA)

Kepentingan kajian

Kepentingan kajian ini adalah untuk mengkaji kualiti air agar mampu menjamin hidupan akuatik serta ekosistem yang terdapat di dalam tasik tersebut. Sekaligus, hasil kajian ini boleh dijadikan sebagai sumber rujukan kepada pihak Majlis Perbandaran Kuantan (MPK) sebelum melakukan sebarang aktiviti yang berkaitan dengan air Tasik Taman Bandar Indera Mahkota. Menurut pihak MPK, kajian kualiti air tidak pernah dilakukan di Tasik Taman Bandar sebelum ini. Kajian ini adalah kajian yang pertama dilakukan bagi mengenalpasti tahap kualiti air di tasik tersebut. Selain itu, pihak MPK juga pernah menerima aduan berkenaan bau busuk dan keadaan tasik yang agak penuh sampah di bahagian saliran masuk. Pihak MPK pernah berkolaborasi bersama Jabatan Perikanan untuk perbincangan tentang masalah ikan mati dan berpenyakit. Hal ini ditambahkan dengan penyakit yang jarang ditemui pada hidupan akuatik iaitu penyakit karat. Tambahan pula, air tasik digunakan untuk penyiraman pokok-pokok di kawasan Kuantan. Kajian kualiti air ini penting supaya dapat menjadikan tasik tersebut lebih selamat untuk digunakan. (Aslina, 2008).

Metadologi

Reka bentuk kajian ini merupakan kaedah tinjauan yang bersifat kualitatif. Dapatan kajian diperoleh dari kajian eksperimental dan kaedah temubual.Kajian ekspeimental dijalankan untuk menentukan kualiti air mengikut piawaian (NWQS) dan mengenalpasti tahap pencemaran air di Taman Tasik Bandar. Kajian kualiti air ini melibatkan 3 sampel stesen iaitu Stesen 1 (S1), Stesen 2 (S2), dan stesen 3 (S3). Parameter-parameter yang dicerap bagi setiap stesen ialah pH, oksigen biokimia (DO), kekeruhan, jumlah pepejal termpai(TSS), permintaan oksigen biokimia (BOD), permintaan oksigen kimia (COD), dan nitrogen ammonia (NH3-N). Kaedah analisis kajian eksperimental merujuk kepada jadual NWQS (National Water Quality Standard). Kajian di makmal dilakukan di dua tempat iaitu makmal Alam Sekitar, Politeknik Sultan Haji Ahmad Shah (POLISAS) dan makmal Universiti Malaysia Pahang (UMP). Kaedah temubual telah dijalankan di bangunan Majlis Perbandaran Kuantan (MPK) bersama Ketua Bahagian Penyelenggaraan, Jabatan Landskap bagi mendapatkan informasi tentang Tasik Taman Bandar.

Dapatan dan Analisis

Kajian ini dilakukan bagi mengenalpasti tahap kualiti air Tasik Taman Bandar samada baik atau tercemar. Proses ujikaji telah dilakukan di makmal Alam Sekitar, Politeknik Sultan Haji Ahmad Shah (POLISAS) serta makmal Berpusat di Universiti Malaysia Pahang (UMP). Antara ujikaji yang dilakukan ialah suhu, nilai pH, permintaan oksigen biokimia (BOD), permintaan oksigen kimia (COD), kekeruhan, oksigen terlarut (DO), nitrogen ammonia (NH3N) dan pepejal terampai (TSS). Hasil ujikaji adalah seperti berikut:

pH

Data analisa menunjukkan nilai pH stesen kajian air tasik tersebut berada dalam julat antara 6.3 hingga 6.7 di mana berada pada subkelas IIA. Bagi nilai pH yang melebihi julat 4 hingga 9, menunjukkan nilai pH air yang neutral menurut APHA(1992). Berdasarkan pengkelasan pH mengikut Kualiti Air Kebangsaan (NWQS) . Secara keseluruhannya pH air berada pada tahap dibenarkan.

Suhu

Bacaan suhu air tasik tersebut pada ketiga-tiga stesen adalah berada dalam julat yang normal iaitu 21.1°C hingga 22.4°C. Hal ini kerana sampel air diambil ketika cuaca kering.

Permintaan Oksigen Biokimia (BOD)

Nilai cerapan pada ketiga-tiga stesen berada di antara 23 mg/L hingga 37 mg/L. Bacaan tertinggi adalah pada stesen 1 iaitu 37 mg/L di bahagian aliran masuk. Bacaan yang tinggi kerana penggunaan oksigen terlarut oleh mikroorgnisma untuk pengoksidaan adalah kurang. Merujuk pada Indeks Kualiti Air (IKA) air tasik adalah sedikit tercemar dan berada dalam kelas ketiga.

Permintaan Oksigen Kimia (COD)

Secara keseluruhannya, nilai Permintaan oksigen kimia (COD) di Tasik Taman Bandar pada stesen 3 di bahagian air keluar menunjukkan bacaan tertinggi iaitu 66 mg/L berbanding stesen 1 dan 2. Walaupun begitu, bacaan ketiga-tiga stesen adalah tinggi dengan nilai bacaan julat antara 55mg/L hingga 66mg/L. Ini disebabkan kewujudan bahan organik dalam tasik seperti sisa makanan atau sisa buangan. Nilai ini akan memberi beban terhadap kualiti air tasik.

Kekeruhan

Nilai kekeruhan berada pada julat 14NTU hingga 29NTU. Nilai kekeruhan tertinggi yang dicerap ialah 29 NTU di stesen 1. Ujikaji kekeruhan perlu dilakukan bagi menentukan mutu air di Tasik Taman Bandar.

Oksigen Telarut

DO cerapan berada pada julat 8.44 mg/L hingga 8.47 mg/L. Ketiga-tiga berada pada kelas I, iaitu air berada dalam keadaan semulajadi dan tidak memerlukan rawatan.

Jumlah Sedimen Terampai (TSS)

Nilai TSS di Taman Tasik Bandar berada dalam julat 31mg/L hingga 80 mg/L. Nilai bacaan pada stesen 1 adalah paling tinggi iaitu 80 mg/l berdasarkan piawaian kualiti air kebangsaan (NWQS).

Nitrogen Ammonia

Nilai nitrogen ammonia berada dalam julat 0.08 hingga 0.16. Nilai bacaan nitrogen ammonia yang paling tinggi adalah stesen 3 iaitu 0.16 berdasarkan piawaian Kualiti Air Kebangsaan (NWQS). Ini mungkin kerana terdapat sisa makanan yang mengalir ke dalam kawasan tasik.

Indeks Kualiti Air (IKA)

Nilai purata IKA bagi ketiga0tiga stesen ditentukan dengan menggunakan kaedah piawai JAS.

$$IKA=0.22*SIDO + 0.19*SIBOD + 0.16*SICOD + 0.15 *SIAN +0.16*SISS + 0.12*SIpH$$

Di mana SI merupakan sub-indeks parameter. Nilai ini paparkan dalam Jadual 1. Nilai purata bagi stesen 1 hingga stesen 3 dikelaskan sedikit tercemar dan berada dalam Kelas III merujuk Institut Penyelidikan Hidraulik Kebangsaan Malaysia (NAHRIM).

Jadual 1 menunjukan nilai Indeks Kualiti Air dan nilai purata Indeks Kualiti Air

Stesen	Nilai Indeks Kualiti Air	Nilai purata Indeks Kualiti Air	Julat Indeks Kualiti Air
Stesen 1 (inlet)	65.03	68.02	60 – 80 (sedikit tercemar)
Stesen 2 (middle)	69.42		
Stesen 3 (outlet)	69.62		

Jadual 2 Klasifikasi kualiti air berdasarkan indeks kualiti air (IKA) (JAS, 2001)

SUB INDEX & WATER QUALITY INDEX	INDEX RANGE		
	CLEAN	SLIGHTLY POLLTED	POLLUTED
Biochemical Oxygen Demand (BOD)	91 – 100	80 – 90	0 – 79
Ammoniacal Nitrogen	92 – 100	71 – 91	0 – 70
Suspended Solids (NH_3N)	76 – 100	70 – 75	0 – 69
Water Quality Index (WQI)	81 - 100	60 - 80	0 – 59

Temubual

Secara keseluruhan hasil temubual dengan pihak Majlis Perbandaran Kuantan (MPK) mendapati bahawa terdapat permasalahan bau busuk, sampah sarap serta kemerosotan kualiti air yang berlaku di Taman Tasik Bandar Indera Mahkota. Terdapat juga ikan mati dan hasil kolaborasi pihak MPK dengan Jabatan Perikanan mendapati ikan yang terdapat di dalam Tasik Taman Bandar Indera Mahokta ini menghidapi penyakit karat yang jarang berlaku kepada hidupan akuatik.

Kesimpulan dan Cadangan

Hasil daripada kajian ini serta ujian yang dijalankan, nilai bacaan yang diperolehi bagi setiap stesen berada pada kelas III mengikut Standard Kualiti Air Kebangsaan (NWQS) iaitu kelas ini menunjukkan bahawa air tasik tersebut memerlukan rawatan intensif dan tidak sesuai untuk hidupan akuatik yang sensitif. Pada keseluruhan kajian, menunjukkan bahawa air tasik Taman Bandar pada masa ini adalah tercemar dan mungkin akan menjadi lebih teruk sekiranya langkah pencegahan dan kawalan tidak diambil. Walaupun begitu, air tasik ini masih sesuai untuk hidupan akuatik yang tidak sensitif atau tahan lasak seperti ikan keli Afrika, ikan lampam dan ikan bandaraya serta hidupan akuatik yang bercengkerang iaitu kura-kura. Hal ini terbukti apabila pihak Majlis Perbandaran Kuantan (MPK) sendiri menyatakan permasalahan bau busuk, sampah sarap serta kemerosotan kualiti air yang berlaku di Tasik Taman Bandar. Secara zahirnya, ikan mati dapat dilihat dan tidak kurang juga ikan yang menghidapi penyakit karat yang jarang sekali berlaku kepada hidupan akuatik. Permasalahan hidupan akuatik ini telah dibuktikan oleh pihak Jabatan Perikanan, hasil kolaborasi pihak Majlis Perbandaran Kuantan (MPK) bersama Jabatan Perikanan.

Berdasarkan purata nilai indeks kualiti air , bacaan menunjukkan air tasik berada dalam kelas III keadaan sedikit tercemar. Walaupun tahap pencemaran ini agak minima pada mata kasar, namum impaknya amat besar kepada hidupan akuatik dan pengujung. Malahan nilai estetik juga dilihat semakin pudar. Dalam masa yang sama, bakteria fototrofik akan mengambil gas berbahaya, jadi bau busuk akan diserap. Oleh itu, bebola lumpur dipilih sebagai jalan penyelesaian kepada masalah pencemaran air kerana bebola tersebut bertindak dalam masa yang singkat untuk merawat masalah pencemaran air. Terdapat beberapa jenis penyakit yang berbahaya apabila menggunakan air yang tidak berkualiti dan tercemar.

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INTEGRATED CURRICULUM THROUGH IMPLEMENTATION OF CDIO- FROM THE PERSPECTIVES OF TOURISM AND HOSPITALITY STUDY

R.Mat Radzi1, a, N.S. Sukor 2,b and S.S. Samian 3,c

Ibrahim Sultan Polytechnic, Johor, Malaysia1, 2, 3

amariaradzi1511@gmail.com, b salwasukor@yahoo.com , csitisuhaila@pis.edu.my

Keywords: CDIO; integrated curriculum; tourism and hospitality: NOGs; Intra-Programme Integrated Curriculum

Abstract: CDIO is one of the initiatives introduced by the Curriculum Development Division (CDD), Department of Polytechnic Education (DPE), and Ministry of Higher Education Malaysia (MOHE). The intention of introducing the integrated curriculum in Malaysian Polytechnics is to enhance its graduates' 21st century skills. The purpose of this paper is to share the experience on how Bachelor Sc. (Honors) Tourism and Hospitality Management (BTH) applied the CDIO to improve the existing curriculum implementation. By using the CDIO framework, BTH has developed a curriculum mapping for 5 syllabuses and documented the implementation planning in the form of NOGs. To develop CDIO curricular for BTH, the Intra-Programme Integrated Curriculum Model were utilized, two or more courses from the same programmes or in same departments, are integrated in a single project or assessment. By enhancing the curriculum will prepare the students for marketable graduates, increasing employability rate and the opportunity for practices of hands on activity and an integrated design project which can strengthen students experience and learnings.

Introduction

CDIO is an innovative educational framework that involves four important fundamentals which are Conceive, Design, Implemention and Operate. In recent years, the engineering world has found that engineering graduates from various skilled and skilled technical institution lack the capabilities in real-world engineering situations. There is a gap between engineering education learned and what the job market needs. This mismatch led to high unemployability rates among graduates. Engineering educators eventually come across a solution by introducing CDIO initiatives around the world. These educators compile the list of engineers required by conducting studies involving industry representatives, engineering faculties, university study committees, academics and alumni of engineering. As a result of this study, these academics have created a new CDIO curriculum draft that is in line with the key functions of the role of the engineers.

The CDIO concept was introduced in the late 1990s and CDIO initiatives were initiated in early 2000 through the collaboration of several universities. The initiative of CDIO implementation approach in Teaching and Learning was initially focused on an engineering field aimed at providing students as future engineers. Students are required to conduct a research on the problems faced by the industry and come out with the idea of product development to solve the problems faced by the industry. However, the implementation of CDIO is no longer limited to engineering, but has

been applied to other fields of study including social sciences. This paper is organized as follows. Section 2 discusses an overview of Outcome Based Learning (OBL) and Outcome Based Education (OBE) in tourism and hospitality field. In Section 3, the implementation of CDIO towards bachelor programme (BTH) in polytechnic will be discussed. Subsequently, Section 4 will discuss lessons learned throughout the process and finally, Section 5 concludes the paper.

Outcome Based Learning

Outcome Based Education (OBE) as defined by Spady means clearly focusing and organizing everything in an educational system around what is essentialfor all students to be able to do succeccfully at the end of their learning experience. It is the result of learning which is a visible and observable demonstration of three things; knowledge, combined with competence, combined with orientations. To make the outcome-based system work, the following four points are necessary. First, what the student is to learn must be clearly identified. Second, the student's progress is based on demonstrated achievement. Third, multiple instructional and assessment strategies need to be available to meet the needs of each student. And finally, adequate time and assistance need to be provided so that each student can reach the maximum potential [1].

The Malaysian Polytechnic curricular for tourism and hospitality education is based on Outcome- based Learning (OBL). This approach has been successfully applied to the design of integrated learning in Polytechnic Diploma and Bachelor Programmes. The OBE education, that emphasizes the use of the student centered learning (SCL) has been implemented by Malaysian Polytechnics since 2010, particularly in responding to the requirements of the Malaysian Quality Framework (MQF) and the need to produce graduates with knowledge, skills and attitude that meet the changing industry needs[2]. The belief and features of OBL was divided into several details [1]:

1. All students can learn and succeed, but not on the same day in the same way.
2. Success breeds success.
3. Schools control the conditions of success.
4. It emphasizes authentic, achievable and assessable learning outcomes.
5. It is primarily concerned with what students/ culminating capabilities at graduation time . It centres curriculum and assessment design around higher order exit outcomes.
6. It is accountable to the stakeholders, the learners, the teachers, the employers and the public.
7. It leads to the change of schooling, including the curriculum, instruction and assessment.

In implementing the operation of OBL some principles has to be emphasized, particularly [1]:

1. Clarity of the focus, meaning that all activities (teaching, assessment,etc) are geared towards what we want students to demonstrate;
2. Expanded opportunity, meaning expanding the ways and numbers of times students get a chance to learn and demonstrate a particular outcome;
3. High expectations, meaning getting rid of the bell-curve and all students should achieve at the highest level;
4. Design down, meaning designing the curriculum from the point at which you want students

to end up.

In OBL, what matters ultimately is not what is taught, but what is learned. Lecturers must set appropriate course intended learning outcomes, instead of teaching objectives. By using constructive alignment (what we teach, how we teach and how we assess) ought to be aligned with the intended learning outcomes, such that they are fully consistent with each other. The quality of teaching is to be judged by the quality of learning that takes place where is all OBL approaches take a criterion-based view of assessment and focus on what students can do with knowledge after a period of learning.

CDIO Towards Bachelor Programme (BTH)

DPE Key Performance Indicator (KPI) of the Industrial Revolution (IR4) through the Innovation- Based Education and the 3rd CDIO Integrated Curriculum involving 15 programmes of study from selected polytechnics. Bachelor Sc. (Honours) In Tourism and Hospitality Management (BTH), Ibrahim Sultan Polytechnic joined the CDIO intiative in 2016. The initiatives from Curriculum Development Division, Department of Polytechnic Education collaboration with CDIO Division has placed BTH on a list of potential programmes to apply CDIO in the teaching and learning process.

In year of 2017, BTH's programme started to support the implementation of the CDIO initiative. BTH trying to adapting and adopting CDIO approach to build a curricular framework and guidelines to help the program establish and ensure sustainable implementation of an OBE system to meet society needs of the quality standards.

Factoring to the success of the CDIO intiative implementation in BTH were the support from management and the close collaboration of lecturers, early adopters and education specialists to customize the CDIO syllabus and to interpret the CDIO standards for the social science context. The management also provided freedom with the necessary resources for redevelopment of workspaces and for the teaching staff to enhance their teaching skills and understanding of CDIO activities.

To develop CDIO curricular for BTH, the [8] Intra-Programme Integrated Curriculum Model were utilized, two or more courses in the same department are integrated in a single project or assessment; as illustrated in Figure 1.



Figure 1 : Modified from Intra-Programme Integrated Curriculum Model[8]

The CDIO Implementation

The internal stakeholders comprised of students and the education management whereas the groups Industry and Society are external stakeholders [10].The actors that represent the key stakeholders in our process are students from Semester 3. The fresh background of these students originate from two disciplined areas; tourism and hotel management. With the constraint of the CDIO education only stressing engineering fundamentals set in the context of Conceiving-Designing-Implementing- Operating (CDIO), BTH is critical in adapting this framework into the programme.

To initiate the steps in implementing the CDIO, a workshop was conducted to create the CDIO curriculum mapping for the BTH syllabus. Subsequently, a group of lecturers were assigned to develop Notes of Guidance (NOG) with 5 courses' syllabus combined in one NOG. By choosing World Festivals, Culture and Destination course as a main subject and followed by subsequent subjects (Hubungan Etnik, Professionalism and Customer Service, English For Tourism and Hospitality and International Travel and Tours) the team lecturers discussed to collaborate and come out with one CDIO Project Syllabus containing a complete scenario of the project. This project was based on intra-department with the purpose to minimize student's burden while integrating the assessments provided by course syllabus. The NOG focus on integration of integrated learning outcome and the assessment rubric. In this case, students will apply the 4C's skill set throughout the project. A series of workshops were conducted to enhance the NOG syllabus and presented to the CDIO panel for approval. This project will be review at the end of the semester to see the success and and discuss it over if there are any admendment so that it can be practice for the future semester.

There are 12 CDIO standards that should be referred to in the implementation of this project. Lecturers are free to choose any standards for use in the implementation of CDIO. For BTH, the third standard approach was chosen which are integrated curriculum, apart from the CDIO skills assessment which was self-developed by the course lecturer, Integrated Curriculum indicates that the existing curriculum is not compromised, and only a set of assessments is produced that need to be integrated with other courses and emphasize assessment in the form of "Project Based" [4,7]. The course learning outcomes (CLO) and assesssment allocations were taken from the existing syllabus [8]. The project Learning Outcomes were formulated to infuse the 21st Century Skills set (collaboration, creativity, communication and creative thinking). At the end of project, implementation of portfolios that require students to self-assess themselves, their grades as well as their attainment of the Program Outcomes (POs) and Learning Outcomes (LOs) and hence to address gaps on how to improve their PO and LO attainment scores[7].

Conclusion

Assessment in OBE require a shift in mindset of educators and educational leaders. It is a process that focuses on what is to be learned the outcomes. An outcome is a culminating demonstration of learning. It is a demonstration of learning that occurs at the end of a learning experience [12]. CDIO initiative and its implementation will be a success with the cooperation from academicians, students, industry and accreditation board. The major challenge is "buy-in" from faculty members. Some of faculty members see CDIO as a burden to their current workload. However, after the first project CDIO implementation in 2017, the BTH lecturers were more comfortable and

more confident in adopting CDIO. By sharing many examples of teaching-learning improvement and changes from CDIO team members made people understand more. Taylor's experienced shows there exist a number of challenges arises. First, the resistance to change occurs since the curriculum of programme in a school would need to undergo a variety of changes to accommodate the inclusion of the standard. Some faculty members and even students may resist this changes. Second, is regarding to additional workload where same of the faculty may interpret such changes in a negative manner that may add unneccessary load on them and hence boost their already exhausted workload [7]. At this situation, each party should play their roles to achieve CDIO goals and objectives according to CDIO syllabus. In the future, it is hoped that there will be an appropriate framework suitable for adoption in the tourism and hospitality field. This is important because CDIO framework serve as tools to guide in integrating knowledge, technical skills, soft skills, product, system, and process in a curriculum, appropriate for the polytechnic education. CDIO integrated curriculum will allow more meaningful teaching-learning environment and excitement with appropriate technology for students' motivation in ensuring students involvement with unique learning style was made possible. By enhancing the curriculum are initiatives in increasing students' communication to prepare the students for marketable graduates, increasing employability rate and the opportunity for practices of hands on activity and an integrated design project which can strenghten students experience and learnings.

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KAJIAN TERHADAP KECENDERUNGAN PELAJAR-PELAJAR KURSUS KEUSAHAWANAN DALAM MENJALANKAN PERNIAGAAN ATAS TALIAN

Nor Fa'alina Binti Abu Hassan[1,a], Nor Radhiah Binti Borhan[2,b]

[1]Politeknik Tuanku Syed Sirajuddin, 02600 Arau, Perlis

[2]Politeknik Tuanku Syed Sirajuddin, 02600 Arau, Perlis

[a] norfaalina@gmail.com, [b] norradhiah.borhan@yahoo.com

Abstrak: Keusahawanan merupakan bidang yang mencabar dan tidak ramai yang mahu menceburi bidang ini. Untuk menceburi bidang keusahawanan dan menjadi usahawan yang berjaya, elemen keusahawanan perlu disuntik dalam diri pelajar-pelajar yang mendorong mereka memilih bidang keusahawanan sebagai cabang kerjaya. Kajian ini dijalankan berhubung kecenderungan pelajar-pelajar dalam menjalankan perniagaan atas talian, di mana ianya banyak menimbulkan kesan positif di kalangan pelajar-pelajar. Kajian ini tertumpu kepada pelajar-pelajar dari kursus DPB2012 *Entrepreneurship* di Jabatan Rekabentuk dan Komunikasi Visual (JRKV), Politeknik Tuanku Syed Sirajuddin (PTSS), Perlis. Terdapat dua objektif yang ingin dicapai dalam kajian ini iaitu mengenalpasti tahap kesedaran pelajar-pelajar terhadap perniagaan atas talian dan mengenalpasti minat pelajar-pelajar dalam menjalankan perniagaan atas talian. Pengukuran bagi kajian ini adalah berdasarkan skor min. Data dikumpul melalui borang soal selidik. Seramai 50 orang pelajar yang mengambil kursus DPB2012 *Entrepreneurship* di JRKV, PTSS telah dipilih sebagai responden kajian. Hasil dapatan kajian secara keseluruhannya mendapati pelajar-pelajar mempunyai kecenderungan menjalankan perniagaan atas talian. Di akhir kajian ini, dicadangkan beberapa cadangan yang sesuai bagi meningkatkan kecenderungan pelajar-pelajar dalam menjalankan pemiagaan atas talian.

KATA KUNCI: Keusahawanan; Atas talian; Kecenderungan

PENGENALAN

Pada alaf baru ini, kemahiran keusahawanan telah menjadi salah satu komponen kemahiran generik atau kemahiran insaniah yang mesti diajar kepada mahasiswa di kebanyakan Institusi Pengajian Tinggi Awam (IPTA) dan Institusi Pengajian Tinggi Swasta (IPTS). Selaras dengan usaha untuk menjadikan bidang ini di antara bidang kerjaya yang diminati, bidang keusahawanan turut diperkembangkan melalui pendidikan. Institusi pendidikan dan latihan memainkan peranan dalam membentuk budaya keusahawanan di kalangan pelajar-pelajar. Menurut Byers (2003), terdapat banyak cara yang boleh dilakukan oleh pihak institusi dalam membantu pelajar-pelajar menceburi bidang keusahawanan seperti menjalankan perniagaan atas talian. Seorang usahawan perlulah kreatif, mempunyai daya imaginasi yang tinggi, inisiatif dan mampu membuat perubahan dan menggunakan peluang yang ada dengan baik (Dabson, 2005).

Justeru itu, kajian ini dijalankan bagi mengenalpasti kecenderungan pelajar-pelajar JRKV, PTSS, dalam menjalankan perniagaan atas talian. Kajian ini diwujudkan bagi menggalakkan para pelajar menceburi bidang perniagaan atas talian kerana ianya menjanjikan sesuatu keseronokan dalam mengaplikasikan bidang teori keusahawanan secara praktikal. Pelajar-pelajar yang menggunakan internet untuk berniaga di atas talian memberikan kelebihan kepada mereka untuk mengembangkan perniagaan dan menjana pendapatan.

Pernyataan Masalah

Lazimnya wujud masalah bagi pelajar-pelajar dalam menjadi usahawan dari segi kos dan masa, keperluan kebergantungan dengan sumber manusia, proses penyediaan premis dan keperluan sistem bersikap automasi. Keadaan ini dapat diatasi oleh pelajar-pelajar dengan menjalankan perniagaan secara atas talian, di mana mereka boleh memulakan perniagaan tanpa menyediakan premis, menggaji pekerja dan tidak melibatkan kos yang tinggi. Mereka bebas menentukan saiz perniagaan mengikut keupayaan mereka.

Objektif Kajian

Objektif kajian ini dijalankan adalah untuk:

i. Mengenalpasti tahap kesedaran pelajar-pelajar JRKV, PTSS terhadap perniagaan atas talian.

ii. Mengenalpasti minat pelajar-pelajar JRKV, PTSS dalam menjalankan perniagaan atas talian

Skop Kajian

Skop kajian tertumpu kepada pelajar-pelajar yang mengambil kursus keusahawanan DPB2012 Entrepreneurship, sesi Jun 2018 di JRKV, PTSS. Kajian yang dijalankan akan berhadapan dengan tanggapan dan pendapat yang berbeza daripada responden yang dipilih secara rawak.

Kepentingan Kajian

Kepentingan kajian ini dilaksanakan bertujuan untuk:

1. Mengenalpasti tahap kesedaran pelajar-pelajar terhadap perniagaan atas talian.

2. Mengenalpasti pelajar-pelajar yang berminat untuk menjadi usahawan atas talian.

3. Memberikan maklumat kepada pihak politeknik agar digunakan bagi menambah

baik kaedah penerapan kemahiran keusahawanan.

KAJIAN LITERATUR

Perniagaan atas talian (online business)

Perniagaan boleh dikategorikan kepada dua jenis iaitu perniagaan luar talian (offline business) dan perniagaan atas talian (online business). Perniagaan luar talian boleh ditafsirkan sebagai aktiviti perniagaan yang dijalankan tanpa melibatkan penggunaan internet dan perlu bersemuka dengan pembeli seperti perniagaan kedai runcit. Manakala perniagaan atas talian bermaksud aktiviti perniagaan yang dijalankan menggunakan internet tanpa perlu bersemuka dengan pembeli. E-Dagang (e-Commerce) merupakan istilah yang biasa digunakan untuk menggambarkan aktiviti perniagaan atas talian. E-Dagang digambarkan sebagai proses membeli, menjual, memindahkan atau bertukar produk, perkhidmatan atau maklumat melalui rangkaian komputer termasuklah internet (Turban, 2012).

Keusahawanan

Menurut Bukryman, Nurizan dan Samir (2008), keusahawanan merupakan satu bentuk disiplin yang menjadi tonggak kepada pembangunan dan pertumbuhan ekonomi sesebuah negara. Daripada aktiviti keusahawanan yang dijalankan akan membolehkan kita menentukan dan mengetahui tahap kemajuan yang telah dicapai oleh sesuatu masyarakat dan negara. Secara umumnya, keusahawanan merupakan suatu istilah yang digunakan untuk menerangkan proses di mana manusia mengenalpasti peluang untuk memenuhi keperluan dan mengumpulkan segala sumber untuk mencapai matlamat tersebut (Kinzer, 1973). Walau bagaimanapun, Casson (1985) menegaskan bahawa konsep keusahawanan merupakan satu titik untuk menerangkan bahawa sumber yang melimpah ruah itu bukannya mengawal kekayaan tetapi cara bagaimana sumber tersebut diuruskan adalah lebih penting dalam mengawal kekayaan.

Kajian Lepas

Dalam kajian keusahawanan, terdapat pelbagai konsep yang dikaitkan seperti sikap (Doughlas & Shepherd, 2002), kecenderungan atau minat (Bird & Jelinek, 1988; Auken & Stephens, 2006) dan sebagainya. Kecenderungan keusahawanan dikaji kerana ia mempunyai impak yang penting dalam mempengaruhi keputusan seseorang itu untuk menjadi usahawan. Selain itu, menurut Krueger dan Carsrud (1993), pembentukan kecenderungan keusahawanan bergantung kepada sikap terhadap perlakuan yang disasarkan kerana ia mencerminkan kepercayaan dan persepsi atau tanggapan seseorang itu. Ini bermakna bahawa kepercayaan seseorang terhadap bidang keusahawanan adalah sangat penting kerana ia mempengaruhi sikap mereka terhadap kecenderungan keusahawanan. Menurut Krueger, Reilly dan Carsrud (2000) pula, kecenderungan adalah merupakan pembolehubah yang terbaik bagi mengukur sikap terancang apabila sikap itu dianggap sebagai luar biasa, sukar dinyatakan dan melibatkan masa yang lama.

METODOLOGI KAJIAN

Metodologi kajian merupakan tatacara melaksanakan kajian yang telah dijalankan oleh pengkaji. Aspek ini perlu dititikberatkan dalam memastikan kajian dijalankan secara sistematik, teratur dan mencapai objektif kajian yang telah ditetapkan.

Rekabentuk Kajian

Kajian ini adalah berbentuk deskriptif dengan menggunakan kaedah kuantitatif iaitu penggunaan set soal selidik. Menurut Mohd Majid (2000), soal selidik merupakan alat ukur yang digunakan dalam penyelidikan pendidikan. Ia digunakan untuk mendapatkan maklumat yang tepat berkenaan fakta-fakta, kepercayaan, perasaan dan sebagainya. Instrumen kajian ini berpandukan kepada kajian-kajian lepas, iaitu Mohammad Najib (2000) dan Lim et. al. (2013). Pada asasnya soal selidik yang digunakan terbahagi kepada 3 bahagian iaitu:

1. Bahagian A – Demografi

Mengandungi 3 item bertujuan untuk mengumpul data berkenaan latar belakang responden seperti umur, bangsa, pendidikan, jenis produk yang diniagakan, tempoh perniagaan dan pendapatan bulanan.

2. Bahagian B - Tahap kesedaran pelajar-pelajar terhadap perniagaan atas talian

Terdiri daripada 10 item bertujuan menjawab persoalan kajian. Pada Bahagian ini responden telah disediakan dengan pilihan jawapan mengikut Skala Likert yang disediakan.

3. Bahagian C- Minat pelajar-pelajar dalam menjalankan perniagaan atas talian.

Terdiri daripada 7 item bertujuan menjawab persoalan kajian. Pada bahagian ini responden telah disediakan dengan pilihan jawapan mengikut Skala Likert yang disediakan.

Sampel Kajian

Sampel terdiri daripada 50 orang pelajar-pelajar yang mengambil kursus DPB2012 Entrepreneurship di JRKV, PTSS. Pelajar-pelajar terbabit terdiri daripada pelajar-pelajar semester dua Program Pengajian Video dan Filem.

Soal Selidik

Penggunaan skala dalam soal selidik adalah mengikut markah dalam Jadual 1 seperti berikut.

Jadual 1: Skala Pemeringkatan Likert

Jadual 1: Skala Pemeringkatan Likert

	Sangat Tidak Setuju	Tidak Setuju	Kurang Setuju	Setuju	Sangat Setuju
Skor	1	2	3	4	5

(Sumber: Mohammad Najib (2000) dalam Ling et. Al. (2013))

ANALISIS DATA

Pengkaji telah menganalisis data-data yang diperolehi daripada borang soal selidik. Data-data yang telah diperolehi dan dikumpul daripada kajian ini adalah data berbentuk kuantitatif. Kaedah skor min juga telah digunakan bagi melihat tahap kecenderungan perniagaan atas talian. Skor min yang paling besar menunjukkan tahap penggunaan paling tinggi. Tafsiran skor min bagi dapatan kajian responden telah digunakan mengikut skala seperti yang dikemukakan dalam Jadual 2 bagi menganalisis data yang diperolehi.

Jadual 2: Jadual Tafsiran

Skor Min	Tafsiran
1.00 – 1.49	Sangat Rendah
1.50 – 2.49	Rendah
2.50 – 3.49	Sederhana
3.50 – 4.49	Sederhana Tinggi
4.50 – 5.00	Tinggi

4.1 Analisis Tahap Kesedaran Perniagaan Atas Talian Dalam Kalangan Pelajar-pelajar di PTSS

Analisis data yang dikemukakan adalah berkaitan dengan tahap kesedaran perniagaan atas talian dalam kalangan pelajar-pelajar di JRKV, PTSS. Perkara ini merangkumi sepuluh aspek yang berkaitan tahap kesedaran perniagaan atas talian. Dapatan kajian ditunjukkan pada jadual di bawah.

Jadual 3: Analisis Tahap Kesedaran Pelajar-Pelajar Terhadap Perniagaan Atas Talian

Item	Min
Saya mengetahui konsep dan perniagaan atas talian (*online business*)	4.06
Perniagaan atas talian adalah lebih mudah dan cepat berbanding perniagaan luar talian (*offline business*)	4.22
Perniagaan atas talian penting dalam aktiviti perniagaan	4.26
Perniagaan atas talian menjimatkan kos perniagaan	4.36
Perniagaan atas talian menjimatkan masa	4.38
Perniagaan atas talian memudahkan peniaga untuk berhubung dengan pelanggan	4.28
Perniagaan atas talian lebih memudahkan untuk meluaskan pasaran perniagaan	4.4
Perniagaan atas talian dapat membantu saya meningkatkan kemahiran dalam teknologi maklumat	4.32
Keuntungan perniagaan saya meningkat selepas menjalankan perniagaan atas talian	4.22
Saya berpendapat bahawa perniagaan atas talian dapat membantu saya dalam urusan perniagaan	4.2
Min Keseluruhan	**4.27**

Hasil dapatan kajian pada Jadual 3 menunjukkan bahawa skor min keseluruhan bagi tahap Kesedaran Pelajar-pelajar Terhadap Perniagaan Atas Talian adalah sebanyak 4.27. Ini menunjukkan bahawa tahap kesedaran pelajar-pelajar adalah sederhana tinggi dan skor min keseluruhan yang ditunjukkan adalah dalam lingkungan skala min 3.50 hingga 4.49. Daripada hasil dapatan ini jelas menunjukkan bahawa pelajar-pelajar ini sedar terhadap perniagaan atas talian yang boleh memberi manfaat kepada mereka.

4.2 Analisis Minat Menjalankan Perniagaan Atas Talian

Analisis data yang dikemukakan adalah berkaitan minat menjalankan perniagaan atas talian dalam kalangan pelajar-pelajar di JRKV, PTSS. Perkara ini merangkumi tujuh aspek yang berkaitan dan ditunjukkan pada jadual di bawah.

Jadual 4: Analisis Minat Pelajar-Pelajar Dalam Menjalankan Perniagaan Atas Talian

Item	Min
Saya berminat untuk memulakan perniagaan sekiranya diberi peluang dan sumber yang diperlukan	4.44
Saya akan bersungguh-sungguh untuk mengendalikan perniagaan saya	4.5
Minat saya terhadap bidang perniagaan semakin bertambah	4.2
Permintaan pelanggan yang tinggi menimbulkan minat saya untuk berniaga secara atas talian	4.44
Menjadi usahawan atas talian akan memberikan saya kepuasan yang tinggi	4.26
Hasrat saya untuk membuka perniagaan sendiri semakin meningkat	4.34
Saya semakin berminat untuk bekerja sendiri daripada makan gaji	4.42
Min Keseluruhan	**4.37**

Berdasarkan hasil dapatan kajian pada Jadual 4 menunjukkan bahawa skor min keseluruhan adalah sebanyak 4.37. Ini bermaksud minat untuk menjalankan perniagaan atas talian dalam kalangan pelajar-pelajar adalah sederhana tinggi dan skor min keseluruhan yang ditunjukkan adalah dalam lingkungan skor min 3.50 hingga 4.49. Daripada hasil dapatan ini jelas menunjukkan bahawa pelajar-pelajar ini sangat berminat untuk menjalankan perniagaan atas talian tetapi perlu diberikan sedikit peluang dan ruang untuk mereka memulakan perniagaan atas talian.

PERBINCANGAN DAN CADANGAN PENYELIDIKAN AKAN DATANG

Penyelidik mendapati bahawa pelajar-pelajar di JRKV, PTSS berminat terhadap bidang keusahawanan kerana mereka berpendapat bidang keusahawanan ini dapat memberi peluang bagi membantu keluarga dan dengan kemudahan teknologi, perniagaan atas talian ini dapat memudahkan mereka berniaga kerana tidak memerlukan modal yang besar dan penyediaan tempat. Peluang keemasan ini tidak membataskan mereka dengan hanya belajar tetapi dapat menjana pendapatan sampingan yang lumayan dengan hanya menggunakan perniagaan atas talian seperti Facebook, Instagram dan Blog. Bahagian ini juga membincangkan beberapa cadangan kajian lanjutan yang boleh dijadikan panduan kepada penyelidik yang akan datang disebabkan rangka masa yang agak terhad dan dana yang tidak mencukupi. Antara cadangan bagi meningkatkan minat pelajar-pelajar menjalankan perniagaan atas talian ialah;

1) Menyediakan kursus kepada pelajar-pelajar yang memfokuskan kaedah menjalankan perniagaan atas talian.

2) Unit Keusahawanan PTSS perlu memberi peluang dengan mempergiatkan aktiviti-aktiviti keusahawanan secara atas talian dan memberi suntikan modal kepada pelajar-pelajar yang berminat untuk menjalankan perniagaan atas talian sebagai persediaan pelajar-pelajar selepas tamat pengajian kelak.

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PERBEZAAN KEMAHIRAN *EMPLOYABILITY* DIMILIKI PELAJAR DENGAN KEHENDAK MAJIKAN.

Mohamad Rasidi Pairan[1], Nur Hazirah Noh@Seth[2], Nurul Aini Mohd Ahyan[3] Mohd Rustam Mohd Rameli[4], Hanifah Jambari[5], Najua Syuhada Ahmad Alhassora[6], Mohamad Farid Sies[7], Muhammad Nasir Nasrul[8]

Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia[1, 2, 3, 4, 5, 6]

Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja, Johor, Malaysia [7, 8]

rasidi@utm.my1, nurhazirah.n@utm.my[2], nurul.aini@utm.my[3], hanifah-j@utm.my[5], farids@uthm.edu.my[6], mnasir86@yahoo.com[7]

Kata Kunci: *Kemahiran employability*

Abstrak: Masalah pengangguran di kalangan graduan merupakan isu yang sangat hangat diperkatakan pada masa kini. Faktor yang sering di bahaskan dan di bincangkan bagi menangani masalah ini adalah graduan yang dihasilkan masih tidak dapat memenuhi kehendak majikan masa kini. Secara umumnya, pemilihan pekerja baru dipilih berdasarkan kesesuaian akedemik dan jawatan yang di pohon. Tetapi pada masa kini majikan tidak hanya memfokuskan kepada akedemik pemohon sahaja tetapi juga kepada kemahiran *employability* agar pekerja mereka dapat menyesuaikan diri dengan semua jenis situasi pekerjaan. Kajian ini dilakukan untuk mengenal pasti adakah terdapat perbezaan yang wujud antara tahap penguasaan kemahiran *employability* yang dimiliki pelajar dengan kehendak majikan. Kajian tinjauan yang berbentuk kuantitatif digunakan dan sampel kajian difokuskan kepada 108 pelajar dan 42 majikan yang terlibat dalam institusi pendidikan telah dipilih secara rawak. Soal selidik digunakan sebagai instrumen kajian dan diedarkan kepada responden berdasarkan persampelan rawak mudah. Data di kumpul dan dianalisis menggunakan statistik deskriptif dan statistik inferens. Hasil dari kajian ini mendapati bahawa wujudnya perbezaan yang ketara antara kemahiran *employability* yang dimiliki pelajar dengan kemahiran *employability* yang diperlukan oleh majikan (p=0.00).

Pengenalan

Institusi pengajian tinggi (IPT) di Malaysia sentiasa berusaha memperluaskan program pengajaran dan penyelidikan seiring dengan perubahan zaman dalam usaha menyediakan tenaga manusia terlatih bagi memenuhi keperluan dan tuntutan pasaran dalam pelbagai bidang. Oleh itu program akademik yang ditawarkan oleh setiap institusi pengajian mestilah dapat melahirkan

graduan yang bukan sahaja bermutu tinggi tetapi menepati kehendak pasaran dunia pekerjaan. Pengangguran yang berlaku terhadap modal insan keluaran institusi pendidikan bukan disebabkan oleh kekurangan pekerjaan tetapi adalah disebabkan oleh ketidaksepadanan antara kemahiran yang diperlukan oleh pasaran buruh dengan kemahiran yang dimiliki oleh lulusan teknikal atau dikenali sebagai mismatch skill. Lulusan yang tidak mencapai piawaian majikan menyebabkan majikan mencari pekerja yang lebih kompeten dari luar negara (Nordin, 2003).

Pendidikan kemahiran employability dan pembelajaran sepanjang hayat perlu diberi penekanan yang mana ia merupakan kunci kejayaan sepanjang proses pengajaran dan pembelajaran (Mohd Noor et al., 2005). Kekurangan graduan yang berkemahiran akan mempengaruhi kadar pertumbuhan negara. Antara kelemahan graduan yang diperkatakan ialah tidak berketerampilan dan tidak memiliki kemahiran yang diperlukan oleh majikan di samping pasaran kerja yang kompetitif (Radin Sohadi et al., 2006).

Justeru, kemahiran employability juga merupakan kemahiran yang diperlukan dalam arena pekerjaan bagi mewujudkan tenaga kerja yang berketerampilan, di samping mempunyai kelulusan akademik yang seimbang (Emat, 2005). Juhdi & Shaharudin Yunus (2007) turut mempersetujui kenyataan tersebut dengan menghuraikan bahawa seseorang tidak dipilih bekerja oleh majikan adalah disebabkan oleh penguasaan kemahiran employability

METODOLOGI KAJIAN

Kajian ini merupakan kajian deskriptif dan inferensi secara tinjauan bertujuan untuk mengenal pasti kemahiran yang wujud di antara kehendak majikan dengan penerapan nilai-nilai employability yang dikuasai oleh pelajar. Seterusnya analisis dilakukan bagi mendapatkan perbezaan kemahiran yang diperlukan oleh majikan dalam memenuhi kehendak institusi pendidikan. Instrumen kajian ini dibina berasaskan kepada model oleh kemahiran insaniah yang digariskan oleh Kementerian Pengajian Tinggi di Malaysia yang telah dibuat penambahbaikan dan pengubahsuaian. Pengubahsuaian telah dilakukan oleh pengkaji berdasarkan objektif dan persoalan kajian yang hendak dikaji. Oleh itu kajian ini memfokuskan kepada tujuh elemen kemahiran employability iaitu:

i. Kemahiran Komunikasi
ii. Kemahiran Berkumpulan
iii. Kemahiran Pembelajaran Berterusan
iv. Kemahiran Penyelesaian Masalah
v. Kemahiran Kepimpinan
vi. Kemahiran Teknikal
vii. Kemahiran Etika

Dalam penyelidikan ini, borang soal selidik digunakan untuk mendapatkan maklumat mengenai tahap kebolehpasaran graduan SPTV UTHM, kemahiran employability yang dimiliki graduan dan elemen kemahiran employability yang menjadi keutamaan majikan terhadap graduan. Seterusnya data kajian diproses dengan menggunakan perisian komputer “Statistical Package for Social Sciences” (SPSS versi 17.0). Lokasi pilihan yang dipilih adalah Universiti Tun Hussein Onn Malaysia dan institusi pendidikan seperti Kolej Kemahiran Tinggi Mara (KKTM), Pusat Latihan Pusat

Latihan Teknologi Tinggi dan Institut Kemahiran Mara (IKM). Dalam kajian ini, terdapat dua populasi yang berbeza yang telah diambil iaitu pelajar dan majikan. Item-item soal selidik ini menggunakan skala likert 4 mata iaitu sangat setuju, setuju, tidak setuju dan sangat tidak setuju.

Dapatan Kajian

Adakah terdapat perbezaan elemen kemahiran employability yang dimiliki pelajar dengan kemahiran employability yang diperlukan majikan?
Dalam kajian ini terdapat satu hipotesis yang telah dibina. Hipotesis kajian ini dikenal pasti bagi mengetahui perbezaan kemahiran employability yang dikehendaki majikan dalam institusi pendidikan dengan kemahiran employability yang dimiliki oleh pelajar Sarjana Pendidikan Teknikal dan Vokasional di UTHM.

Hipotesis null (Ho): Tidak terdapat perbezaan yang signifikan antara elemen kemahiran employability yang telah dimiliki oleh pelajar Sarjana Pendidikan Teknik dan Vokasional (SPTV) UTHM dengan kemahiran employability yang diperlukan oleh majikan institusi pendidikan.

Hipotesis null (Ha): Terdapat perbezaan yang signifikan antara elemen kemahiran employability yang telah dimiliki oleh pelajar Sarjana Pendidikan Teknik dan Vokasional (SPTV) UTHM dengan kemahiran employability yang diperlukan oleh majikan institusi pendidikan.

Jadual 1 menunjukkan perbezaan antara elemen kemahiran employability yang menjadi penerapan pelajar Sarjana Pendidikan Teknikal dan Vokasional di UTHM dengan tahap kemahiran employability yang diperlukan oleh majikan dalam institusi pendidikan. Perbezaan dibuat berdasarkan kedudukan mengikut min tertinggi dan perbezaan tahap signifikan.

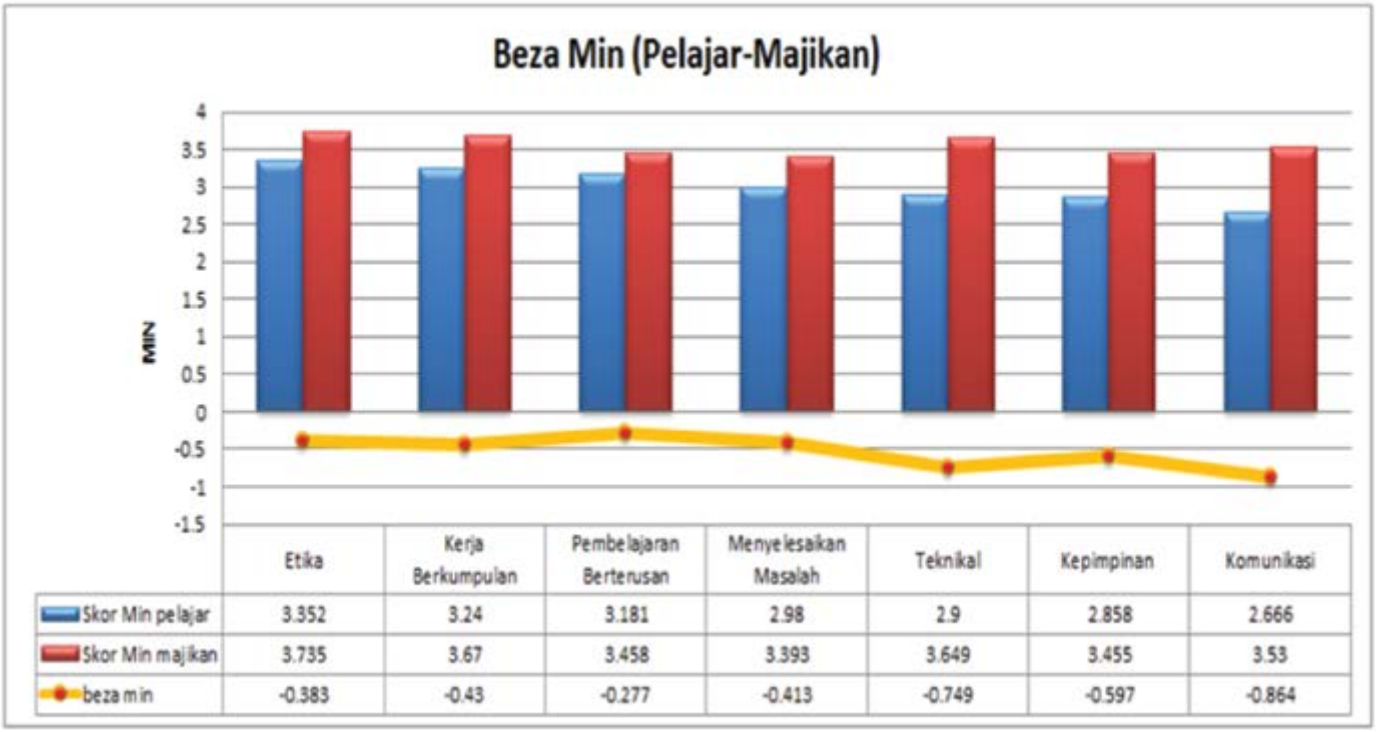
Jadual 1: Perbezaan yang signifikan antara elemen kemahiran employability pelajar dan majikan.

Elemen Kemahiran *Employability*	**Rank Pelajar**	**Rank Majikan**	**Skor Min Pelajar**	**Skor Min Majikan**	**Nilai Beza Min**	**Tahap Min Pelajar**	**Tahap Min Majikan**
Kemahiran Etika	1	1	3.352	3.735	-0.383	Tinggi	Tinggi
Kemahiran Kerja Berkumpulan	2	2	3.240	3.670	-0.43	Tinggi	Tinggi
Kemahiran Pembelajaran Berterusan	3	5	3.181	3.458	-0.277	Tinggi	Tinggi
Kemahiran Menyelesaikan Masalah	4	7	2.980	3.393	-0.413	Sederhana	Tinggi
Kemahiran Teknikal	5	3	2.900	3.649	-0.749	Sederhana	Tinggi
Kemahiran Kepimpinan	6	6	2.858	3.455	-0.597	Sederhana	Tinggi
Kemahiran Komunikasi	7	4	2.666	3.530	-0.864	Sederhana	Tinggi
Purata Min	-	-	3.025	3.556	-0.531	-	-
Jumlah keseluruhan responden	150						

Jika merujuk pada Jadual 1, nilai perbezaan min tersebut dikira menggunakan formula:

Nilai Perbezaaan = Skor Min Pelajar – Skor Min Majikan

Berdasarkan jadual tersebut, kesemua elemen kemahiran employability menunjukkan nilai negatif bagi nilai perbezaan skor min. Nilai negatif itu menunjukkan nilai min kemahiran employability yang dikuasai oleh pelajar tahun akhir Sarjana Pendidikan Teknikal dan Vokasional masih rendah berbanding dengan min kemahiran employability yang diperlukan majikan dalam institusi pendidikan. Jika dilihat dari aspek nilai min bagi kedua-dua responden, didapati bahawa keseluruhan nilai skor min bagi majikan adalah lebih tinggi berbanding pelajar.



	Etika	Kerja Berkumpulan	Pembelajaran Berterusan	Menyelesaikan Masalah	Teknikal	Kepimpinan	Komunikasi
Skor Min pelajar	3.352	3.24	3.181	2.98	2.9	2.858	2.666
Skor Min majikan	3.735	3.67	3.458	3.393	3.649	3.455	3.53
beza min	-0.383	-0.43	-0.277	-0.413	-0.749	-0.597	-0.864

Rajah 1: Perbezaan Skor Min Kemahiran Employability Yang Dimiliki Pelajar Dengan Kehendak Majikan

Bagi lebih memperlihatkan nilai perbezaan dengan lebih jelas, nilai-nilai tersebut ditunjukkan dalam bentuk graf bar yang mewakili nilai min kemahiran employability yang menjadi penerapan pelajar dengan kehendak majikan seperti Rajah1. Daripada graf dapat dilihat dengan jelas bahawa elemen kemahiran teknikal dan komunikasi mempunyai perbezaan yang ketara manakala elemen yang menunjukkan nilai perbezaan yang menghampiri nilai kosong atau boleh dikatakan tidak mempunyai perbezaan ialah kemahiran pembelajaran berterusan.

Merujuk kepada rajah pada nilai perbezaan skor min, didapati bahawa sub-kemahiran yang mempunyai nilai perbezaan yang paling besar ialah kemahiran komunikasi dengan nilai perbezaan 0.864 jika nilai negatif diabaikan. Ini membuktikan bahawa tahap kemahiran komunikasi pelajar mempunyai perbezaan yang paling besar berbanding dengan elemen kemahiran employability lain yang diperlukan majikan dalam mengambil calon kerja di institusi mereka. Selain itu, hasil keputusan

analisa menunjukkan sub-kemahiran teknikal juga mempunyai perbezaan min yang besar iaitu bernilai 0.749. Jurang perbezaan ini menggambarkan keperluan majikan terhadap aspek teknikal ini adalah melebihi daripada penguasaan yang pelajar miliki. Bagi elemen kemahiran employability yang mempunyai perbezaan yang paling kecil ialah elemen pembelajaran berterusan iaitu 0.277. Ini bermaksud tidak terdapat perbezaan yang ketara antara kemahiran pembelajaran berterusan yang dimiliki pelajar dengan kehendak majikan.

Bagi mengenal pasti tahap wujudnya perbezaan antara penguasaan pelajar dengan keperluan majikan, pengkaji telah menjalankan ujian-t tidak bersandar untuk mendapatkan analisis perbezaan skor min pelajar dan majikan. Jadual 2 menjelaskan keseluruhan analisis yang telah dijalankan berdasarkan ujian-t. Melalui jadual 2 dapat dilihat pada darjah keyakinan 95%, keputusan kajian adalah signifikan ($t=-14.445$, $df=148$, $p<0.05$). Berdasarkan kepada nilai signifikan (p) yang lebih kecil daripada 0.05, iaitu 0.00, maka hipotesis null kajian ditolak. Hasil analisis data tersebut telah menunjukkan bahawa terdapat perbezaan yang signifikan antara kemahiran employability majikan dengan kemahiran employability yang diterapkan pelajar. Nilai perbezaan min 0.531 juga membuktikan bahawa nilai keseluruhan skor min pelajar adalah lebih rendah berbanding nilai keseluruhan skor min majikan. Justeru, hasil analisis jelas menunjukkan penerapan kemahiran employability di kalangan pelajar Sarjana Pendidikan adalah lebih rendah daripada tahap kemahiran employability yang diperlukan majikan dalam institusi pendidikan.

Jadual 2: Keputusan ujian-t perbezaan kemahiran employability antara pelajar dan majikan

Item	Responden	N	Df	T-kiraan	Beza min	*p*	Keputusan
Kemahiran *Employability*	Pelajar	108	148	-14.445	-0.531	0.000	Ho ditolak
	Majikan	42					

Signifikan pada aras P<0.05 (2 tailed), 95% darjah keyakinan

Daripada kajian ini mendapati bahawa terdapat perbezaan yang ketara antara kemahiran yang dikuasai pelajar dengan kemahiran employability yang dikehendaki majikan. Oleh itu tindakan perlu dilakukan dalam memperkecilkan jurang yang wujud ini, sebagai contoh mendedahkan pelajar kepada aktiviti yang melibatkan masyarakat. Dengan cara ini, pelbagai kemahiran dapat dipupuk secara tidak langsung. Selain itu reka bentuk kurikulum juga boleh diperbaiki kerana reka bentuk kurikulum memainkan peranan yang penting dalam penyediaan graduan mahir.

Kesimpulan

Hasil daripada analisis data ini menunjukkan bahawa keseluruhan elemen kemahiran employability pelajar Sarjana Pendidikan UTHM adalah lebih rendah berbanding tahap kemahiran employability yang diperlukan oleh majikan institusi pendidikan.

Penghargaan

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Breaking Through The Hidden Reasons Why Demang Abdul Ghani Gallery Is Not Popular Among Tourist And Local People

Zuraida Yaacob1, a, Nur 'Adilla Mat Nipah2, b, Nur Qamariah Abdul Hakim3, c and Siti Nuraisya Mohd Salleh4, d

Jabatan Pelancongan dan Hospitaliti, Politeknik Merlimau, Melaka

azuraida@pmm.edu.my, bnuradad25@gmail.com, cnurqamariah.2ali@gmail.com, dsitinurai-sya98@gmail.com

Keywords: Tourist Attraction 1; Hidden Reason 2; Lack of Promotion 3; Unique Attraction4.

Abstract.: The aim of this study is to breaking through the hidden reasons why Demang Abdul Ghani Gallery is not popular among tourist and local people. The objective of this study are to identify whether the location of Demang Abdul Ghani Gallery is one of the reasons why the gallery is not popular, visitors' assumptions towards Demang Abdul Ghani Gallery and to discover whether the promotion affect the popularity of Demang Abdul Ghani Gallery. The result was drawn from questionnaire of 30 tourists from domestic and international and 20 local people. The data was analyzed using Statistical Package for the Social Sciences (SPSS) which shown the mean scores of the reason why Demang Abdul Ghani Gallery is not popular among tourist and local people. The findings of this study shows that the hidden reasons why Demang Abdul Ghani Gallery is not popular among tourist and local people because of the lack of promotion that makes tourist and local people have no idea about this gallery.

Introduction

Melaka is the third smallest state and the oldest town in Malaysia. It is one of the country's major historic attractions. Melaka located in the southern region of the Peninsular Malaysia. The state is bordered by Negeri Sembilan to the north and west and Johor to the south. Once, Melaka was spelled 'Malacca' in English but then in 2017 the Secretary of Melaka Government State, Datuk Seri Naim Abu Bakar said 'all the newspaper and media either in Malay or English or any other language should use 'Melaka' in the writing or pronounce it in each of their publishment.

The tourism industry has become a major factor in Malaysia's economic growth and the Malacca state has been a vital contributor to the industry. Various efforts have been made by the government to improve the tourism sector through the First Malaysian Plan (RMK1) until the Eleven Malaysian Plan (RMK11). However, there is concern with the adequacy of the infrastructures provided given the unique attraction of the state as historical city and a designated UNESCO World Heritage Site. The historical uniqueness Melaka needs to be maintained through sound management and protection.

In 2015, all state governments need to assist the Ministry of Tourism and Culture to promote local tourism products to attract people to travel in the country. It is necessary so that not only tourism products in every state can be introduced but it also can encourage people to travel in the

country and next will reduce the outflow of money. The effort to introduce local tourism products was needed as there were still many people in the country who had never traveled to some places in the country.

There are some of museums and galleries in Melaka that is under the Perbadanan Muzium Negeri Melaka (PERZIM). Museum and gallery is one of the reasons tourists visit Melaka since there are eight hundred thousand (800 000) or more tourists visited last year according to PERZIM. But according to that data, the number of tourist visit Demang Abdul Ghani Gallery is still low. So, that is the reason why this research is come out.

Problem Statement

In 2009, this gallery was preserve between 11 historical buildings around the Malaysia. Therefore, the purpose of this study is to conserve so that this treasure is not lost in this era due to his unique architecture and for future generation. According to Chief Minister Datuk Seri Idris Haron said, Melaka registered 16.7 million tourists in 2017. But, the data that the researcher got from Demang Abdul Ghani Gallery was quite unsatisfied. The minimum number of visitors at Demang Abdul Ghani Gallery is zero (0), while the highest is a whole bus which means around forty (40) visitors. As for monthly, Demang Abdul Ghani Gallery only got RM 300 around a hundred (100) visitors. This study was designed to identify the reasons why Demang Abdul Ghani Gallery in Merlimau, Melaka is not popular among tourist and local people.

Research Objective

In this study, researcher come out with three objective which is to identify the visitors' assumptions about Demang Abdul Ghani Gallery, to identify whether the location of Demang Abdul Ghani Gallery is one of the reasons why the gallery is not popular and to discover whether the promotion affect the popularity of Demang Abdul Ghani Gallery.

Research Methodology

Research design that been used in this study is quantitative method. This method is chosen because it was suitable to gain information to solve the problem that occurred at the Demang Abdul Ghani Gallery with more specific or detail. Research instrument that been used is questionnaire and its dived into 3 main section which is Section A is about demography, section B is about to identify the visitors' assumptions about Demang Abdul Ghani Gallery, section C is about to identify whether the location of Demang Abdul Ghani Gallery is one of the reasons why the gallery is not popular and section D is about to discover whether the promotion affect the popularity of Demang Abdul Ghani Gallery.

The result was drawn from questionnaire of 30 tourists from domestic and international and 20 local people. This study had been done at Banda Hilir and surrounding gallery. Moreover, these instruments used to help researcher to gain more information and data about Demang Abdul Ghani Gallery. The data was analyzed using Statistical Package for the Social Sciences (SPSS) which shown the mean scores of the reason why Demang Abdul Ghani Gallery is not popular among

tourist and local people.

Data Analysis

Data for questionnaire analyzed using mean score value analysis method. Data be interpreted based on the interpretation of the range of values the mean. According to source modified from Wierma (2000), to interpret values mean score obtained the mean range is based on the following table.

Table 1.1: Interpretation of the range of the values of the mean

Mean score	Interpretation	Level
1.00 to 2.49	Low	Weak
2.50 to 3.49	Medium	Medium
3.50 to 5.00	High	Good

(Source : Adaptation from Wierma, 2000)

Objective (1): To identify the visitors' assumptions about Demang Abdul Ghani Gallery
There are 10 questions that should be answered by teh respondent regarding visitors' assumptions about Demang Abdul Ghani Gallery. Table 1.2 below shows the mean obtained.

Table 1.2: To identify the visitors' assumptions about Demang Abdul Ghani Gallery

No.	Item	Min	Interpret
1.	I will enjoy visiting Demang Abdul Ghani Gallery more than any other attractions in Merlimau, Melaka	3.68	High
2.	I think enjoy visiting Demang Abdul Ghani Gallery will provide us with interesting history	4.00	High
3.	I hope this gallery will provides us with interesting activity	4.04	High
4.	I believe this gallery will provides us with interesting history equipment	3.90	High
5.	I hope this gallery will provides us a good facilities	4.12	High
6.	I think Demang Abdul Ghani Gallery entrance fee is affordable	4.34	High
7.	I prefer the gallery will provides us an in house guide	4.20	High
8.	I would like to enjoy the unique experience at Demang Abdul Ghani Gallery	4.00	High
9.	For me, the design of Demang Abdul Ghani Gallery is very interesting	4.02	High
10.	I will like the unique architecture of Demang Abdul Ghani Gallery	4.02	High
	Overall mean	**4.03**	**High**

Objective (2): To identify whether the location of Demang Abdul Ghani Gallery is one of the reasons why the gallery is not popular

There are 10 questions that should be answered by teh respondent regarding visitors' assumptions about Demang Abdul Ghani Gallery. Table 1.3 below shows the mean obtained.

Table 1.3: To identify the visitors' assumptions about Demang Abdul Ghani Gallery

No.	Item	Min	Interpret
1.	I will enjoy visiting Demang Abdul Ghani Gallery more than any other attractions in Merlimau, Melaka	3.68	High
2.	I think enjoy visiting Demang Abdul Ghani Gallery will provide us with interesting history	4.00	High
3.	I hope this gallery will provides us with interesting activity	4.04	High
4.	I believe this gallery will provides us with interesting history equipment	3.90	High
5.	I hope this gallery will provides us a good facilities	4.12	High
6.	I think Demang Abdul Ghani Gallery entrance fee is affordable	4.34	High
7.	I prefer the gallery will provides us an in house guide	4.20	High
8.	I would like to enjoy the unique experience at Demang Abdul Ghani Gallery	4.00	High
9.	For me, the design of Demang Abdul Ghani Gallery is very interesting	4.02	High
10.	I will like the unique architecture of Demang Abdul Ghani Gallery	4.02	High
	Overall mean	**4.03**	**High**

Objective (3): To discover whether the promotion affect the popularity of Demang Abdul Ghani Gallery

There are 11 questions that should be answered by teh respondent regarding visitors' assumptions about Demang Abdul Ghani Gallery. Table 1.4 below shows the mean obtained.

No.	Item	Min	Interpret
1.	I have heard about the promotion of Demang Abdul Ghani Gallery	1.60	Low
2.	I have seen promotion of Demang Abdul Ghani Gallery on Facebook	1.58	Low
3.	I have seen promotion of Demang Abdul Ghani Gallery on website	1.64	Low
4.	I have seen promotion of Demang Abdul Ghani Gallery on brochure	1.58	Low
5.	I have seen promotion of Demang Abdul Ghani Gallery from word of mouth	1.76	Low
6.	I believe the promotion of Demang Abdul Ghani Gallery can increase the popularity of the gallery	1.06	Low
7.	I believe that it is important to promote this gallery	4.24	High
8.	I believe with effective promotion of Demang Abdul Ghani Gallery, it can create interest for the tourist to visit the gallery	4.32	High
9.	I believe that the promotion of Demang Abdul Ghani Gallery can increase the awareness of how important the historical site is	4.32	High
10.	I believe that the gallery needs more promotion to popularize it	4.38	High
11.	I believe that the number of visitors can affect by lack of promotion	4.24	High
	Overall mean	**2.79**	**Medium**

Table 1.4: To discover whether the promotion affect the popularity of Demang Abdul Ghani Gallery

Findings

The finding that the researcher had gained based on the research is that lack of promotion is the main reason why Demang Abdul Ghani Gallery is not popular. By the lack of promotion, the tourist and also local people did not have any idea about the location of the Demang Abdul Ghani Gallery. The researcher also got to know that the tourist and local people do have positive assumptions towards Demang Abdul Ghani Gallery, however, with the lack of promotion the tourist and local people did not acknowledged the existence of the memorable gallery.

Suggestion

During this study, vary process had been done which is done the observation, survey and distribute the questionnaire to respondent to find the solution. After all process, researcher found that a few problems occur because of lack of promotion at Demang Abdul Ghani Gallery. So, a few suggestions below could be taken in order to promote this gallery and let tourist visit and enjoy their visit at this gallery. The key point here is about promotion and suitable promotional tools to let tourist, local people and everybody know and visit Demang Abdul Ghani Gallery as their tourism destination.

Brochure

Brochure is one of the medium to give information to tourist. As we can see now, the related brochure in Melaka tourism products indirectly provide information about Demang Abdul Ghani Gallery itself. While in 2009, this gallery has been restored among the 11 historic building across the country so that this treasures is not lost this era due to his unique architecture and for future generation. Then, for reason of such brochures about Demang Abdul Ghani Gallery should be created and be propagated to the public.
In addition, the characteristics that should be found in the brochure of Demang Abdul Ghani Gallery is like having dual-language which are Bahasa Malaysia and English also featured the information easy to understand. This brochure also must have pictures, colors and graphics more attractive so that the attractiveness of the brochure to read higher next trigger interest visitors for visiting tis gallery.

Creating a variety of interesting Activity

The main factors why tourist did not come to this gallery are because there is no interesting activity that they can join. So, for the future study, they can create a variety of interesting activity can be held in this Gallery to attract tourist. So, they can enjoy their visit with those activities that they can involve in. among activities that can be held as traditional games like congkak, batu seremban, galah panjang and etc, guided tour focus for school student and IPTA student and other interesting activity that could be attract tourist attention.

Website

In line with the development of this art, internet technology (IT) is not unfamiliar with life

now. Therefore, the results from this study indicate that there are no promotions that have been developed through website for Demang Abdul Ghani Gallery itself. So, this opportunity should be taken to introduce longer thus promoting Demang Abdul Ghani Gallery with a variety of interesting information in the eyes of domestic or international tourist. With the availability of this website hopefully will be tremendous impact on the statistics of attendance of tourist to this gallery.

Conclusion

As for the conclusion, majority respondent agree that the hidden reason why Demang Abdul Ghani Gallery is not popular among tourist and local people is that the gallery is lack of promotion. The tourist and local people that had answered the questionnaire seems like they did not have any idea where and what the Demang Abdul Ghani Gallery is. The future research might be in the context of examine the suitable promotional tools that can be used in order to promote this gallery to the world. The output will give benefit to tourist as well as the PERZIM itself to strengthen the promotion about heritage product especially this gallery.

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PERSEPSI PELAJAR TERHADAP PROGRAM DIPLOMA PERKHIDMATAN BANGUNAN

Haryati Ismail1, a, Aryuziyanti Mohamad2,b dan Abdul Muthalib Abdul Rahman3,c

1,2,3 Politeknik Sultan Azlan Shah, Behrang, Malaysia

Katakunci: persepi; kemahiran; kerja; keusahawanan; berfikir kritikal

Abstrak: Diploma Kejuruteraan Perkhidmatan Bangunan merupakan satu program di bawah Jabatan Kejuruteraan Awam yang menumpukan bidang operasi dan penyenggaraan perkhidmatan bangunan. Pertambahan bilangan lulusan teknikal yang tidak mendapat pekerjaan adalah merupakan satu masalah. Peningkatan kadar pengangguran disebabkan beberapa faktor termasuklah wujudnya ketidaksepadanan antara kemahiran yang diperlukan oleh pasaran buruh dan kemahiran yang dimiliki. Kajian ini di jalankan mencapai dua objektif yang dirangka iaitu (1) Menentukan impak program Diploma Kejuruteraan Perkhidmatan Bangunan terhadap kemahiran pelajar dan (2) Menentukan tahap kepuasan lulusan terhadap program Diploma Kejuruteraan Perkhidmatan Bangunan. Seramai 41 lulusan akhir sesi Disember 2017 telah menjawab borang soal selidik yang diedarkan. Kajian mendapati, semua pelajar mendapati program ini memberi impak kepada kemahiran kerja, kemahiran keusahawan dan kemahiran berfikir secara kritikal. Selain itu, responden juga berpuas hati dengan program yang mereka ikuti. Di akhir kajian, bererapa cadangan diberikan untuk memastikan pelajar berpuas hati terhadap program Diploma Kejuruteraan Perkhidmatan Bangunan serta memperolehi kemahiran yang diperlukan untuk menempuhi alam pekerjaan.

Pengenalan

Program pengajian Diploma Kejuruteraan Perkhidmatan Bangunan merupakan salah sebuah program di bawah Jabatan Kejuruteraan Awam. Buat masa ini ianya telah ditawarkan di empat buah politeknik di Malaysia iaitu Politeknik Sultan Abdul Halim Mu'Adzam Shah, Politeknik Kuching Sarawak, Politeknik Sultan Salahuddin Abdul Aziz Shah (Politeknik Premier) dan Politeknik Sultan Azlan Shah. Tempoh pengajian yang ditetapkan untuk program ini adalah 3 tahun.

Program pengajian Diploma Kejuruteraan Perkhidmatan Bangunan direkabentuk untuk melengkapkan pelajar dengan pengetahuan teoritikal, kemahiran teknikal dan tingkah laku yang diperlukan dalam bidang operasi dan penyenggaraan perkhidmatan bangunan. Pelaksanaan aktiviti pengajaran dan pembelajaran program pengajian ini dijalankan di kampus, makmal, bengkel dan industri berkaitan. Program ini juga meliputi skop kerja dalam mengenali rekabentuk sistem bagi memastikan kerja pengoperasian dan penyenggaraan bangunan berjalan lancar serta memenuhi kehendak industri, pelanggan dan masyarakat. Pelajar juga akan dilatih bagi menguasai kemahiran keusahawanan supaya dapat menyumbang kepada pertumbuhan ekonomi sejajar dengan pembangunan negara. Selain itu, pelajar juga akan menjalani latihan industri bagi menyediakan graduan kepada sektor pekerjaan yang berlainan dalam industri kerana kemahiran dan pengetahuan yang diperoleh amat berguna untuk industri yang serba moden ini.

Pertambahan bilangan lulusan teknikal yang tidak mendapat pekerjaan adalah merupakan satu masalah. Faktor pengangguran ini bukan hanya disebabkan masalah kekurangan pekerjaan tetapi adalah juga disebabkan wujudnya ketidaksepadanan antara kemahiran yang diperlukan oleh pasaran buruh dan kemahiran yang dimiliki (skill missmatch). Kajian ini di jalankan bagi mengetahui persepsi lulusan program Diploma Kejuruteraan Perkhidmatan Bangunan terhadap program ini. Ia juga berkepentingan dalam menentukan halatuju program ini. Oleh itu, kajian ini dilaksanakan untuk mencapai objektif yang dirangka iaitu:

● Menentukan impak program Diploma Kejuruteraan Perkhidmatan Bangunan terhadap kemahiran pelajar
●Menentukan tahap kepuasan lulusan terhadap program Diploma Kejuruteraan Perkhidmatan Bangunan

Kajian Literatur

Hasil kajian yang dijalankan oleh Mohamad Sattar, Md Yusof, Napsiah & Roseamnah (2009) menyatakan individu harus menekankan kemahiran yang sangat diutamakan oleh majikan seperti kemahiran berfikir, interpersonal dan kualiti personal untuk berdaya saing dalam mendapatkan pekerjaan. Sinar Harian, 4 Mac 2012 menyatakan, graduan gagal menepati kehendak majikan dalam mencari pekerjaan kerana kurang kemahiran berfikir secara kritis dan lemah dalam berkomunikasi. Menurut Mohd Makhbul, I Yussof & AH Awang (2015), majikan beranggapan graduan masih belum mencapai kemahiran yang di harapkan dari segi komunikasi dan interpersonal. Berita Harian, 31 Januari 2016 pula menyatakan, majikan pada hari ini mahukan graduan yang holistic, seimbang dan mempunyai ciri keusahawanan. Graduan yang kurang mempunyai nilai modal insan dan kemahiran sosial dikatakan menjadi punca kepada kegagalan mendapat pekerjaan.

Sehubungan dengan itu, pada 2014, satu kerangka struktur program diploma telah dirangka dengan memberi penekanan kepada kemahiran insaniah. Kemahiran berkomunikasi dan kerja berpasukan juga diterapkan kepada pelajar supaya mereka dapat berkomunikasi, berinteraksi dan bekerja secara berpasukan dengan penuh bertanggungjawab dan berkesan. Segala pengetahuan dan kemahiran yang diperolehi oleh pelajar amat berguna untuk membina kerjaya atau pun melanjutkan pelajaran ke peringkat lebih tinggi dalam bidang kejuruteraan perkhidmatan bangunan dan pengurusan fasiliti.

Peluang pekerjaan pelajar yang luas selepas menamatkan pengajian dengan Diploma Kejuruteraan Perkidmatan Bangunan juga turut dititikberatkan semasa merekabentuk program ini. Antara bidang kerjaya yang boleh dimasuki oleh graduan adalah Penolong Jurutera, Pengurus Fasiliti, Pembantu Teknik Penyelia Penyenggaraan, Juruteknik Makmal/Bengkel, Pembantu Penyelidik, Perunding Kemudahan dan Perkhidmatan Bangunan dan Kontraktor Penyenggaraan Bangunan. Justeru itu, dalam kajian ini adalah berfokuskan kemahiran penting seperti kemahiran berkerja, kemahiran keusahawanan dan kemahiran pemikiran secara kritikal yang dapat dipraktikkan oleh lulusan program ini selepas tamat pengajian mereka.

Metodologi Kajian

Kajian ini merupakan sebuah kajian berbentuk kuantitatif. Borang soal selidik telah digunakan untuk mencapai dua objektif yang dirangka. Nilai Cronbach Alpha yang diperolehi bagi boang soal selidik ini adalah sebanyak 0.964. Seramai 41 pelajar Diploma Kejuruteraan Perkhidmatan Bangunan yang telah menamatkan pengajian mereka bagi sesi Disember 2017 telah mengambil bahagian di dalam kajian ini. Borang soal selidik ini menggunakan skala likert tiga poin bagi objektif satu dan skala likert lima poin bagi objektif dua.

Terdapat tiga bahagian utama di dalam borang kaji selidik ini iaitu demografi responden, impak program terhadap kemahiran lulusan dan tahap kepuasan lulusan terhadap program Diploma Kejuruteraan Perkhidmatan Bangunan. Dapatan dari responden di analisis dengan menggunakan Statistical Package for Social Science (SPSS). Data diintrepetasi dengan merujuk kepada Ariola (2006).

Dapatan Kajian

Jadual 1 di bawah menunjukkan demografi responden berdasarkan jantina. Dari 41 jumlah responden, 48.8% (20) daripadanya adalah lelaki dan 51.2% (21) adalah perempuan. Berdasarkan umur, responden berusia 21 tahun merupakan responden terbanyak iaitu merangkumi 51.2% diikuti dengan responden berusia 22 tahun iaitu 36.6%. Responden berusia 24 dan 25 masing-masing merupakan responden terkecil dengan hanya 2.4%.

Objektif pertama kajian ini adalah menentukan impak program Diploma Kejuruteraan Perkhidmatan Bangunan terhadap kemahiran pelajar. Untuk itu, sebanyak tiga kemahiran utama di ukur iaitu kemahiran bekerja, kemahiran keusahawanan dan kemahiran berfikir secara kritikal. Reponden dikehendaki menjawab beberapa soalan berkaitan impak program terhadap tiga kemahiran utama tersebut dengan menggunakan skala likert 3 poin iaitu hampir sama, agak meningkat dan meningkat dengan ketara. Dapatan kajian ditunjukkan bagi objektif pertama ditunjukkan di dalam Jadual 1, Jadual 2 dan Jadual 3 di bawah.

Bagi kemahiran bekerja, tujuh daripada sepuluh item memperolehi mata min 2.5 dan ke atas iaitu agak meningkat hingga meningkat dengan ketara. Min mata tertinggi adalah boleh bekerja secara produktif dalam kumpulan dengan min 2.70. Boleh melakukan pembentangan secara oral dengan berkesan dan kemahiran kerja praktikal dalam bidang pengajian saya pula merupakan mata kedua tertinggi dengan nilai mata 2.59. Jadual 2 di bawah menunjukkan dapatan berkaitan impak program Diploma Perkhidmatan Bangunan terhadap kemahiran keusahawanan. Ke semua item menunjukkan nilai min melebihi 2.00 iaitu di antara hampir sama sehingga agak meningkat. Item yang mempunyai nilai mata tertinggi adalah mampu mengatur masa dan sumber lain dengan berkesan (2.29) manakala mampu menyediakan rancangan perniagaan yang berkesan merupakan item yang memperolehi nilai min terendah (2.09).

Kemahiran terakhir yang diukur adalah kemahiran berfikir secara kritikal. Jadual 3 menunjukkan min melebihi 2.00 dengan nilai mata min tertinggi 2.51 iaitu mampu menerapkan pembelajaran untuk menyelesaikan masalah atau berinovasi. Mampu menganalisis dan mengkritik

kerja-kerja yang dilakukan oleh orang lain merupakan item yang mempunyai nilai mata terendah iaitu 2.39. Dapat disimpulkan, bagi objektif pertama, menentukan impak program Diploma Kejuruteraan Perkhidmatan Bangunan terhadap kemahiran pelajar ialah diantara agak meningkat sehingga meningkat dengan ketara.

Jadual 1 : Kemahiran Bekerja

Item	Min
Kemahiran komputer dan IT	2.463
Mampu bekerja secara produktif dalam kumpulan	2.707
Mampu melakukan pembentangan secara oral dengan berkesan	2.512
Mampu menghasilkan dan menulis dokumen secara berkesan bagi pelbagai tujuan	2.585
Mampu memahami dan mentafsirkan maklumat	2.561
Mampu mentafsir dan menggunakan angka dan statistik dengan mahir	2.439
Mampu secara konsisten melaksanakan tugas yang dirancang pada waktu yang tepat	2.537
Pengetahuan teori dalam bidang pengajian saya	2.463
Kemahiran kerja praktikal dalam bidang pengajian saya	2.585

Jadual 2 : Kemahiran Keusahawanan

Item	Min
Mampu menyediakan rancangan perniagaan yang berkesan	2.097
Memahami pasaran modal dan peluang perniagaan yang berpotensi	2.146
Mampu berunding dengan perjanjian dan perjanjian perniagaan	2.122
Mampu mengatur masa dan sumber lain dengan berkesan	2.293

Jadual 3: Kemahiran Berfikir Secara Kritikal

Item	Min
Mampu maklumat sintesis dari pelbagai sumber	2.463
Mampu menganalisis dan mengkritik kerja-kerja yang dilakukan oleh orang lain	2.390
Mampu menerapkan pembelajaran untuk menyelesaikan masalah atau berinovasi	2.512
Mampu menggunakan maklum balas daripada orang lain untuk meningkatkan kualiti kerja	2.463

Selain daripada mengkaji impak program, kajian ini juga dijalankan bagi menentukan tahap kepuasan lulusan terhadap program Diploma Kejuruteraan Perkhidmatan Bangunan. Bagi tujuan ini, resonden perlu menjawab tiga iterm berkaitan dengan menggunakan skala likert 5 poin dari sangat tidak berpuashati hingga sangat berpuas hati. Seperti yang ditunjukkan di dalam jadual 4 di atas, item yang mempunyai nilai min tertinggi adalah anda lebih bersedia untuk berjaya sekiranya melanjutkan pelajaran dengan nilai min 4.12. Anda lebih bersedia untuk berjaya dalam pasaran kerja merupakan nilai min kedua tertinggi dengan 3.89 dan diikuti dengan anda lebih bersedia untuk berjaya dalam pasaran kerja semasa (3.56). Secara keseluruhan, didapati responden berada di dalam linkungan neutral sehingga berpuashati terhadap program ini. Dapat disimpulkan walaupun berpuas hati terhadap program ini, kebanyakan responden belum bersedia sepenuhnya untuk menghadapi alam pekerjaan.

Jadual 4: Kepuasan pelajar terhadap program

Item	Min
Anda lebih bersedia untuk berjaya dalam pasaran kerja semasa	3.829
Anda lebih bersedia untuk berjaya dalam pasaran kerja semasa	3.563
Anda lebih bersedia untuk berjaya sekiranya melanjutkan pelajaran	4.122

Kesimpulan dan cadangan

Secara keseluruhannya, hasil kajian menunjukkan bahawa semua lulusan graduan program Diploma Kejuruteraan Perkhidmatan Bangunan memperoleh impak yang tinggi hasil daripada proses pembelajaran mereka dalam kontek kemahiran bekerja, keusahawanan dan berfikiran kritikal.

Kaedah pembelajaran pelajar perlu diperkukuhkan dan diperluaskan dengan penglibatan pelajar secara menyeluruh berkaitan kemahiran-kemahiran penguasaan secara berkesan. Berdasarkan kajian ini, pengkaji mengenal pasti terdapat beberapa kelemahan lulusan yang perlu

diberi perhatian perlu dikhususkan kepada pelajar-pelajar semasa. Beberapa cadangan untuk meningkatkan kualiti pengajaran dan pembelajaran program ini berdasarkan dapatan kajian. Kaedah pengajaran dan pembelajaran dipertingkatkan hubungan perkembangan semasa di industri yang berhubungkait pengajaran teori kepada penggunaannya di industri sama ada untuk bekerja sendiri atau di industri. Oleh yang demikian, aktiviti-aktiviti khusus perlu diperluaskan dengan pihak industri bagi memenuhi pemahaman dan mempertingkatkan kemahiran pelajar sebelum menamatkan pengajian. Selain itu, pendedahan kepada penggunaan komputer dan teknologi maklumat hendaklah sentiasa berdasarkan teknologi terkini seperti mana yang digunapakai di industri.

Dalam kontek keusahawanan, pendedahan kaedah merancang diperlukan untuk menjadi usahawan mengikut bidang program yang dipelajari. Pelajar diberi tunjuk ajar yang menjuruskan proses permulaan perniagaan dengan lebih praktikal termasuk panduan permulaan modal dan sumber-sumber rujukan yang diperlukan. Bagi meningkatkan pemikiran secara kritikal, pelajar perlulah diberi ruang mengkritik secara kritis terhadap hasil-hasil kerja pelajar lain semasa sesi pembentangan, hasil projek dan sebagainya. Ini sebagai peluang pendedahan keyakinan diri pelajar selain memupuk pelajar berfikiran luas dan kontek pembelajaran sedia ada. Sehubungan itu, peluang pelajar untuk memberikan maklum balas terhadap apa juga proses pengajaran dan pembelajaran, maklum balas hasil dapatan pelajar lain perlu diberi ruang sewajarnya sebagai tindak balas meningkatkan kualiti kerja secara optimum. Selain daripada itu, program-program kemahiran insaniah perlu lebih banyak diterapkan sepanjang tempoh pembelajaran. Ianya dapat membina keyakinan pelajar dan memmbantu mereka lebih bersedia untuk menghadapi alam pekerjaan.

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Sejauhmanakah Keberkesanan Pengaruh Pendekatan Pensyarah Terhadap Sikap Dan Gaya Pembelajaran Pelajar Di PSAS Dalam Matematik Kejuruteraan Dua

Noormala Abdullah1, a
1Politeknik Sultan Azlan Shah, Behrang Stesen, Perak
anoormala@psas.edu.my

Keywords: Pengaruh; Pendekatan Pensyarah; Sikap; Gaya Pembelajaran

Abstrak: Kajian ini dijalankan untuk mengenalpasti sejauhmanakah pengaruh pendekatan pensyarah terhadap sikap dan gaya pembelajaran dalam Kursus Matematik Kejuruteraan Dua di Politeknik Sultan Azlan Shah. Kajian yang dijalankan adalah berbentuk kajian kuantitatif dengan menggunakan set soal selidik. Populasi kajian ini adalah seramai 340 dan seramai 181 orang sampel pelajar telah dipilih melalui Jadual Persampelan Krejie dan Morgan (1970) sebagai responden kajian dan juga untuk memenuhi objektif kajian ini iaitu untuk mengenalpasti sejauhmanakah pengaruh pendekatan pensyarah mempengaruhi sikap dan gaya pembelajaran pelajar dalam Kursus Matematik Kejuruteraan Dua. Borang soal selidik digunakan sebagai bahan kajian bagi mendapatkan data dan di analisis menggunakan perisian Statistical Package for Social Sciences (SPSS) 20.0 dengan menggunakan Ujian-T dan Annova. Hasil kajian menunjukkan bahawa responden mempunyai sikap yang positif ketika mempelajari kursus Matematik Kejuruteraan Dua di Politeknik Sultan Shah. Dapatan kajian juga mendapati jenis-jenis gaya pembelajaran yang disukai oleh pelajar turut dipengaruhi oleh minat serta peranan tenaga pengajar mempengaruhi gaya pembelajaran pelajar dalam Kursus Matematik Kejuruteraan Dua. Walau bagaimanapun dalam kajian ini, didapati bahawa pendekatan pensyarah sememangnya mempengaruhi gaya pembelajaran pelajar dalam kursus ini. Keseluruhannya para pelajar kursus Matematik Kejuruteraan Dua dilihat mempunyai sikap dan gaya pembelajaran yang positif terhadap pendekatan pensyarah dan sukatan Kursus Matematik Kejuruteraan Dua.

Pengenalan

Matematik dan bidang kejuruteraan bagaikan berpisah tiada. Ia seperti aur dengan tebing, saling memerlukan. Matematik merupakan tonggak utama dalam kejuruteraan kerana kemahiran dan pengetahuan matematik yang dipelajari akan digunapakai dalam matapelajaran teknikal yang lain. Oleh sebab itulah matapelajaran matematik menjadi syarat wajib lulus dengan sekurang-kurangnya kepujian gred C dalam SPM untuk melanjutkan pelajaran di peringkat diploma kejuruteraan di Politeknik Malaysia. Namun begitu, walaupun ambilan pelajar telah mengikut syarat kelayakan permohonan ke politeknik, keputusan pelajar bagi sesetengah kursus Matematik Kejuruteraan masih kurang memberangsangkan di Politeknik Malaysia amnya dan di Politeknik Sultan Azlan Shah khususnya. Oleh itu, kajian ini dijalankan untuk mengenalpasti faktor-faktor yang mempengaruhi pencapaian pelajar dalam kursus DBM 2013 Matematik Kejuruteraan 2 di Politeknik Sultan Azlan Shah (PSAS).

Permasalahan Kajian

Pada sesi Disember 2014, Kursus DBM 2013 Matematik Kejuruteraan 2 telah mula diperkenalkan. Silibus kursus adalah terdiri daripada topik Indeks dan Logaritma, Pembezaan dan Pengamiran. Pencapaian pelajar pula sering dikaitkan dengan kegagalan dan proses pengajaran pensyarah pula dipertikaikan. Mohd Razali, S. (2015) menerangkan pensyarah yang jelas diikuti dengan latihan yang mencukupi dapat meningkatkan pencapaian pelajar untuk memperolehi gred yang lebih baik. Menurut Yahya Samian (2012), penyampaian pengajaran yang lemah dianggap sebagai faktor utama yang menyumbang kepada prestasi yang lemah. Secara umumnya pencapaian pelajar dalam kursus ini dilihat dari pelbagai faktor seperti pengajaran pensyarah, sikap dan gaya pembelajaran dan lain-lain.

Objektif Kajian

1. Mengenalpasti skor min bagi setiap pembolehubah yang mempengaruhi keberkesanan Pengajaran dan Pembelajaran bagi subjek ini.

2. Mengenalpasti hubungan antara faktor-faktor yang mempengaruhi keberkesanan proses pengajaran dan pembelajaran tersebut dengan jantina.

3. Mengenalpasti perbezaan antara persepsi pelajar terhadap faktor-faktor yang mempengaruhi keberkesanan proses pengajaran dan pembelajaran tersebut berdasarkan jantina dan jabatan.

Kajian Literatur

Menurut Zalizan M. Jelas, Amla Salleh, Norzaini Azman (2014), menentukan skor min bagi setiap pembolehubah adalah untuk meneguhkan teori mengenai pengaruh keberkesanan Pengajaran dan Pembelajaran dalam subjek ini sepertimana kajian yang dilakukan di barat terhadap konstruk yang dikaji.

Bagi Zainuddin Abu Bakar, Meor Ibrahim Kamaruddin, Megat Aman Megat Zahiri Megat Zakaria dan Mohd Ali Ibrahim (2007) menyatakan bahawa analisis min, sisihan piawai dan korelasi telah dijalankan bagi menentukan hubungan di antara pemboleh ubah yang dikaji. Penentuan ini dapat dilihat dalam Jadual 1.

Jadual 1 : Penentuan Tahap Skor Min

Julat Min	Tahap
1.00 – 2.00	Rendah
2.01 – 3.00	Sederhana
3.01 – 4.00	Tinggi

Dalam Zalizan M. Jelas, Amla Salleh, Nor Zaini Azman, Rohana Jani (2014), perbezaan gender dalam hasil pendidikan telah menjadi agenda penyelidikan antarabangsa dalam beberapa dekad yang lalu, dan masih merupakan isu yang mencabar di Malaysia. Ketidakmampuan lelaki telah menjadi tumpuan penyelidikan analisis gender oleh Kementerian Pendidikan (Zalizan M. Jelas et al, 2014; 2001; 2013) dan pendidik lain (Zalizan M. Jelas et al, 2014; Zalizan, Saemah, Roselan & Jamil 2005; Nor Aniza, Zalizan & Manisah 2011). Kajian terdahulu di Malaysia telah menumpukan pengajian mereka tentang kesan gaya pelajar dan kemahiran belajar serta strategi pembelajaran yang memihak kepada kanak-kanak perempuan daripada kanak-kanak lelaki. Untuk menangani masalah ini adalah penting untuk mengetahui lebih lanjut mengenai faktor-faktor yang mungkin menghalang kemajuan akademik yang dibuat oleh semua kanak-kanak, tetapi terutamanya oleh mereka yang secara tradisional mengalami masalah dalam menampung kumpulan rakan sebaya mereka dan terutama anak lelaki. Tujuan makalah ini adalah untuk menganalisis corak jantina dalam kehadiran sekolah dan pencapaian pendidikan dan mengaitkan trend kepada corak penglibatan pelajar dan kebakaran sekolah sebagai faktor yang mempengaruhi prestasi sekolah mereka. Terdapat bukti dalam kesusasteraan untuk menunjukkan keterlibatan pelajar dan pembakaran sekolah menyumbang perbezaan jantina dalam prestasi sekolah (Zalizan M. Jelas, 2014 et al; Lam et al, 2012; Furlong & Christenson 2008; Salmela-Aro & Tykkynen 2012; Zhang, Gan & Cham 2007). Data yang dilaporkan dalam karya ini merupakan sebahagian daripada kajian yang lebih besar untuk menyiasat jurang jantina dalam pendidikan untuk mencadangkan langkah strategik untuk memperkecilkan jurang.

Menurut kajian daripada Zahara Aziz dan Md Anowar Hossain (2010), setelah melalui beberapa ujian, pelajar yang melalui ujian secara eksperimen ini menunjukkan peningkatan dalam pencapaian matematik berbanding dengan pelajar yang tidak terlibat dengan rawatan. Pelajar yang tidak terlibat dengan rawatan adalah pelajar yang tidak dibantu dalam melakukan latih tubi dan bimbingan dalam memberi kefahaman di dalam subjek matematik. Kesan kaedah pembelajaran secara berpusat adalah signifikan dengan pencapaian matematik antara pembelajaran secara koperatif dan konvensional. Pembelajaran secara koperatif dan konvensional adalah berkadaran dengan keseluruhan pencapaian matematik.

Bagi pengkaji Zaliza Mohamad Nasir, Zaitul Azma, Zainon Hamzah (2014) menyatakan bahawa sikap mempunyai perkaitan rapat dengan pencapaian seseorang di dalam pembelajarannya. Sikap ialah sesuatu yang abstrak dan hanya dapat dilihat atau dirasa melalui tindakan yang diambil. Faktor diri sendiri merupakan faktor yang paling mempengaruhi seseorang untuk mempelajari sesuatu. Jika pelajar ini memiliki sikap yang positif seperti kesedaran betapa pentingnya sesuatu perkara yang dipelajari, maka dia akan cuba menguasai perkara tersebut dengan pelbagai cara.

Metodologi

A.Rekabentuk Kajian

Kajian yang dijalankan berbentuk kajian kuantitatif. Set soalselidik diedarkan kepada pelajar yang mendaftar kursus DBM 2013 Matematik Kejuruteraan 2 untuk sesi Disember 2017 dari jabatan akademik iaitu JKA, JKE dan JKM.

B. Populasi dan persampelan

Populasi kajian adalah semua pelajar yang mendaftar kursus DBM 2013 Matematik Kejuruteraan 2 untuk sesi Disember 2017 adalah seramai 340 dan seramai 181 orang sampel pelajar telah dipilih sebagai responden kajian. Ia merujuk kepada Jadual Persampelan oleh Krejie, R.V dan Morgan (1970).

C. Instrumen Kajian

Instrumen soal selidik dibina berdasarkan kepada kajian-kajian yang lepas. Soal selidik ini dibahagikan kepada 2 bahagian iaitu Bahagian A dan Bahagian B. Bahagian A mengandungi profil responden dan Bahagian B adalah soalan-soalan yang berkaitan item-item bagi menjawab persoalan kajian. Tandaan (/) dan Skala Likert digunakan.

Dapatan Kajian

Purata keseluruhan skor min bagi pembolehubah mean sikap pelajar adalah 3.59166 yang menunjukkan bahawa responden bersikap positif terhadap pembolehubah tersebut dengan tahap penerimaannya yang tinggi.
Purata keseluruhan skor min bagi pembolehubah min gaya pembelajaran adalah 3.9753 yang menunjukkan bahawa responden bersikap positif terhadap pembolehubah tersebut dengan tahap penerimaannya yang tinggi.
Purata keseluruhan bagi skor min bagi pembolehubah mean pendekatan pensyarah adalah 3.7544 yang menunjukkan bahawa responden bersikap positif terhadap pembolehubah tersebut dengan tahap penerimaannya yang tinggi.

Hasil bagi ujian-t terhadap pembolehubah mean sikap pelajar adalah seperti berikut:

		Levene's Test Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
mean_sikap_pelajar	Equal variances assumed	1.653	0.201	-1.069	440	.264	-0.5423	.04783	-.14991	.04342
	Equal variances not assumed			-1.321	328.010	.291	-0.5423	.04143	-.13838	.03918

Memandangkan nilai ρ adalah 0.264 iaitu lebih besar nilainya jika dibandingkan dengan nilai α, maka hipotesis nol diterima (H0: Tidak terdapat perbezaan yang signifikan di antara tahap penerimaan pelajar lelaki dengan pelajar perempuan). Skor min bagi pelajar lelaki adalah 4.1038 manakala skor min bagi pelajar perempuan adalah 4.0753. Hal ini dapat disimpulkan bahawa kedua-dua kumpulan pelajar tersebut bersikap positif dengan tahap penerimaannya yang tinggi terhadap mean sikap pelajar.

Hasil bagi ujian-t terhadap pembolehubah mean gaya pembelajaran adalah seperti berikut:

		Levene's Test Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
mean_gaya_pembelajaran	Equal variances assumed	5.578	0.018	-1.537	440	.124	-0.9886	.06441	-.22473	.02793
	Equal variances not assumed			-1.761	328.010	.078	-.09886	.05706	-.20898	.01136

Berdasarkan jadual tersebut Nilai ρ adalah 0.018 iaitu kurang daripada nilai α. Ini menunjukkan bahawa kedua-dua kumpulan tersebut tidak mempunyai varians yang sama. Hasilnya keputusan ujian-t bagi perbandingan min dua kumpulan sampel tak bersandaran yang mempunyai varians populasi yang sama (equal varians assumed) tersebut tidak diambilkira. Jadi, nilai ρ seterusnya yang akan diambilkira adalah 0.078. Dengan menggunakan nilai ρ tersebut, maka proses analisis yang bertujuan untuk menentukan sama ada terdapat perbezaan yang signifikan ataupun tidak dapat diteruskan .

Nilai ρ adalah 0.078 iaitu nilainya lebih besar nilainya jika dibandingkan dengan nilai α yang telah ditetapkan. Maka hipotesis nol diterima (HO : Tidak terdapat perbezaan yang signifikan di antara tahap penerimaan pelajar lelaki dan perempuan). Skor min yang diperolehi oleh kumpulan pelajar lelaki adalah 4.0697 dan skor min bagi kumpulan pelajar perempuan adalah 4.1378.

Mean Gaya Pembelajaran

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.605	2	.802	2.129	.118
Within Groups	164.193	441	.374		
Total	166.789	443			

Berdasarkan jadual ANOVA berikut, nilai kebarangkalian ρ adalah 0.118 iaitu lebih besar nilainya jika dibandingkan dengan nilai α. Maka, hipotesis nol yang merujuk kepada semua populasi mempunyai tahap penerimaan yang sama telah diterima.

Mean Pendekatan Pensyarah

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.539	2	.769	1.629	.183
Within Groups	205.701	441	.417		
Total	206.890	443			

Berdasarkan jadual ANOVA berikut, nilai kebarangkalian ρ adalah 0.183 iaitu lebih besar nilainya jika dibandingkan dengan nilai α. Maka, hipotesis nol yang merujuk kepada semua populasi mempunyai tahap penerimaan yang sama telah diterima.

Kesimpulan dan Cadangan

Dapatan kajian secara keseluruhannya menunjukkan bahawa skor min bagi setiap pemboleh ubah adalah mempengaruhi keberkesanan proses pengajaran dan pembelajaran, tidak terdapat perbezaan persepsi pelajar terhadap faktor-faktor yang mempengaruhi keberkesanan pengajaran dan pembelajaran berdasarkan jantina, tiada hubungan antara faktor-faktor yang mempengaruhi keberkesanan proses pengajaran dan pembelajaran tersebut dengan jantina di mana gaya pembelajaran dan pendekatan pensyarah adalah sangat penting dalam meningkatkan sikap positif dan motivasi pembelajaran pelajar matematik kejuruteraan dua. Dengan ini, pelajar akan lebih berusaha meningkatkan pembelajaran dan sikap mereka dengan teknik dan kepelbagaian pengajaran oleh pensyarah. Dalam perspektif ini, pensyarah seharusnya mahir mengelolakan bahan pengajaran sehingga bagi menarik minat pelajar untuk terus mengikuti pembelajaran matematik kejuruteraan dua yang dianggap subjek sukar oleh pelajar kejuruteraan. Selain itu, kajian yang dijalankan juga menjelaskan tentang situasi sebenar kelemahan dan kekuatan pelajar ke atas sikap dan gaya pembelajaran mereka terhadap matematik kejuruteraan dua. Oleh itu, kepelbagaian pengajaran dan pembelajaran dari aspek pendekatan, kaedah, teknik aktiviti dan bahan pengajaran oleh pensyarah haruslah dikemaskini selalu bagi memenuhi kepelbagaian sikap dan gaya pembelajaran pelajar teknikal untuk menarik minat mereka memasuki institusi pendidikan teknikal seperti Politeknik Malaysia ini.

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ANALYSIS OF INTEGRATION OF INFORMATION OF BUS SYSTEM AND URBAN RAIL TRANSIT SERVICES AT TBS STATION (TERMINAL BERSEPADU SELATAN)

Aminah Binti Mohd Salin[1a], Prof. Dr.Hj. Mohd Idrus Bin Mohd Masirin[2b], Mohd Syafiq Bin Abd Rashid[3c], Noor Hafiza Nordin [4d]

1[a], 2[b],3[c],4 [d]Faculty Of Civil & Environment Engineering,University Tun Hussein Onn Malaysia,86400, Parit Raja,

Batu Pahat, Johor, Malaysia

Corresponding author : aminahmohdsalin@yahoo.com.my

idrusmas@gmail.com

Abstract : Terminal Bersepadu Selatan (TBS) is one of the public transportation system that effective, efficient and user-friendly public transportation systems that can solve traffic congestion problems around Pudu. TBS at Bandar Tasik Selatan built adjacent to the three public transport Light Rail Transit (LRT), Keretaapi Tanah Melayu (KTM) commuter and Kuala Lumpur International Airtport (KLIA) Transit express buses to transport from the south. TBS is the best hub of integration between bus system services and urban rail transit system in Malaysia. However, it has a disadvantage in that it is still in the early stages of operation. Weakness was found to be no integration of information between TBS and two urban rail transit of LRT and KTM. Therefore, the primary objectives of this study were to determine the integration of information to users in TBS. This study is very important to do in because it would be confusing and difficult for users who first arrived at TBS. Furthermore, urban rail transit stations are located outside the terminal to add more confusion to the user. Data for this study were obtained by the two methods, which are interviews and questionnaires in the field and online. Based on the data, it can be concluded that there is an information system in TBS special function at first impression for users who first arrived. If users frequently use these services, we found that many lack the information provided. Overall, these study successfully because all the data is fully obtained to achieve the objectives of the study. It is hoped that by improving the integration of information for both types of transport to encourage and increase the number of public transport users. In the future, it will make TBS as the most important economic center in Malaysia.

Keywords: Terminal Bersepadu Selatan (TBS), urban rail transit, integration of information

Introduction

Terminal Bersepadu Selatan (TBS) is built for express bus terminal in Bandar Tasik Selatan, which is located far from the city centre. Before the TBS exist, express buses from the south involving Negeri Sembilan, Malacca, Johor and Singapore also drop off their passengers at the Puduraya is now known as Pudu Sentral. This resulted in the issue of the bus is delayed arriving or departing later than the scheduled by the passengers due to traffic congestion or interference during a trip to Pudu Sentral [1].

Integration of transport modes ensures safety, protection and easy access to various land public

transport modes. In addition, the integrated transport terminal will cause the sustainable development of the transport system, efficient and ethical manner that is accessible to the entire community without impact or damage to the environment and safe for human consumption [2]. Among the elements of the transportation system that effectively and efficiently is the existence of a transit information system that provides information related to transit so that the user can plan a trip before travelling and make more informed decision about when and how to travel. This can lead to more efficient utilization of the transportation system [3, 4]. Transit information system provides information covering a variety of categories, including transit routes, map itineraries, fares and places, rather than comparative travel times across model [4].

TBS is built adjacent to the three types of rail public transportation that Light Rail Transit (LRT), KTM commuter and KLIA Transit. Most users on TBS are not residents in the area and do not understand the movement of public transport in Kuala Lumpur. Furthermore, urban rail transit stations are located outside the terminal[5].

The initiatives from TBS has created an integration of information system between TBS and urban rail transit in order to avoid confusion and inconvenience to users who are not familiar or other words first come on TBS, The urban rail transit, which are LRT and KTM, was built to connect rural areas to urban centres. Therefore, this study was undertaken to examine and analyse the integration of information between bus and rail transit services in the city TBS.

The objectives and aims of this study have been determined as follow :

1. To identify the bus and urban rail transit available in Terminal Bersepadu Selatan.
2. To determine the integration of information to users in Terminal Bersepadu Selatan.
3. To determine the relationship between the time of arrival and departure and transit travel time from one to the other public transport.

The scope of this study will be focused on existing system of information in terminal or by the roadside. The integration of information will be analysed and conducted between TBS and urban rail transit, which is LRT and KTM commuter station. Methods used in conducting this study are research and observations, questionnaires and interviews. The implementation period of this study will be carried out within 10 months.

Literature Review

With the introduction of an integrated transport terminal, Malaysian has achieved a high level of quality through a transformation in the effective provision of transport infrastructure and good [6]. Integrated transport terminals combine several modes of transportation in a terminal to facilitate the movement of the user. The integrated transport terminal is said to be very efficient because it provides door-to-door transportation [7]. In Malaysia, most terminals adopting the concept of integrated transport terminal, among them TBS. TBS is a new integrated transport terminal at Bandar Tasik Selatan built by MAJU Terminal Management and Services (TMAS). TBS a bus terminal that is built to flow to the south of the bus, which offers such as KL to Malaca, KL to Singapore, Kuala Lumpur to Johor, KL to Seremban and others. TBS begin operations on January 1, 2011. Proximity

TBS located in Bandar Tasik Selatan from the city centre, about 30 minutes of south with connected to Middle Ring Road 2 (MRR2) and Sungai Besi Expressway (SBE) [8].

As mention on introduction, LRT was besides with TBS and operated by the RapidKL Rail Network has two routes, which are Route Ampang Line and Kelana Jaya. LRT Ampang is a transit route that connected directly with TBS through Bandar Tasik Selatan Station. LRT Ampang is Y-shaped path from Ampang –Sentul Timur Station begins at Ampang, while the Sri Petaling-Sentul Timur route begins in Sri Petaling Station. Where the two paths met in Chan Sow Lin Station to make a change in the route or go north, and stopped at Sentul Timur.

Operating hours are 6.00 a.m until 12 midnight, 7 days a week [9, 10]. Transit interval is 3 to 5 minutes during peak hours and 5 to 8 minutes during non-peak hours. LRT Ampang Line also connects users to the Hentian Putra and Pudu Sentral [9,11].

Another urban rail transit besides TBS is KTM commuter. KTM commuter is an electric train services that was launched in 1995 and has been the focus of users working or living in Kuala Lumpur and the surrounding areas, in particular to avoid traffic jams. KTM commuter network over 153km through 42 stations divided into two streams can be done at Kuala Lumpur Central (KL Central). Operating hours are from 5.48 a.m. to midnight every day. Train interval is 15 minutes during peak hours and 20 minutes during off-peak hours [9,11].

An important aspect of efficient transport terminal is a transit information system. This system is implemented to provide information or travel information to consumers related to the existing transport, routes, fares and all relevant information. There are three types of the systems that can give and provide pre-trip travel of the system in terminal or by the roadside and in-vehicle transit information system [3]. System of terminal or sidewalk typically provides information to transit users are already on the way. This information is typically conveyed using various public agency internet and phone system, roadside dynamic message signs (DMS) , arrival signage at the stations as terminal stop with platforms, television and radio report and newer in-vehicles navigation system, electronic signage, interactive information kiosk a and so on [4,12]. The overall goal of this system is to provide real-time arrival and departure times of busses and trains to reduce anxiety while waiting for the user while improving customer satisfaction. If there is a delay in departure time, this information will quickly reach the consumer. This equips travellers with the ability to make informed decisions about travel options, leading to more efficient utilization of corridor assets [4].

Research Methodology

The research methodology of this study is to ensure that the data collection methods used to be achieved the objectives and aims. Figure below describes briefly the overview of the process and work flow involved in the study.

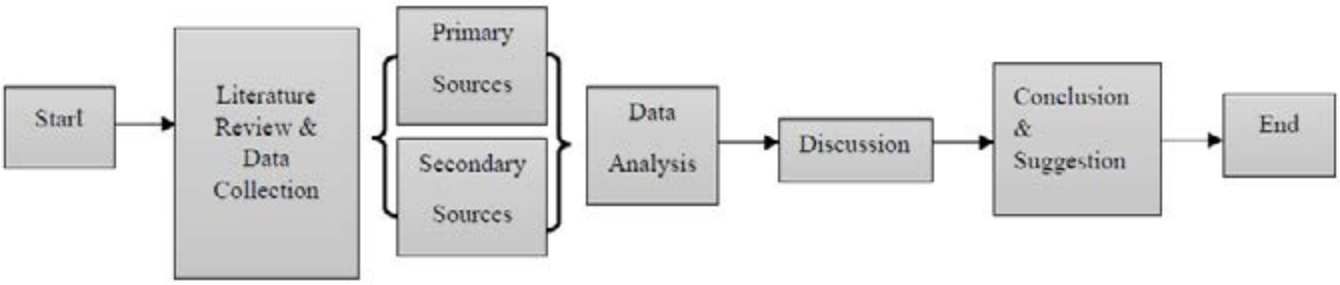

Figure 1 : Workflow process

Based on Figure 1, the data collection for this study was mainly carried out in the field. There are two methods used for data collection on the field. The first methods are the information is acquired by observation in the vicinity the terminal. It is to get a picture of the actual situation of the problems faced by consumers. The data collection methods are using questionnaires and interviews with users in the bridge that connect TBS and urban rail transit. Questionnaires and interviews were carried out to get feedback from users whether having the integration of information or not at the terminal area. The selections of individuals to be interviewed were randomly assigned for unbiased information obtained not happen so the data can be used in the analysis. The data analysis of these questionnaires and interview will be used statistic method. The result of this study will be shown by pie chart, bar chart and table for more understandings.

Result and Discussions

Bus System. There are two types of buses operating system at TBS depends on the distance, which is long-distance bus system and short-distance bus system. There are two operating systems for long-distance bus ticketing system that under centralized and decentralized ticket. The centralized ticketing system is a ticket purchases are managed by the TBS. While, the decentralized ticketing system is managed by the bus company.

Table 1: List of Express Bus Companies which Operate on TBS

The centralized ticketing system	The decentralized ticketing system
Air-Bus Express	Arwana Express
Delima Express	Bus 88 Express
Five-Star Express	Causeway Link Express
Hasry Express	City Express
Konsortium Express	Eagle Coach Express
Kwok Ping Express	Eltabina Sdn Bhd Express
Maharani Express	Five Stars Express
Maju Express	K.K.K.L Express
Mara Liner Express	Lower Perak Motor Service Express
Mayang Sari Express	Star Qistna Express
Melor Interline Express	Satria Sdn Bhd Express
Meridian Express	Sis.Kend.Bumiputra Express
Metro Bus Express	Sri Maju Express
Seasons Express	Kuala Yakin Express
Sepakat Liner Express	Grassland (Zenwan) Express
Star Mart Express	-
Star-Trip Express	-
Transnasional Express	-
Nice Executive Coach Express	-
Super Nice Express	-

Table 2: Schedule of Rapid KL bus routes operating in TBS

Code	Route	Base
T405	Taman Awana Cheras	Cheras
T408	Taman Segar/ Taman Bukit Supreme	Cheras
T424	HUKM / Desa Tasik	Balakong
S02	Kotaraya / Pudu Sentral	Sentul

According to the **Table 1** shows a list of express bus companies that operate on a centralized ticketing system on the left side. While on the right side shows a list of express bus companies that operate on a decentralized ticketing system. The short distance bus system provides users to the Klang Valley from TBS. The bus system is also known as city buses. From **Table 2**, it can be seen that there only one company that operates which is Rapid KL. There are four types of travel routes for buses operating.

Table 3: Range of travel time from TBS to transit stations

Categories	Range of time (minute)
Adult man	5 - 6
Adult woman	5 - 7
Senior citizen man	7 - 10
Senior citizen woman	8 - 11

Travel Time from TBS to Urban Rail Transit Station. There are four categories of user will be analyses for third objective. For each category, the range of time are based on five users are randomly selected. The result range of travel time from TBS to urban rail transit in each category can be seen in Table 3.

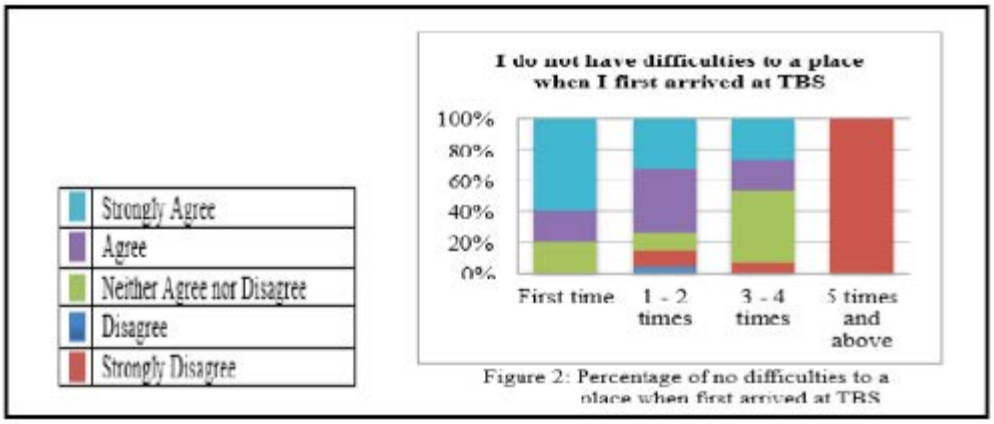

Figure 2: Percentage of no difficulties to a place when first arrived at TBS

Questionnaire Analysis. Figure 2 shown that 60% is the percentage of strongly agree to say no difficulties to a place for the first time to the respondents. From interviews conducted, they are more inclined and like to communicate directly at the information desk for information. For respondents who used 5 times and over in a month, 100% said difficulty for a place when I first arrived at TBS. This is to be expected because of the more frequent users to use, the more problems that users will enjoy. In addition, it is also influenced by the comparison made between TBS and bus terminals others.

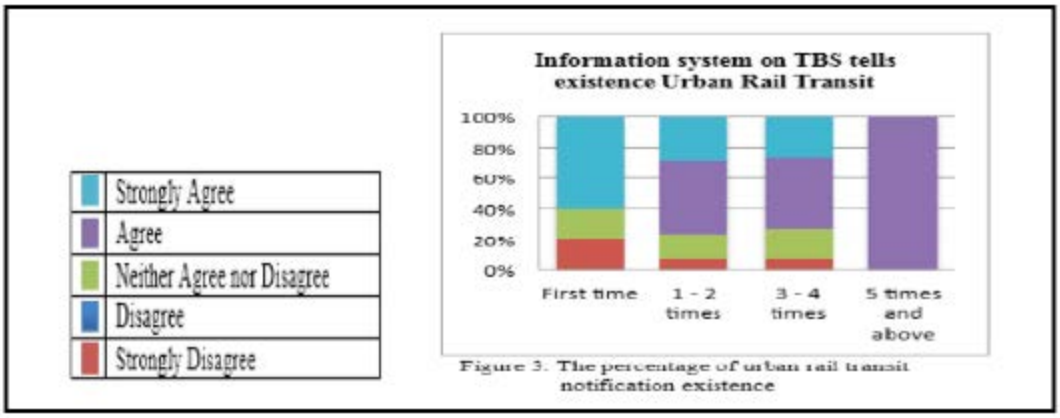

Figure 3. The percentage of urban rail transit notification existence

From Figure 3, it can be seen that first time respondents, 60% strongly agreed, while 20% disagree and 20% are not sure. For the first time respondent, the main thing to look is the information board. For respondent who frequent 1-2 times and 3-4 times a month, both are the same percentage. For respondent whose frequency 5 times and over in a month, 100% agree there indicated. Scope observation of respondent who did not agree and are not sure is different from strongly agree to agree as they see delivery information must be enclosed with description.

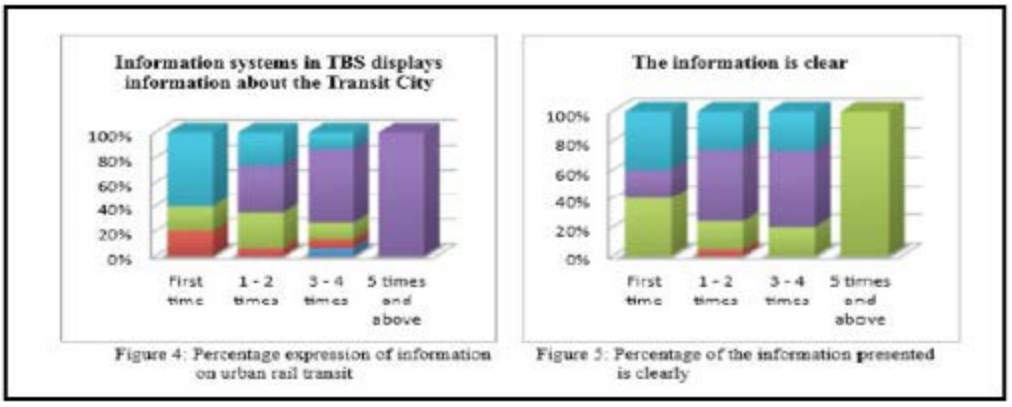

Figure 4: Percentage expression of information on urban rail transit

Figure 5: Percentage of the information presented is clearly

As seen in Figure 4, this question has related with question from Figure 2. That why percentage are same for both questionnaires. For the first time respondent only 20% do not agree and are not sure whether the TBS show information about urban rail transit. While 60% did not agree. For respondents whose frequency 3-4 times per month, 10% strongly disagree and 10% do not agree. Figure 5 shown 40% said not sure and 40% strongly agree that the information presented is clearly for the first time respondent. While 20% said only agree. Based on the chart, only a small amount of respondents who frequently 1-2 times a month said that not agree. The information clearly means any information disclosed in ways easier to understand. In addition, it also focuses on the urban community but also take into account the rural community as well as the terminal is in the public. The information also should be easily understood by foreigners.

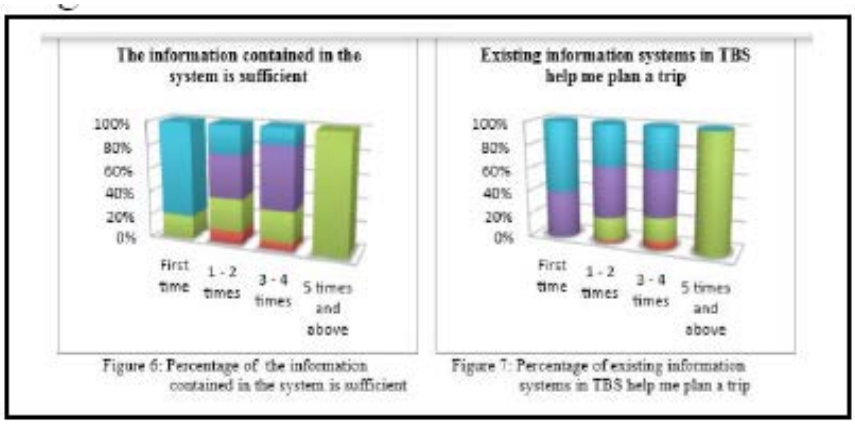

Figure 6: Percentage of the information contained in the system is sufficient

Figure 7: Percentage of existing information systems in TBS help me plan a trip

From **Figure 6** , it can be seen that first time respondents, 80% said strongly agree and the rest are not sure. For respondents that 1-2 times and 3-4 times a month found the percentage of strongly agree, uncertain and disagree reduced. The answers of the respondent agree 3-4 times increased from 1-2 times a month. 100% said not sure for of the respondents and the frequency of 5 times over a month. This is because the respondent had become routine and remember to skip the direction to an area or place. The information contained in the system will affect travel-planning information for users. As seen in **Figure 7**, 100% of respondents who first time give a positive answer. TBS says that 60% strongly agreed and 40% disagreed. For respondent who use 1-2 times and 3-4 times a month, it was found that a very small percentage does not agree with this question. For respondents that 5 times and above 100% are not sure whether the existing information system with TBS help plan a trip or not. Good information system is a system that helps users to plan their journeys.

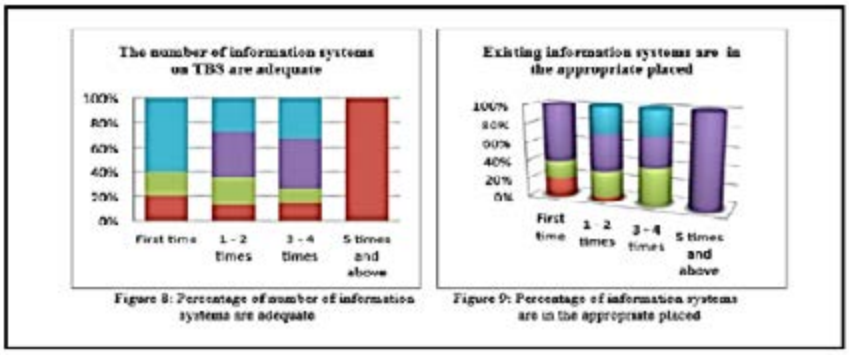

Figure 8: Percentage of number of information systems are adequate

Figure 9: Percentage of information systems are in the appropriate placed

Figure 8 shown the percentage of first time respondents who said the number of information system is adequate on TBS was dominated by strongly agreed with 60%. While 20% are not sure and also do not agree. Comparison between the frequency percentage of respondents 1-2 times and 3-4 times a month showed no definite percentage rate while the percentage of strongly agree are increased. The quantity of information systems plays a very important role because if a large area then it needs quite more based on the estimated amount of user capacity during the planning of construction. From Figure 9, it can be seen that 20% said disagree that if the information system is put in the right place for the first time respondent. As a result of interviews, they say the an information system can be discovered through directional signage placed in TBS. Overall respondents agreed

existing information systems are placed in the right area. Only a few respondents who disagree.

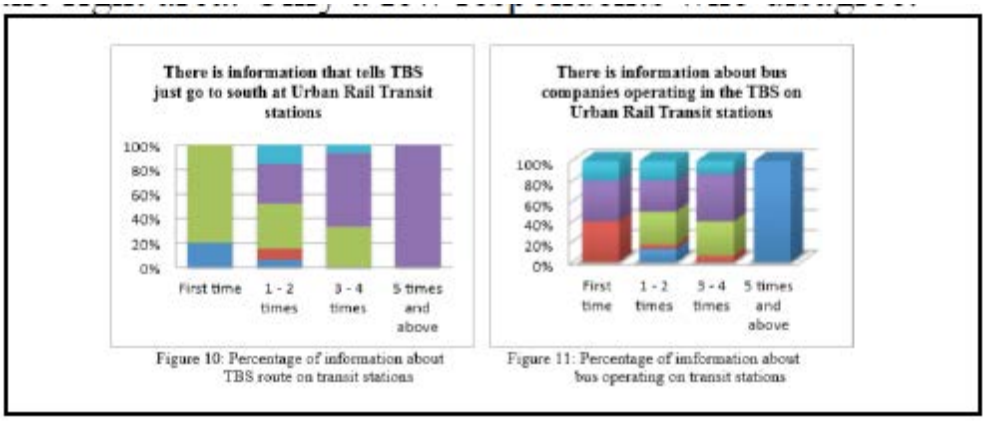

Figure 10: Percentage of information about TBS route on transit stations

Figure 11: Percentage of information about bus operating on transit stations

As seen in Figure 10, respondents who first time showed that 80% were not sure and 20% strongly disagree whether the information notified or not. Based on the above bar chart, the percentage decline is uncertain. The percentage increased to agree 100% of respondents and frequency of 5 times over. This indicates the more frequent use of increasingly more vulnerable to the existing information system in TBS. Figure 11 shown 100% strongly disagree by 5 times and above respondent. For the first time, the 40% disagree, 40% agree, and 10% strongly agree there is information related to bus operation. For respondents who frequently 1-2 times and 3-4 times indicate agree and strongly agree more than disagree and strongly disagree. But for both of these categories, percentages are not sure about the same. This shows all respondents are not aware of information that are all around when it becomes a habit and routine to an area.

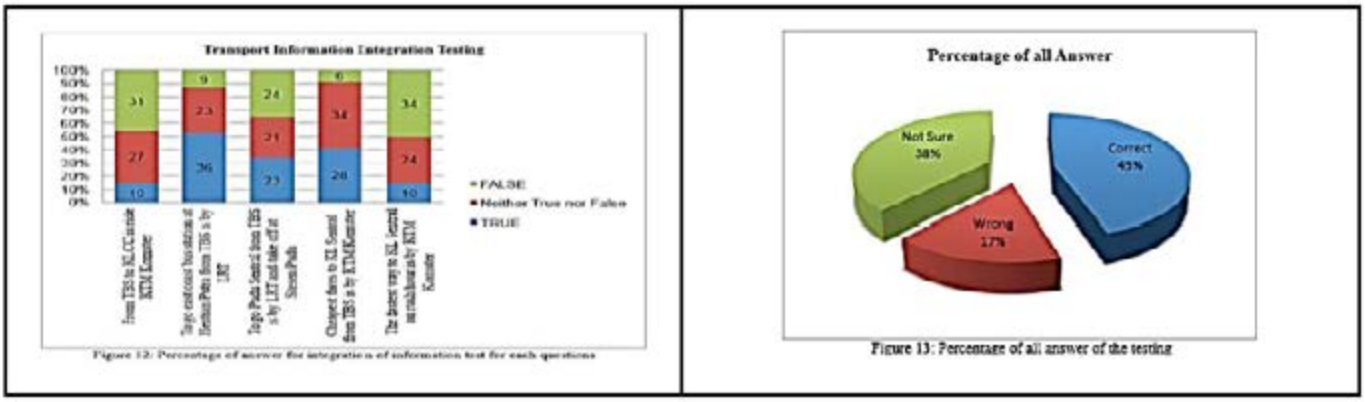

Figure 12: Percentage of answer for integration of information test for each questions

Figure 13: Percentage of all answer of the testing

In Figure 12, percentage is about the selection answer based on the questions asked. These test are important to be done to find and find out the percentage of transportation information known to the respondents after opening TBS. For the first question the answer is actually wrong. The second question the answer is correct while the third is the wrong question. The next question is the right fourth and fifth questions are wrong. Based on the pie chart shown on Figure 13 that the percentages for the correct answer to the whole question was as high as 45%. This means that existing integration of information presented in TBS and urban rail transit has been successful. But

the percentage of not sure also very high at 38%, and wrong is about 17%. This means that a further action should be taken so that the percentage of not sure and wrong reduced until reaching 0%.

Observation.

The information presented by the signboard was found to be minimal and very simple. It simply tells the position, but not the type of transit that are on TBS. Moreover, the location of information system like a signboard, touch screen kiosks and so on is not suitable. If the information system placed on correct location, it must be able to take advantage of consumers first. So it will make the information more efficiently and can reduce the human resources in the information centre. While on TBS also has provides touch screen kiosk travel information but unfortunately, it does not described in detailed but only illustrative the area only. So the available information cannot be function as travel planning to users.

Observation was also conducted at the urban rail transit which is LRT and KTM commuter and it was found that there was no integration of information established. There are no explanations of the existing transportation system. What was found namely only location of transportation has been told. Besides, the existing information system they were not suitable and not user friendly to the passengers. However, continuous improvement can still be conducted in the future.

Conclusion

From the analysis and discussion, it can be conclude that:

1. From the questionnaire and interview method obtained, the existing system information on TBS is for users who first arrived there. It provides for the first impression to avoid the problem from new users. From frequent user of these services, they will find that many lack of the information provided.

2. Integration of information between the bus system service and the urban rail transit systems need to add more to make it easier for the user. This because the number of users will be increase in the future. In additional, integration of information should also focus on all users instead for new users only.

3. The location of transit system should be revamped, to ensure the proper working order fully to the consumers. Placement of transit system in the right place can reduce labour used. Besides, it can save cost use because it doesn't require a lot of system information.

4. Most users do not know the city's bus services exist, including researchers. This is because there are no information board already setting the direction of the city bus in TBS. Furthermore, the city bus service a located outside the terminal cause the service is not able to function more efficiently.

5. The type of information on the touch screen kiosk should be added more as like as fares, routes, places of interest and other information deemed appropriate yet to be placed. This is because consumers prefer to use this system because it is friendly used. With the provided information about interesting places in Malaysia, it can enhance the rate of the country's tourism industry.

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The Role of Internet of Things (IoT) in Enhancing People with Disabilities Livelihood : A Review

M. Mohamed Hashim1, a
1 Politeknik Tuanku Syed Sirajuddin, Arau, Perlis
akamie1010@yahoo.com

Keywords: Internet of Things (IoT); People with Disabilities (PWD), Enhancing Livelihood

Abstract. In recent years, the utilizing of Internet of things (IoT) technology has increased the human's quality of life almost in all aspects. People with disabilities (PWD) are among the marginalized population who's not missed out on enjoying this new lifestyle in this age. Nevertheless, an insufficient number of studies have systematically reviewed the growing influence of IoT in PWD livelihood. Present study has been conducted purposely to evaluate studies that have explored the role of IoT in PWD livelihoods and identify the themes and sub-themes that encouraging the enhancement of PWD livelihood. Researcher performed a systematic literature review of studies that written in English and published in the latest three years (from 2016 to 2018) in two indexed journal online databases; Scopus and Web of Science (WoS). The inclusion and exclusion criteria were employed in order to identify related studies that evaluate the purposes for which IoT are utilized and to review the impact of IoT on various aspect of life. The process of screening and retrieving has been done to all titles, abstracts and potential studies to ensure the study has met the inclusion criteria, yielding a total of 18 primary studies. The precise finding of studies that relevant to the review will be extracted through ATLAS.ti7 software to allow researcher to code the key themes and sub-themes. The results of the review reveal that IoT have influence in enhancing the quality of life for PWD in the aspects of mobility, communication, education and daily activities. For future study, researchers are encouraged to highlight the IoT usage pattern among disabled people separately according to the type of impairment.

Introduction

Being an independent for a person with disabilities is a new challenge in this age. The rapid changing of technology has benefitted to all the world society, including marginalized population like people with disabilities. Obviously, the process of being independent for this population is more complicated because it is affected by the impairment itself. Previous study claimed that moving (mobility), learning (education) and communicating are the most crucial issues at the basis of daily activities for disabled people [1]. Overcoming the issue, a new revolution term in the field of Computing and Communication named Internet of Things (IoT) can offer assistance and support to people with disabilities in enhancing livelihood [2]. The interconnection between physical object and virtual things from evolve operation of information and communication technologies have offer much assistances, not only in accessing information, but also in mobility and learning tools [3]. In addition, enhancing livelihood of people with disabilities in the aspects of mobility, education and communication may consider employment opportunities because the application of internet of things in education context could make learning environment more accessible. In turn, as employment

is the most important element in everyone's life, the internet of things may bring big changes of sustenance in disabled people livelihood.

Materials and Methods

The studies on the interrelationship between IoT usage and disabled people are not disclosed systematically to uncover the role IoT in enhancing the disabled people livelihood. Therefore, the present study identifies journal studies that explore the role of IoT in bringing renewal toward better life of disabled people [4] to address precise, synthesized and latest information about related studies to diminish bias and maximize accuracy. Systematic review is known as an approach that uses particular methods to search, review and integrate result of primary studies. First, to identify related studies on the field for inclusion in the revision, researcher has conducted a systematic search on a few keywords such as internet of things, people with disabilities and enhancing livelihood. The systematic searching has been done on 2 high indexed journals from online databases in order to get a rigorous and accurate literature review in the field. The entire search is only focused on journal and conference articles that appear in both databases. All articles identified were written in English and published in the latest 3 years (2016 until 2018). By doing so, researcher's intention is to gain sensitivity of the searching and avoid missing any potential high quality research. Researcher avoids other types of document sources such as book, book review and review article to maintain rigorous value in current study as this only can be found in articles from journals.

Second, screening process has been done on titles and abstract to determine related study has met the inclusion criteria. To be included in the criteria, each study had to meet the following criteria:

- Studies on related topics of Internet of Things that enhancing the people with disabilities livelihood
- Containing participants from disabilities people population, including any types of impairment
- Containing any new invention that created for disabled people usability

With these criteria, researcher scanned full types of paper to capture content that related to few themes such as mobility, education and communication for thematic synthesis for this qualitative review. Thematic scrutiny is a technique used in qualitative study broadly to provide an approach for recognizing and scrutinizing themes from data [5]. The articles that met the inclusion criteria were entered into ATLAS.ti7 software to start coding the key themes, sub-themes in the content of studies. After identified articles have been coded, the themes and sub-themes were scrutinized and labeled as descriptive themes. A narrative description of each themes synthesized will be presented in evidence tables as driver to the objective of the study.

Study selection and characteristics: A number of 59 articles were identified after systematic searching within 2 electronic databases sources (Scopus = 39 and WoS = 20), based on titles, abstracts and keywords. After first screening on databases, 25 articles (Scopus = 15 and WoS = 10) were found to be potentially related to the topic of IoT in enhancing people with disabilities livelihood in terms of mobility, education and communication as well as new invention for the usability of disabled people. However, there are 7 articles duplicates in both databases, 2 articles from book

chapters and 1 article is inaccessible. In this case, researcher considers counting 7 duplicates articles from WoS database and the irrelevant articles which not met the inclusion criteria were excluded. Therefore, from out of 25, only 18 articles are found had met the inclusion standards and used the systematic evaluation.

Identification of themes and sub-themes in the studies: As the technology rapid changing nowadays, the internet of things bring a lot of renewal in a few aspects of disabled people daily activities. Based on the 18 articles, this study will provide a summary of the synthesized result that considered as theme and sub-theme relate to internet of things. Researcher was surprised that almost all the studies focus on new invention for people with disability usability. Out of 18 studies, 6 studies bringing a new innovation mobility aspect, 1 study discussing on education for disabled and 5 studies developed system for the purpose of communication. However, researcher also had covered new sub-themes; security (3), shopping behavior (2) and health care (1) which can be categorized as daily activities. All themes and sub-themes identified are summarizes in Table 1 and discussion on each themes be explained after the table.

Table 1: Identified themes and sub-themes

Themes	Sub-themes	No. of articles
Mobility	Access to physical infrastructure and space	3
	Outdoor navigating system	2
	Indoor localization and navigation	1
Communication	Web of things as an enabler for disabled people to gain information	1
	Artificial intelligent to improve web accessibility	1
	Wearable brain-machine interfaces for people with disabilities and limited motor skill to interaction	1
	Video streaming with multi camera for a tele-presence wheelchair	1
	Enhanced technologies of visual and touch communications in exploiting information and communication technology (ICT) innovative technologies	1
Education	IoT as assistive technology in tertiary education	1
Daily activities	Assisted living technology system for security purpose	1
	Smart Lock System for doors using Bluetooth technology for security purpose	1
	Reconfigurable Platform of Assistive Technology for home care and hospitalization of people with disabilities	1
	System to support disabled people to find and select product in supermarket	1
	IoT for e-Commerce – online shopping for disabled people	1
	Health care support system for assisted living	1

Discussion

Mobility: The findings from 6 of the 18 studies show that the most important part that may integrate the quality life of people with disabilities when they are able to move independently with the assistant of navigation technology system to achieve their livelihood objectives. Previous study had proved that mobility is one of the challenging parts in disabled people life, especially for physical and visual impaired people [6]. Therefore, the new technology system that able to navigate the movement of disabled people is such a good practice for this group of population to encourage them to be more independent. Nowadays, the combinations of advance technology and IoT offer much invention as a solution for PWD disabilities to enable independence and integration of their livelihood. According to the studies reviewed, the new invention on mobility aspect focuses at both outdoor and indoor situation [7], because both places are equally important for people with visual impaired to be explored. However, advanced technology and IoT nowadays are moving forward into broader usage in creating new innovation for PWD. For example, a study conducted in USA had created a cyber-physical concept city where the cyber space infused with the information collected from IoT embedded in the physical infrastructure [8]. This invention called Smart City allows connection between physical spaces with cyber space using IoT as a tool. Unlike the other invention, Smart City is a greater innovation that allowed PWD not only to be independence, but also making them as an information technology (IT) literacy person. It is a new trend in innovation field to access physical infrastructures and space using IoT since it is found the most in our review.

Communication: Out of 18 studies, 5 found that the utilizing of IoT in the new invention has yielding a smart assistive technology for disabled people. For example, a study from Thailand reveal that an integrated augmented reality application together with enhance technologies of visual and touch communication may help hearing impaired people to communicate visually and allow them to feel human-computer experience [9]. Another invention that utilized the brilliant IoT concept is telepresence wheelchair, where this invention allows the user to control or navigate the wheelchair from distance location using video communication and interaction. In addition, the wheelchair also equipped with multi cameras to provide effective assistance for elderly and people with disability.
In our review, communication is another important part in disabled people livelihood. People with hearing impaired especially really need an assistive device technology to express what they want to say to the others. In fact, not everyone know and able to use sign language when communicate with hearing impaired people. Therefore, in upgrading facilities for people that facing difficulties in hearing and communication, the combination of technology and IoT are the best way to solve this issue.

Education: Review from the only study that focuses on education for student with disabilities highlighted digital assistant has much benefited to them such as able to find out information quickly and easily although students were not proficient in the use of IoT [10]. This reflected the view that learning session can be more effective and interesting with the assistant of IoT and when PWD able to use IoT proficiently. Fortunately, this study showed that PWD has broad understanding of the important of IoT for the education needs of PWD. In fact, those students suggest using digital assistant smart speaker to provide real time captions by listening to a lecturer or audio from a presentation. According to the students, information written by lecturer on board could be converted into text to provide to students on Learning Management System (LMS). This has show that PWD

is more comfortable with learning system using IoT embedded into teaching methodologies.

Daily Activities: Surprisingly in this study, researcher had found new theme and sub-themes to be added as new element in the field. The current researcher categorized this new theme as daily activities in this study since the discussion had touch on a few important aspects in the life of disabled people. From the review, researcher had found 3 studies that create on new invention of security aspect for disabled people. For example, a new invention of lock system for operating door without a control to open [11]. This invention is an effective lock system with low power and can be used on almost all gadgets. This lock system is an effective technology that brings a comfort to the user and can be used for all kinds of human's physical condition. A new high-accuracy localization system is a useful invention to monitoring daily activities of older adults and people with disabilities in order to reduce the caretaking cost as well as anxiety situation [12]. Other inventions in this categorized are a system based on internet of things that embedded in a mobile platform to support people with disabilities to shop [13]. From researcher point of view, security aspect is much important for PWD as they are always exposed to the risk of threats while at home or outside. This theme and sub-themes is a new finding that can be embedded into body of knowledge as new element to be discussed more on future. In fact, security aspect is important to everyone as crime continues to rise time to time. Besides, the IoT technology also used as assisted living facilities to support caregivers work with people with disabilities [14]. Based on the discussion from all studies, the used of IoT in assistive technologies may promote greater independence for people with disabilities as well as enhancing their livelihood.

Conclusion

The internet of things is one of the famous buzzwords in information technology field nowadays. The concepts of internet of things which transform the real object into intelligent virtual object enable to unify everything, keep control things around us and keeping us informed of the state of the things. From the systematic review findings of internet of things and the disabilities people livelihood, the greater independence of disabled people more noticeable when it is embedded in assistive technology devices. Through systematic searching in 2 high indexed online databases, it is found that almost all studies suggest new inventions that use IoT as a tool to upgrade the function of system and give best impact for the user. The most impressive impact that able to make a big changes in disabled people life can be divide into a few themes; mobility, communication and education. Surprisingly, researcher has found new themes; daily activities that can be embedded as a new important element in enhancing the livelihood of people with disabilities.
The implication of this study is providing a rigorous literature review discussion in the related field of study. In fact, current study is also contribute to the body of knowledge with the new theme and sub-themes regarding PWD important elements in their livelihood. For further study, research on how effective IoT usage among PWD should be done separately depends on the type of impairment to get precise finding.

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Exploring Waqf Risk Management: The Case of Wakaf Daarut Tauhiid

D.N. Devani[1,a] and H. Ihsan[2,b]

[1]Politeknik Negeri Padang, Padang, Indonesia

[2]Politeknik Negeri Padang, Padang, Indonesia

[a]dellanoviadevani@gmail.com [b]hidayatul@pnp.ac.id

Keywords: Waqf, Risk Management, Risk Mitigation, Accountability, Dual Accountability.

Abstract. This study aims to explore the practice of risk management in productive waqf. In addition, this research also aims to understand as to how risk management is useful in ensuring accountability of waqf managers (*mutawalli*). This research is a qualitative inquiry with Wakaf Daarut Tauhiid was chosen as a case. Data were collected through semi-structured interviews, participant observation and document review. The data obtained were analyzed using thematic analysis. The results of this study indicate that Daarut Tauhiid Waqf has begun to take into account the emergence of risk and has carried out several mitigation activities such as avoidance for the category of sharia risk, determination of limited funds for financial risk (retention), risk modification by setting Standard Operating Procedures (SOP) to all risk categories and risk transfers for several risks related to sharia compliance. This study concludes that risk management is one aspect that waqf institutions must do to ensure accountability is fulfilled, both to Allah and stakeholders.

Introduction

In the last few years, there is expectation on waqf to provide more benefits for the society. Waqf is expected to overcome economic disparities and to alleviate poverty [1] as well as to be able to lift up national economic growth [2]. Mutawalli (waqf manager) is, therefore, required to be more creative and innovative in investing the waqf assets. However, putting waqf assets into business does not only earn benefits, but also bear the risks.

On the other hand, waqf management today faces various problems such as less developed of waqf assets and many cases of losses of waqf assets due to mismanagement [3] In fact, the mutawalli should ensure the permanence of the value of waqf property and the sustainability of its benefits. There are also various risks that must be considered in financing activities and distribution of benefits of waqf. Therefore, as part of professional management, mutawalli should be able to identify various risks in managing waqf and find the way to mitigate them. Indeed, managing the risk is part of the accountability. There is lack of empirical evidence regarding how risk management is practised in waqf institutions. Hence, this study is aimed to address that issue.

Literature Review

Some recent studies discuss the issue of accountability in waqf management [4.5.6]. Waqf accountability can be seen as the ability of waqf trustees to be responsible and answerable on the assets entrusted to them [7]. In particular, Islamic Accountability, referred to as Dual Accountability, can explain the mutawallis' accountability [8]. Dual accountability implies that as Allah's khalifa (vicegerent), humans are responsible for all resources entrusted to them. In addition, they must be able to fulfil every contract between them. This concept then becomes a model of waqf accountability [8]. Further, in order to strengthen internal and external accountability of organisation, risk management is required [9]. In other words, risk management is a form of internal control and corporate governance to show organisational accountability, both to external and internal parties.

Risk is an adverse event. It occurs due to an event that deviates from what is expected [10]. Efforts aimed at reducing the possibility of risk are referred to as risk management [11]. Risk management is an effort carried out by management in identifying and measuring risks, as well as forming strategies to reduce risk events. Risk management activities consist of three main activities: risk assessment, dealing with the risks strategies, monitoring for the results [12].

There was no existing literature that discussed risk management in waqf. Thus, in this study, the researchers will borrow some concepts from non profit studies to analyse risk management in waqf. There are four categories of risks in the management of non-profit organizations, namely; fundraising risk, financial risk, staffing risk, reputation risk [13].

Fundraising risk is a risk that arises in every funding activity. The fundraising process is the main source in the management of waqf, so this category must be seriously considered. Financial risk is the risk that occurs due to lack of internal control in managing funds, causing a deficit in the organization's finances. Managing waqf is closely related to financial risk, because the waqf fund is gathered from the community, to whom the mutawallli should be accountable. Staffing risk comes from employees while reputation risk arises due to the loss of trust in the organization that causes a decrease in acceptance of donations or even withdrawal of strategic alliances and collaboration partners.

In addition to these, the researchers used other two general risk categories [10], namely; risk of physical assets and operational risk. The risk of physical assets is chosen because in the context of waqf, mutawalli must be able to maintain the existence of waqf property. Moreover, operational risk is employed because the waqf institution must pay attention to every risk that occurs in operational activities for better waqf management.

In the Islamic Financial Institutions (IFIs), there is a sharia compliance audit that is useful to ensure that activities carried out by the IFIs do not conflict with the provisions of sharia [14]. The implementation of Sharia compliance audit is to ensure that all products and services are in accordance with sharia principles. In other words, the IFIs should concern on the shariah complience risk. The risk of sharia compliance is a higher priority category compared to other risk identification. Therefore, in this study, researchers used sharia risk to identify the extent of sharia risk in the

management of waqf.

In order to mitigate the abovementioned risks, several activities can be take place, such as; avoidance, establish limited funds for activities that are indicated as risky (retention), modify the risk features to reduce the severity of risk (modification), or transfer the risk (transfer) [12].

Research Methods

Research Design. This study used a qualitative approach with case study as a research design. A qualitative approach allows researchers to see practices, understand and describe how mutawalli perceives the importance of risk management practices in managing waqf. Case study design was chosen to enable the researchers exploring a problem with detailed boundaries, take in-depth data and include various sources of information needed. The researchers selected Wakaf Daarut Tauhiid Bandung as a research case because this institution is one of the waqf managers that actively manage productive waqf and has demonstrated high accountability through various mechanisms [6]. Hence, the researchers expected that the practice of risk management can be found at this institution. Further, the practice of risk management is seen from the management of productive waqf, particularly what type of risks that occur and how to mitigate them. The conceptual framework being used in this study is several risk categories [13], [10], [14] and several mitigation activities [12]. Last, to conclude whether this risk management is one of the mechanisms used by mutawalli to demonstrate accountability to stakeholders, researchers use teory Dual accountability [8].

Data Collection and analysis. Data were gathered through in-depth interviews, participant observation, and document review. Further, thematic analysis was employed in analyzing data. Thematic analysis is a data analysis method by identifying themes that are patterned from the findings.

The Case Profile

The history behind the establishment of the Daarut Tauhiid Waqf cannot be separated from the recitation activities led by Kiyai Haji Abdullah Gymnastiar (Aa 'Gym) circa 1990. Initially, the group of recitation consisted of few students and over the time the number of the group members increased. Later, Aa Gym began to invite the congregation to collect waqf donations that would be used for the construction of a mosque where they could use for recitation and worship. Aa Gym later established Daarut Tauhiid foundation to legalize all dakwah activities. Throughout the time, the number of waqf assets under the management of Daarut Tauhiid increased tremendously that lead the foundation to set up a special unit to handle waqf matters called Wakaf Daarut Tauhiid Development Center (Pusbang Wakaf). The Pusbang Wakaf was later renamed to Wakaf Daarut Tauhiid which nowadays actively manages productive waqf.

Findings and Analysis

Mutawalli's Perception on Risk Management

Although there is no clear guideline for risk management practices, the mutawalli in Wakaf Daarut Tauhiid agrees with the importance of risk management practices in managing waqf. There are actually two main reasons behind this perception. First, the mutawalli realizes that waqf property should be kept to ensure it perpetuity. Second, the mutawalli is aware that waqf is not private property. Rather, it belongs to the ummah thus there is responsibility should be fulfilled both to Allah and to the waqif who entrust the property. There is also responsibility to people who entitle receiving benefits from the property.

Risk Management of Productive Waqf and Mitigation Efforts

There are several risks that concern waqf management in Wakaf Daarut Tauhiid, that is: sharia risk, physical assets risk, fundraising risk and reputation risk. Besides these, other risks such as: staffing risk, operational and financial are also taken into account by the mutawalli, although they are not as strong as the previous risks.

Sharia risk is the most essential risk to be anticipated in managing waqf. This risk occurs due to a mismatch of management activities with sharia rules. It is important to anticipate this risk, because any activities relating to the management of waqf property should comply sharia. In addition, waqf is considered as part of worship which is expected to benefit the waqif (donor) and beneficiaries. Thus, if the mutawalli does not manage the assets in accordance with the sharia provisions, it will damage all the essences of waqf.

Therefore, to mitigate shariah risk, Wakaf Daarut Tauhiid applies modification action through several Standard Operating Procedures (SOP). For instance, in starting up new waqf programs or receiving new waqf assets should follow the SOP. The mutawalli also applies modification action in mitigating sharia risk through istibdal (exchanging waqf assets). The istibdal can ensure the benefit of waqf will go to the prescribed beneficiaries. In addition, Wakaf Daarut Tauhiid also avoids specific terms and conditions from the waqif upon receiving waqf asset. This is to anticipate any conditions that cannot be fulfilled. Hence, in case there are waqf assets received, but the mutawalli is not able to manage them, Wakaf Daarut Tauhiid will transfer the risk by returning the waqf assets to the religious court to be transferred to other institutions that are able to manage.

Another risk is physical assets risk. This is another important risk to anticipate, because in nature the safeguarding of property is an absolute principle in waqf. To reduce this risk, Daarut Tauhiid waqf distributes the responsibility for asset maintenance to those institutions that use it, conduct asset audits and routinely check the respective institutions.

Other crucial risks that require attention are some risks that embedded in the fundraising process. Some examples of risks that occur in fundraising activities are the risk of waqif donation

commitment, the risk of donation errors, the risk of communication content and waqif maintenance risk. These risks will definitely have an impact on the number of waqf receipts and the achievement of donation targets made.

Further, another risk to be considered in fundraising activities is reputation risk. The institution's reputation will be directly proportional to the amount of donations received. The wider the waqf institution is known, the bigger the amount of donations received. The better the reputation of the institution among the community, the higher the trust of the waqf to make donations. To mitigate risks embedded in fundraising activities, Wakaf Daarut Tauhiid applies more procedures (modification) in online and offline waqf services, in marketing communication activities and waqif maintenance activities in Customer Relationship Manager (CRM).

Other risks such as staffing risk, financial and operational risk are the least risk in terms of its occurrence in Daarut Tauhiid Waqf. Staffing risk can be overcome because of the seriousness of Wakaf Daarut Tauhiid in upholding its Islamic values and always instilling these values in its employees and routinely conducting employee coordination and motivation (modification).

Furthermore, financial risk can be mitigated by choosing several investment modes that are low risk while reducing the number of risky investments (retention). Meanwhile, the operational risk can be reduced through the internal control that can be seen in the implementation of Standard Operating Procedures (SOP) in every activity. This effort is then strengthened by the routine audits (modification).

Risk Management to Ensure Accountability

Mutawalli agreed with the importance of risk management practices because of the vertical accountability should be fulfilled to Allah and horizontally to the human beings. Humans refer the people who are interested (stakeholders) on the management of waqf. There are some groups of stakeholders indentified by Wakaf Daarut Tauhiid namely waqif, Daarut Tauhiid Board, government and mauquf alaih (beneficieries). This is in line with dual accountability theory [8] which states that as the khalifah of Allah, humans are responsible for all the resources entrusted to them. Furthermore, the model of dual accountability is presented as follows:

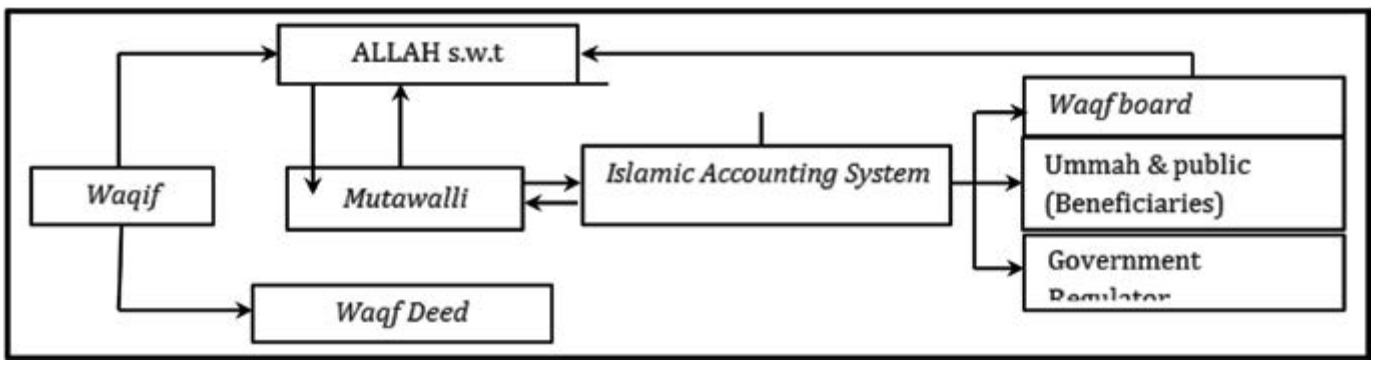

Figure 1. Waqf Accountability Models

In this waqf accountability model, it can be seen that the highest accountability to be fulfilled is to Allah. Fulfilling accountability to Allah is among other by obeying the shariah rules. Mitigating shariah risk is the example of this accountability. On the other hand, accountability to the stakeholder can be discharged through Islamic Accounting System. In this Accounting System process, an internal control is needed, which is implemented through risk management. Therefore, risk management practice is one of accountability manifestations, shown by mutawalli to Allah and the stakeholders.

Conclusion

The results of the research show that this risk management practice is one aspect that can be done by waqf institutions to fulfil accountability to Allah and stakeholders. Having said the importance of risk management in waqf, the waqf regulator should immediately come up with some regulations pertaining to risk management for waqf institutions.

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E-Learning for CAD using SCORM Based Modules

Rabindra s/o Gandhi Thangarajoo[1],Mohd Noralimi Bin Mohd Ali[2]

[1; 2] Electrical Department, Politeknik Port Dickson,Malaysia

rabindran.poli@1govuc.gov.my,

noralimi.poli@1govuc.gov.my

Keywords: SCORM ; LMS ; I-Spring; Simulation; CIDOS

ABSTRACT: This study aims to find out the effectiveness level of the SCORM formatted notes applied to polytechnic students on the Electronic Computer Aided Design course which is offered through a Learning Management System. SCORM is a standardized format used by teachers who offer educational content through their institutions Learning Management System. It allows students some element of control over time, place, path, or pace of their learning. The material was developed from readily available Powerpoint notes which was installed with an embedded toolbar application called I-Spring. The single SCORM package was then uploaded into the LMS platform called CIDOS. The subjects chosen were third semester electrical engineering students taking the computer simulation course in Polytechnic Port Dickson. The students learned through the online platform. Students answered a pre-test before using the module and also a post test afterwards, which gauged their learning level of the subject. Results indicates a significant increase in their understanding of the topic involved by way of observing a better score distribution.

Introduction

Electronic CAD Learning by using SCORM

Learning method currently employed in the service of teaching are slowly changing from a class-based approach to one which involves the use of technology to enhance learning. Hadullo, Oboko and Omwenga [7] stated that "… The rapid growth of Information and Communication Technology (ICT) has brought about significant changes in the practice of e-learning globally. With the proliferation of web based learning, one method is by using a Web Based Authoring tool to produce notes and e-learning material in a format called SCORM or "Sharable Content Object Reference Model". This coincides with how "…in recent years, there has been an increasing adoption of Learning Management System (LMS) assisted e-learning in higher education institutions (HEIs) in developing countries…".[7]

In this paper, this format is applied with a group of polytechnic students who are undertaking the Electronic Computer Aided Design Course which simulates electronic components. The entire course labsheet notes have been converted into the SCORM format. However one of the course

material (Laboratory 6) has been singled out and the student's performance for that lab has been gauged by using a pre-test and post-test. The SCORM model has already been tested with students and in some cases in the workforce.The e-learning modules were uploaded in the existing platform which was already in use by students. Known as the Curriculum Information Document Online System (CIDOS), it has been in use for the nearly a decade.

SCORM is the outcome of a problem where students engaged in activities like viewing a video, taking a quiz, submitting assignment or answering a forum but would still yearn for a more simplified or single format. This is evidenced by one research where "… at least the 55% of students are satisfied with the support, usability, features, etc. which are offered by the Java applets. …" in a Computer Network course conducted via SCORM and interactive simulations. [3]

Objective

The objective of this study is to find out the following items:

●The effectiveness of the SCORM based notes on the labwork performance of CAD students.

Statement Of The Problem

1. Do student achieve better understanding of the subject matter after using a SCORM based notes.

Scope

1. The students involved are 132 students undertaking the third semester course Electronic Computer Aided Design.

2. Students will be exposed to several SCORM Based modules but only Lab 6 will be tested.

3. Each students are allowed unlimited number of trials and could study the materials at their own pace.

4. The student's knowledge are measured via a pre-test and post-test.

Literature Review

Scorm Use In Higher Education Institutes

SCORM has been used as an e-learning tools for a long time. However most of the research involved

would be a measure perception or efficacy. SCORM has already been implemented for school based learning and also for the workforce.

One study was conducted by the Xin Bai [1], was distributed through web enabled devices. In her research , " … The e-learning modules combine both content and assessment and are presented in an ordered fashion that allows a student to practice and drill as they gain knowledge … ". instead of digital copies of textbooks currently popularly known as e-books, their final product is an electronic text book alternative. Xin Bai [1] has set her goal of helping " …students develop positive self-efficacy beliefs in their computer literacy capacity through positive experiences with hybrid elearning…". The software used was LessonBuilder as an authoring tool while the LMS system used was the Blackboard. The results obtained from Xin Bai [12] show that " …students with higher self-efficacy beliefs are more likely to report positive learning experiences, including learning pace control, time management, and content understanding…".

In another example by Yang and Tsai [2], they were responsible in designing a "…Content Repository Management System (CRMS) for management of learning objects on web-based learning environment…". Their algorithm decompose and reassemble four kinds of Learning Objects based on SCORM specification which are Assets, CAs, SCOs and SCAs. They too use a "PackageHandler" which is used for packing the all files as a ZIP file in a process very much like the AICC format used in CIDOS. Their results indicates that SCORM "…has good compatibility with most of popular learning specifications…"which "… ensures its widespread acceptance and application in the near future...". Yang and Tsai [2] has stated that their package supports various ways for managing the LOs and allows reducing the overload of users' input task by providing visualized authoring environment. That enables CRMS more extensible, efficient,and speedy in producing teaching materials by sharable LOs.

The engineering schools also benefited from SCORM as the case by Candelas,Gil and Jara [3], where an average of 100 students were taking the Computer Networking Course and were given study materials in the SCORM format. They combined the EJS (Easy Java Simulations) with the KivaNS API to form the SCORM related notes and measured both the motivation level as well as the skills that they gained. They deduced that during a three year course, the student's success " … rate greater than 65%, even greater than 90%. At the same time, the students who do not pass the exam are significantly reduced… "

Methodology

The Learning Content Management Software (LCMS) platform used was CIDOS which is already in use in the polytechnic system. The platform chosen was for the DEE3071 Electronic Computer Aided Design. This study involves two part where the SCORM compliant Learning Object was developed in the first part and the second part involves its use with students and the final post test analysis.

The presentation for Lab 6 entitled "Printed Circuit Board" was developed where a complete PowerPoint presentation was prepared in teaching students how to convert circuit schematics into Printed Circuit Board. The presentation was embedded with videos in between lessons to make the

lesson delivery more complete. The Web Authoring Tool installed was I-Spring 6.0 which embeds itself well with Microsoft PowerPoint. I-Spring was primarily used to control the audio presentation of the slides.

Once the audio is well synchronized with presentation, finally I-Spring can be used to publish the Learning Object in an acceptable AICC compliant zip format. This will then be uploaded into the CIDOS platform. Students who accessed the module would see them like in Figure 3.1 below.



Figure 3.1 : The Learning Object Interface

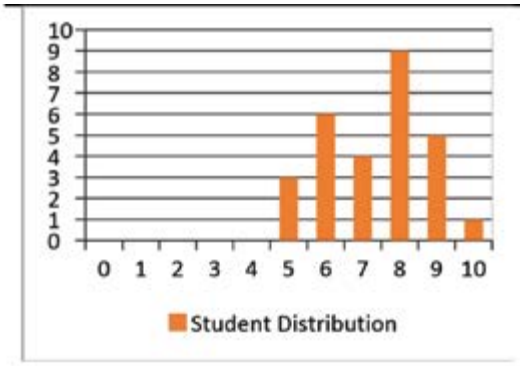
The final part of this study is the use of this platform and a session for students to answer the pre-test and post-test. The modules were made available to all students undertaking the course. However only 5 classes were chosen for evaluation with a total of 146 students which is 58% from the student population. Due to availability of the module to all students, control subjects were not chosen this time. All students were already introduced with the modules with previous lab topics. Pre-test was given at the beginning of Lab 6 for Printed Circuit Board Design and immediately the learning session starts with the module. Students would execute the lab with the aid of the SCORM modules. At the end of the 2 hours period, students would upload the end design to the LMS system. They will answer the Post-test question immediately then. The questions will test student's understanding of the PCB design process. Any shortcoming between the two learning methods (SCORM and teacher-student interaction) was dealt after the post-test. The results are discussed in the following section.

Results And Analysis

By way of the pre and post –tests done within a two hour period, the following conclusions can be made. Almost all of the students have achieved very low marks on the pre-test, predictably because

they haven't gone through the Lab 6 lesson yet. The mean of the pre-tests (μ) are almost equal to 0 for all classes. However they displayed significant improvement on the post test after being exposed to the e-learning module. The post-test mean are shown in the Table 1. Table 1 also shows the marks distribution of four of the five test subject classes. A Pre-test distribution would have shown a graph skewed to the left of the distribution. A simple average z-score calculation for each class's post-test was also almost 0 to show that the post-test result for each students doesn't vary significantly from the mean.

Table 1: Student Post Test Score Distribution of four sample classes

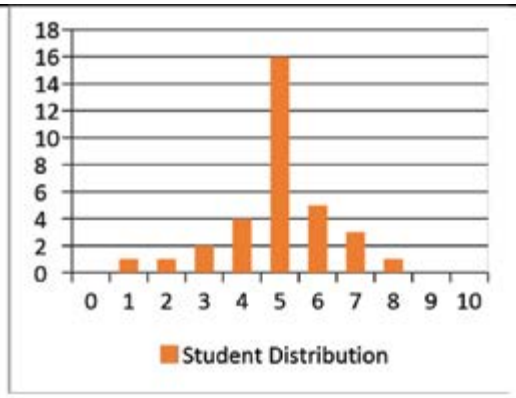


DEG3S2

$\bar{x}$ *1.19*

n=32 students

$\bar{x}$ *7.36* marks

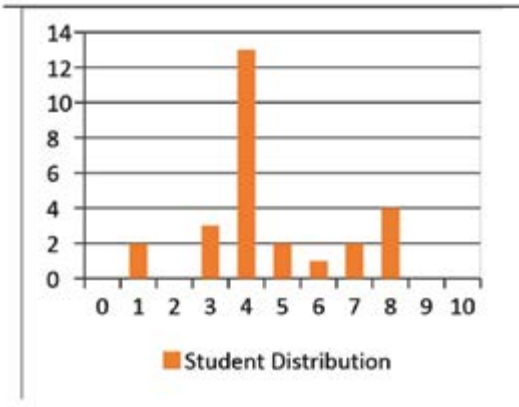


DET3S1

σ *0.89*

n=34 students

$\bar{x}$ *4.97* marks

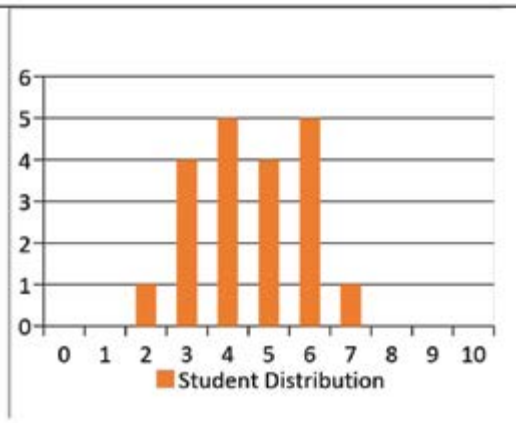


DET3S2

σ *1.51*

n=33 students

$\bar{x}$ *4.63* marks



DEQ3S1

σ *1.15*

n=24 students

$\bar{x}$ *4.55* marks

* the results from DEP3S1 is not shown here due to lack of space. They have a standard deviation of σ= 0.36 with student population n=24 and mean =4.55.

Conclusions

This study concludes that most students had no prior experience with a SCORM based notes nor its advantages by way of pre-tests. The post-test among other things revealed that there was significant increase in their comprehension when they were using the SCORM based notes. The distribution table for three graphs almost resembles a normal distribution curve with the curve for DEG3S2 skewed to the right.

Overall the learning experience for the students is concluded to be a very positive one since they gain better comprehension before their practical lessons. Therefore this answers the problem statement stated earlier in this paper. After going through the same lessons again during class time, this enables better understanding for the students with increased average marks for all subjects. Further improvement to the research can then be made by including all labs in the experiment or repeating this experiment with a control group to refine the research result

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Rangka Kerja Metodologi Program Diploma Seni Digital (DDS) Melalui Lima Indikator Pembelajaran Abad ke-21: Satu Kajian

M. Nurulaini Idaya1, a and B. Norzaida2,b

1,2Politeknik Tuanku Syed Sirajuddin, Perlis, Malaysia

aainibvc@gmail.com, bayda909@gmail.com

Kata kunci: Pembelajaran abad ke-21; Outcome-Based Education (OBE); Rangka kerja metodologi; Kolaborasi; Pengajaran dan pembelajaran (P&P)

Abstrak. Kajian ini bertujuan untuk mengetengahkan pendekatan rangka kerja metodologi bagi Program Diploma Seni Digital. Program ini dimartabatkan selari dengan niche area media kreatif di bawah Center of Technology (CoT), Politeknik Tuanku Syed Sirajuddin (PTSS). Cabaran yang dihadapi sebelum pelaksanaan pendekatan rangka kerja ini, tiada aturan kerja yang jelas dalam pelaksanaan pengajaran dan pembelajaran (P&P) yang sistematik dan berkesan. Objektif kajian adalah untuk melihat keberkesanan rangka kerja metodologi Program Diploma Seni Digital (DDS) melalui lima indikator yang terdapat dalam pengurusan Pelan Strategik PTSS. Lima indikator tersebut merangkumi pendekatan Indikator 1; Outcome Based Education (OBE), Indikator 2; kolaborasi industri, Indikator 3; penyelidikan staf, Indikator 4; pembangunan projek pelajar dan Indikator 5; inovasi & pengkomersilan. Metodologi Kajian dalam bentuk tinjauan dengan mengedarkan borang soal selidik pada 35 orang pelajar semester akhir sesi Jun 2018 dan 15 orang pensyarah yang mengikuti bidang tujahan tersebut. Hasil dapatan kajian menunjukkan bahawa kelima-lima indikator yang mengetengahkan pembelajaran abad ke-21 tersebut memberi persepsi yang sangat positif oleh pensyarah dan pelajar. Secara keseluruhan, pelaksanaan rangka kerja ini telah menjadi satu aliran kerja yang teratur dan jelas bagi memperkasakan pencapaian lonjakan yang ditetapkan oleh institusi.

Pengenalan

Keberhasilan pelaksanaan program adalah bermula daripada penentuan rangka kerja yang ditetapkan oleh pihak institusi iaitu Politeknik. Pelan Strategik PTSS adalah antara dokumen pemacu dalam Politeknik yang telah menetapkan beberapa teras KPI yang perlu dicapai berdasarkan kepada indikator-indikator tersendiri. Kajian ini bertujuan untuk mengkaji keberkesanan pembelajaran abad ke-21 melalui lima indikator dalam rangka kerja metodologi Program DDS. Bagi mencapai kecemerlangan institusi dalam tempoh 2016-2020, Pelan Strategik PTSS [12] memfokuskan kepada tujuh teras utama mengikut empat lonjakan Pelan Pembangunan Pendidikan Malaysia 2015-2025 (Pendidikan Tinggi) (PPPMPT), [14]. Walau bagaimanapun, pelaksanaan program yang berkesan juga dikesan melalui perancangan teliti bagi beberapa Key Performance Indicator (KPI) yang terdapat dalam lima elemen bidang tujahan CoT iaitu melalui elemen kolaborasi dengan industri, konsultasi, inovasi dan penyelidikan, penerbitan dan kecemerlangan pendekatan pengajaran dan pembelajaran.

Semua pihak yang terlibat secara langsung dengan dunia pendidikan perlu menyedari

bahawa tiada ruang untuk tidak ikut sama melaksanakan transformasi pendidikan. Malah perubahan dalam pendidikan perlu sentiasa seiring perkembangan zaman atau selangkah ke hadapan. Ahli akademik perlu bersedia menerima perubahan dengan cekap dan berkesan agar pengajaran dan pembelajaran (P&P) menjadi lebih segar dan memenuhi keperluan pelajar. Proses P&P dapat dilaksanakan dengan baik dan teratur dengan pendekatan OBE. Tetapi sejauh manakah proses P&P ini dapat dilaksanakan mengikut peredaran zaman dan permintaan daripada pihak berkepentingan seperti pihak industri dan pelajar.

Objektif kajian ini adalah bagi:

i) mengenalpasti lima indikator penting dalam proses pengajaran dan pembelajaran (P&P) abad ke-21
ii) mengkaji keberkesanan pembelajaran abad ke-21 melalui pendekatan rangka kerja metodologi Program Diploma Seni Digital

Skop kajian pula meliputi organisasi yang mensasarkan Pelan Strategik institusi, pelajar dan pensyarah pula ke arah pelaksanaan P&P manakala penglibatan industri dalam bentuk kolaborasi.

Kajian Literatur

Cabaran bagi ahli akademik semakin dirasai pada masa kini dalam usaha mempelbagai kaedah P&P bagi menarik perhatian pelajar. [9] menekankan tujuh perkara yang ditampilkan dalam pembelajaran abad ke-21 untuk pelajar meneruskan kehidupan dan dunia pekerjaan iaitu kemampuan berfikir secara kritikal dan penyelesaian masalah, kolaborasi dan kepemimpinan, ketangkasan dan kemampuan beradaptasi, inisiatif dan keusahawanan, mampu berkomunikasi efektif baik secara oral mahupun bertulis, mampu mengakses dan menganalisis informasi, dan memiliki rasa ingin tahu dan imaginasi. Menyedari kepentingan ahli akademik untuk memahami dan bersedia melakukan perubahan dalam kaedah P&P sesuai dengan pembelajaran abad ke-21, kajian ini mengetengahkan kepada lima indikator yang setiap satu indikator tersebut terdapat daripada kajian-kajian yang sedia ada dan akan menjawab dalam perbincangan dan kesimpulan.

Outcome-Based Education (OBE) – Indikator 1

Pembelajaran berbentuk OBE telah dilaksanakan dalam sistem pendidikan di Malaysia khususnya institusi di peringkat tinggi. Program Diploma Seni Digital, satu-satunya program yang wujud di bawah Jabatan Rekabentuk dan Komunikasi Visual (JRKV) di Politeknik Tuanku Sirajuddin (PTSS), Perlis di bawah Jabatan Pendidikan Politeknik dan Kolej Komuniti (JPPKK), Kementerian Pendidikan Tinggi Malaysia merupakan salah satu program yang melaksanakan sepenuhnya OBE yang dibawa oleh Malaysia Quality Agency (MQA) di bahagian Kementerian Pendidikan, Malaysia (MoE). Kajian [7] mengenai OBE memfokuskan pada pelajar dan apa yang perlu dipelajari dalam sesuatu kursus. Ia membantu pelajar mempelajari sesuatu yang baharu dan dapat menguasai apa yang dipelajari. Menurut kajian tersebut, MQA bertanggungjawab membangunkan dan melaksanakan rangka kerja secara umum dalam pendidikan.

Untuk mengetahui kaedah P&P yang terbaik, daya kreativiti yang tinggi oleh ahli akademik

amat diperlukan. Salah satu pendekatan yang ada melalui sistem OBE ini boleh dilihat melalui Kemahiran Insaniah (KI) di mana proses Critical Thinking and Problem Solving Skill ini dapat dilihat melalui proses Pembelajaran Aktif (AL). Menurut kajian intipati pemahaman dalam OBE [3], terdapat indikator ke-4 iaitu "Active participation in the learning activities" mendapat keputusan yang tinggi di mana responden dari fakulti mereka menunjukkan bahawa banyak pemahaman intipati daripada OBE adalah tentang penglibatan aktif dan penglibatan dalam kelas. Hal ini disokong oleh [5], satu kaedah bagi pelajar berhubung secara terus melalui pemikiran dan aktiviti dalam menyelesaikan masalah adalah menjurus kepada kaedah manipulasi, mengaplikasi dan menilai sesuatu idea oleh pelajar berbanding seseorang pengajar memberikan informasi melalui teori secara terus-menerus. Secara tidak langsung, ia adalah aktiviti pembelajaran berpusatkan pelajar (student-centered learning). AL adalah pembelajaran secara pengalaman situasi sebenar dan merasai sendiri sesuatu situasi tersebut. Menurut [5], kaedah AL ini berjaya apabila keputusan yang terhasil melalui pemerhatian dan laporan pencapaian daripada segi kepuasan pelajar dan hasil pembelajaran (LO) adalah sangat tinggi.

Kolaborasi Industri – Indikator 2

Penglibatan dengan pihak berkepentingan iaitu industri sangat diterapkan melalui sistem pendidikan Institusi Pendidikan Tinggi di Malaysia khususnya Pendidikan TVET. Politeknik Malaysia merupakan salah satu institusi yang sedang menerapkan hubungan kerjasama antara institusi dan industri. Kolaborasi bersama industri yang telah ditetapkan dalam Pelan Strategik setiap politeknik di Malaysia merupakan salah satu KPI yang perlu dicapai agar graduan yang dilahirkan di sesebuah institusi tersebut menjadi graduan yang holistik, bercirikan keusahawanan dan seimbang (Lonjakan 1) dan graduan TVET yang berkualiti (Lonjakan 4) dalam merealisasikan PPPMPT [14]. Dengan adanya kerjasama dengan sesebuah industri yang berkaitan dengan sesuatu bidang menjadikan proses P&P yang dilaksanakan lebih berkualiti dan mengikut kehendak industri luar. [1] menjelaskan bahawa kerjasama Industri-Institusi adalah melibatkan pelbagai aktiviti dan menghasilkan pelbagai output. Kerjasama antara industri dan institusi yang berjaya adalah bergantung kepada pelbagai aktiviti yang perlu diukur seperti penyertaan industri dalam bentuk seminar, penglibatan dalam reka bentuk kurikulum, latihan industri pelajar di industri, permasalahan dalam bidang industri dijadikan sebagai projek, industri sebagai pakar rujuk, penglibatan dalam proses pengajaran dan sebagainya.

Penyelidikan Staf – Indikator 3

Bagi merealisasikan lagi ruang dan peluang ahli akademik agar sentiasa menambah baik kemahiran dan ilmu, mereka diberi peluang oleh institusi untuk meningkatkan kemahiran dalam menjalankan penyelidikan. Ahli akademik khususnya pensyarah beroleh pengetahuan mengenai penyelidikan melalui kursus yang diadakan di kolej sendiri ataupun melalui jemputan dari pihak lain [8]. Selain itu, para pensyarah juga diberi peluang dengan menghasilkan penyelidikan melalui pelaksanaan projek pelajar. Sepanjang pelaksanaan projek, pelajar dibimbing oleh penyelia untuk meneroka pengetahuan dan kemahiran baharu [15].

Pembangunan Projek Pelajar – Indikator 4

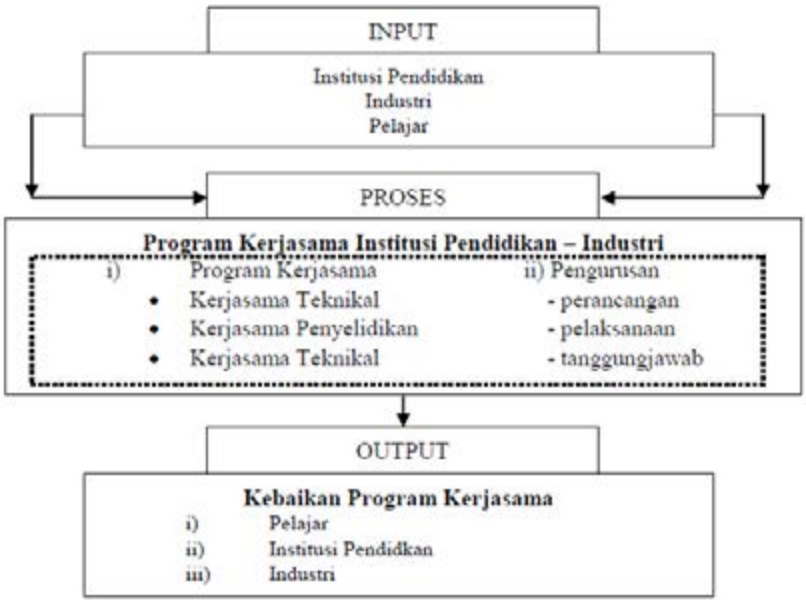
Menurut [4], sesuatu penilaian hendaklah mempunyai tahap keberkesanan yang tinggi

dalam mengklasifikasikan pelajar mengikut kemahiran dan kebolehan sebenar. Bagi melihat pencapaian pelajar, Domain Pembelajaran iaitu kognitif (Cognitive), Efektif (Affective) dan Psikomotor (Psychomotor) boleh dikenalpasti. Kajian [3] menunjukkan domain kognitif merujuk pada pengetahuan dan perkembangan kemahiran intelektual. Efektif merujuk pada perasaan seperti menilai, motivasi, tingkah laku dan penghayatan, manakala domain psikomotor pula merujuk kepada pergerakan fizikal, koordinasi, dan penggunaan kemahiran motor. Segala penilaian tugasan atau projek pelajar akan dilihat melalui tiga domain tersebut. Penilaian akhir semester merupakan penentuan kepada pelajar dalam membangunkan sesebuah projek akhir. Pembangunan projek pelajar di akhir semester di institusi merupakan satu kursus wajib bagi program pengajian tertentu yang perlu dilaksanakan bagi memenuhi syarat bergraduasi. Projek memberi ruang kepada pelajar untuk mengaplikasi pengetahuan dan kemahiran terdahulu serta mempamerkan keupayaan mereka dalam merealisasikan idea, kreativiti dan inovasi di samping menyelesaikan masalah [15].

Inovasi & Pengkomersialan – Indikator 5

Pengurusan di setiap politeknik mempunyai unit yang bertanggungjawab dalam penyelidikan iaitu Unit Penyelidikan Inovasi dan Pengkormesialan (UPIK). Melalui unit ini, antara inisiatif PTSS adalah menganjurkan pertandingan inovasi setiap tahun iaitu “PTSS Innovation and Competition” (INNOCOM) di Peringkat Kebangsaan. Para pelajar dan pensyarah sekarang amat berminat untuk menghasilkan rekaan dan inovasi terkini selaras dengan matlamat kerajaan bagi melahirkan budaya inovasi dalam kalangan generasi muda. Manakala di peringkat JPPKK, Pengarah Pusat Penyelidikan dan Inovasi Politeknik (PPIP) telah menetapkan satu garis panduan dalam merancang, mengurus inovasi, harta intelek dan pengkomersialan. Selain itu, PPIP juga akan memastikan inovasi yang disenarai pendek dibuat perlindungan harta intelek terlebih dahulu sebelum diketengahkan pada pameran dan pertandingan di peringkat yang lebih tinggi [2][10].

Kajian Sedia Ada dalam Bentuk Kerangka Konsep Kajian



Rajah 1: Kerangka Konsep kajian daripada sumber [11]

Rajah 1 merupakan kajian yang sedia ada daripada [11] yang menghuraikan tentang kerjasama institusi pendidikan – industri yang dilaksanakan di Politeknik Merlimau di mana terdapat tiga elemen penting iaitu input, proses dan output. Kerangka ini mirip kepada kerangka kerja metodologi yang dicadangkan iaitu di bawah indikator kolaborasi industri. Walau bagaimanapun, kerangka [11] tidak menggambarkan secara menyeluruh mengenai pelan pembangunan utama dan percambahan elemen-eleman lain yang perlu dicapai. Ia bermaksud, kerangka kajian sedia ada hanya memfokuskan kepada indikator kedua dalam kerangka kerja metodologi kajian ini.

Metodologi Kajian

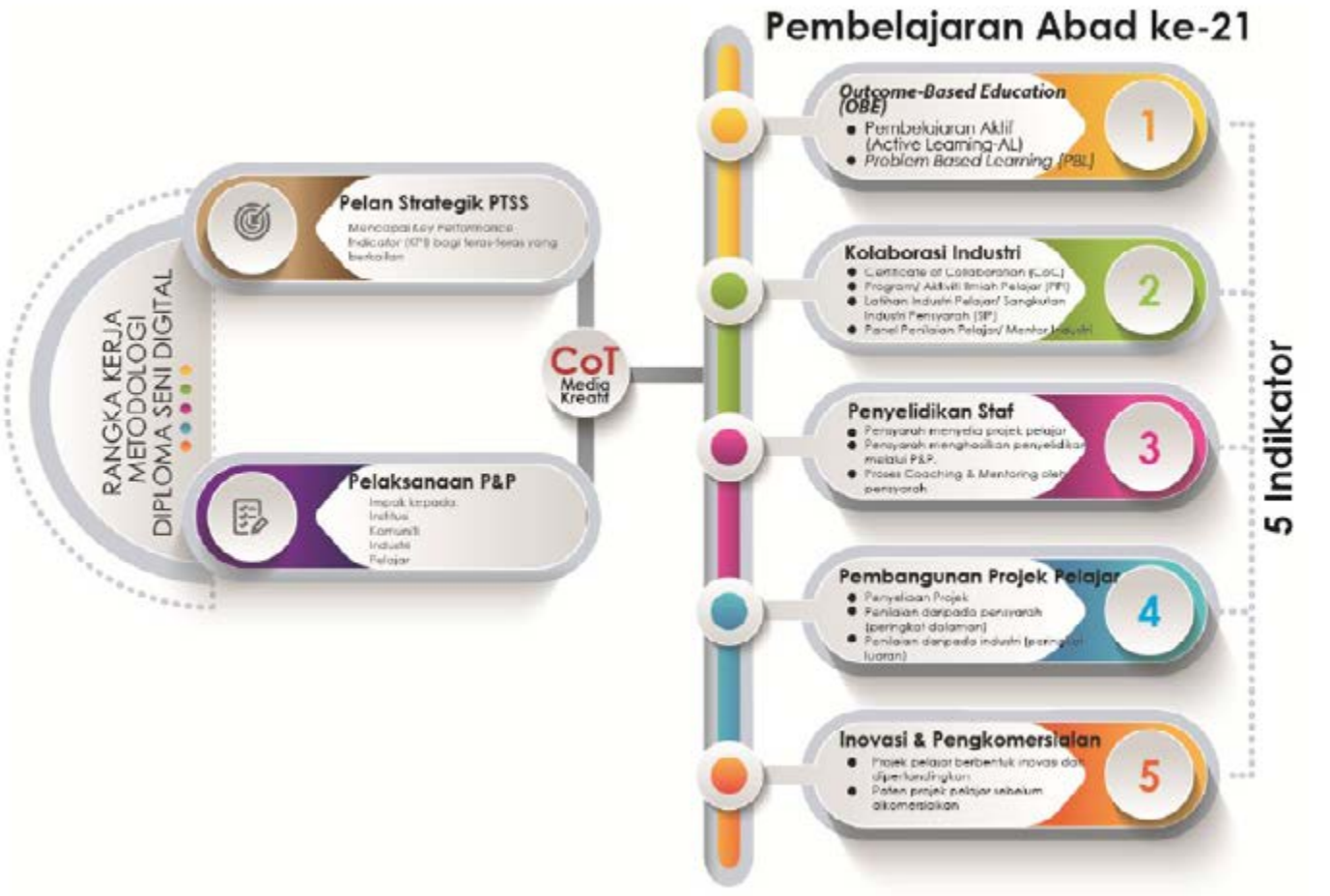
Bagi melihat keberkesanan pembelajaran abad ke-21 melalui lima indikator dalam rangka kerja metodologi program DDS ini, penyelidik menggunakan kaedah tinjauan berbentuk deskriptif dengan menyediakan borang soal selidik kepada responden. Menurut [13], penyelidikan deskriptif merupakan penyelidikan yang bermatlamat untuk menerangkan suatu fenomena yang sedang berlaku. Soal selidik merupakan cara terbaik dalam pengumpulan maklumat dan mendapatkan jawapan yang relevan dengan persoalan kajian yang dilakukan daripada responden yang dikaji. Kajian ini dibuat dengan melibatkan kepada dua kategori responden iaitu pensyarah dan pelajar yang terlibat secara langsung dengan kaedah rangka kerja yang dibangunkan ini. Sebanyak 35 borang soal selidik telah diedarkan kepada pelajar semester akhir Sesi Jun 2018 Program DDS, PTSS manakala sebanyak 15 borang soal selidik pula kepada pensyarah di PTSS. Penyelidik membincangkan keputusan dan analisa data kajian diperolehi bagi menjawab peratusan kekerapan bagi setiap soalan. Penyelidik telah menggunakan Skala Likert empat pemeringkatan untuk mengukur jawapan responden (Jadual 1). [6] merujuk kepada dua jenis Skala Likert iaitu 5 skala yang mempunyai mid-point (neutral) dan Skala Likert yang menggunakan 4 skala yang kedua-duanya masih tetap dapat diselesaikan dengan merujuk pada kajian yang dilaksanakan.

Jadual 1: Skala Pemeringkatan Likert

Item	Skala
Sangat Bersetuju	4
Bersetuju	3
Tidak Bersetuju	2
Sangat Tidak Bersetuju	1

Reka Bentuk Rangka Kerja Metodologi Program Diploma Seni Digital (DDS)

Penghasilan reka bentuk rangka kerja metodologi Program DDS adalah berdasarkan dapatan daripada peringkat pelaksanaan dalam pengurusan program di Jabatan Rekabentuk dan Komunikasi Visual, PTSS. Reka bentuk rangka kerja metodologi ini hampir mempunyai persamaan dengan kerangka konsep kajian [11] pada tiga bahagian iaitu ‘Input’, ‘Proses’ dan ‘Output’. Manakala rangka kerja metodologi penyelidik menekankan pada lima indikator penting yang mempunyai persamaan di bahagian ‘Proses’ dalam kerangka kajian tersebut.

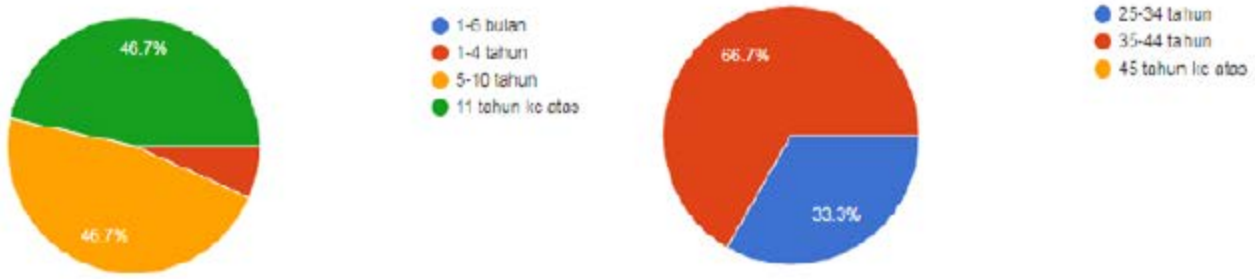


Rajah 2: Rangka Kerja Metodologi Program Diploma Seni Digital (DDS)

Analisis Data

Bahagian ini melaporkan analisis data berdasarkan tinjauan yang dijalankan melalui soal selidik yang melibatkan kategori pelajar dan pensyarah. Instrumen kajian meliputi tiga bahagian iaitu Bahagian A demografi responden, Bahagian B untuk menjawab objektif kajian pertama; keberkesanan lima indikator penting dalam proses P&P abad ke-21 manakala Bahagian C objektif kajian kedua; keberkesanan pembelajaran abad ke-21 melalui pendekatan rangka kerja metodologi Program DDS.

Keberkesanan Lima Indikator Penting dalam Proses Pengajaran dan Pembelajaran (P&P) Abad ke-21 bagi Persepsi Pelajar dan Pensyarah



Rajah 3: Analisis Demografi Pensyarah

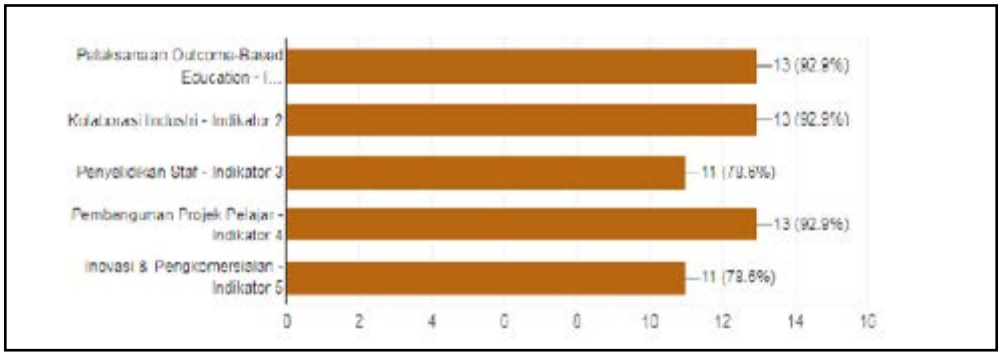
Seramai 15 orang pensyarah bidang ini mempunyai pengalaman mengajar sekitar 5 hingga 10 tahun dan 11 tahun ke atas iaitu dengan jumlah peratusan masing-masing sama iaitu 46.7% dan di antaranya berumur sekitar 25 ke 34 tahun dengan peratusan 33.3% manakala umur 35 ke 44 tahun adalah 66.7%. Bagi menjawab keberkesanan Indikator 1; Outcome-Based Education (OBE), 80% menunjukkan pensyarah sangat bersetuju dan 20% bersetuju memahami pendekatan OBE dalam P&P dan 73.3% di antara pensyarah tersebut yang sangat bersetuju keberkesanan proses P&P melalui kaedah Pembelajaran Aktif (Active Learning). Pensyarah mengamalkan proses P&P dengan menggunakan kaedah Problem Based Learning (PBL) di mana keputusan bersetuju sebanyak 53.3% dan sangat bersetuju 46.7%.

Bagi Indikator 2; Kolaborasi Industri, sebanyak 66.7% menyatakan sangat bersetuju dan 33.3% bersetuju bahawa proses P&P dapat dilaksanakan dengan adanya kolaborasi bersama industri/ agensi/ komuniti. Selain itu, program/ aktiviti ilmiah pelajar boleh dilaksanakan dengan adanya kolaborasi bersama industri di mana pensyarah sangat bersetuju, 73.3% dan hanya 6.7% tidak bersetuju. Analisis dapatan bagi latihan industri dapat dilaksanakan dengan adanya kolaborasi bersama industri, ada juga pensyarah yang menyatakan sangat tidak bersetuju, 6.7% walaupun majoriti pensyarah yang lain iaitu 66.7% menyatakan sangat bersetuju. Memandangkan Sangkutan Industri Pensyarah (SIP) sangat berkait dengan kolaborasi bersama industri, majoriti pensyarah memberi keputusan yang positif iaitu sangat bersetuju (73.3%) dan 26.7% bersetuju. Dalam melaksanakan projek pelajar, amat sesuai untuk menjadikan industri sebagai panel penilai pelajar/ mentor program dan keputusan yang dibuat oleh pensyarah yang sangat bersetuju sebanyak 86.7%. Indikator 3; Penyelidikan staf, pensyarah menunjukkan 73.3% sangat bersetuju bahawa penyelidikan boleh dibuat melalui proses penyeliaan projek pelajar dan juga melalui proses P&P. Begitu juga dengan analisis data bahawa dengan adanya aktiviti penyelidikan, proses coaching dan mentoring dapat dijalankan dengan merujuk kepada sangat bersetuju (73.3%) berbanding tidak bersetuju (13.3%).

Manakala Indikator 4; Pembangunan projek pelajar, pensyarah sangat bersetuju (80%) dan bersetuju (20%) di mana ia dapat dilaksanakan melalui penyeliaan projek daripada semasa ke semasa. 66.7% sangat bersetuju penilaian projek dilaksanakan oleh pensyarah di peringkat dalaman manakala 73.3% sangat bersetuju bahawa penilaian projek pelajar juga perlu dilaksanakan oleh panel industri di peringkat luaran. Indikator 5; Inovasi dan Pengkomersilan, 93.3% menyatakan sangat bersetuju bahawa pembangunan projek pelajar yang berinovasi perlu digalakkan untuk

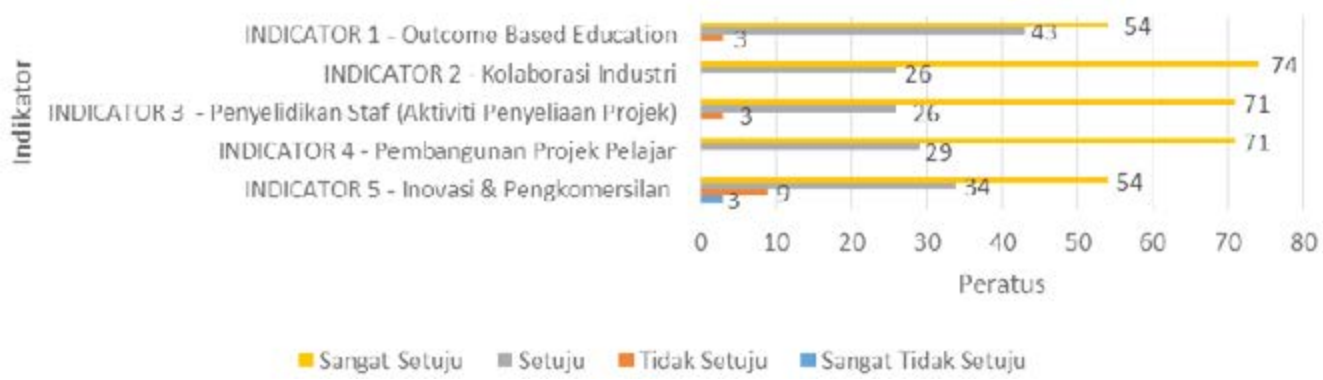
dipertandingkan dalam pelbagai peringkat. Selain itu, institusi juga banyak menyokong dalam pembangunan projek pelajar tersebut dengan merujuk pada analisis data daripada pensyarah iaitu 73.3% menyatakan sangat bersetuju dan bersetuju 26.7%. Projek pelajar yang telah dibangunkan juga perlu dipatenkan dan dikomersilkan dengan hampir majoriti menyatakan sangat bersetuju (80%) dan 66.7% pensyarah sangat bersetuju bahawa institusi sangat menyokong dalam mempatenkan dan mengkomersilkan projek pelajar berbanding tidak bersetuju sebanyak 13.3%. Analisis pelajar pula mendapati seramai 35 orang responden adalah pelajar semester akhir (100%). Bagi keberkesanan proses P&P, 51% pelajar sangat setuju dengan Indikator 1, 69% pula menunjukkan keberkesanan bagi Indikator 2, 49% keputusan menunjukkan responden sangat setuju dengan Indikator 3, 63% sangat setuju dengan Indikator 4 dan bagi Indikator 5, keputusan menunjukkan 63% responden sangat setuju.

Keberkesanan Pembelajaran Abad ke-21 Melalui Pendekatan Rangka Kerja Metodologi Program DDS bagi Persepsi Pelajar dan Pensyarah



Rajah 4: Pemilihan lima indikator yang ada dalam rangka kerja metodologi Program DDS

Seramai 13 orang pensyarah menunjukkan persepsi sangat positif dengan memilih Indikator 1, Indikator 2 dan Indikator 4 untuk lebih ditekankan di dalam P&P iaitu 92.9% pada Rajah 4. Manakala 11 orang pensyarah (78.6%) menunjukkan perkara yang positif apabila memilih Indikator 3 dan Indikator 5. Ada pensyarah yang memberikan pendapat bahawa penglibatan daripada pihak institusi juga amat penting agar program dapat dilaksanakan dengan baik. Selain itu, kerjasama dan komitmen pelajar dan pensyarah juga dititikberatkan. Pembangunan projek pelajar perlu ditekankan lagi dan tidak lupa juga latihan dan kemahiran pensyarah juga perlu dipertingkatkan. Selain itu, dalam indikator tersebut, perbanyakkan aktiviti bersama industri supaya dapat memberi nilai tambah kepada pelajar di samping membuka ruang yang luas untuk kebolehpasaran pelajar. Penilaian projek atau program bersama industri supaya aktiviti yang dijalankan menepati atau memenuhi keperluan institusi dan industri. Dengan adanya pendedahan yang berterusan dengan pihak industri, ia dapat memberikan lebih pengalaman kepada pelajar justeru penguasaan kemahiran terhadap elemen-elemen penting dalam bidang untuk diaplikasikan sewaktu pembangunan projek akhir pelajar sangat diperlukan bagi mendapatkan hasil yang berkualiti tinggi.



Rajah 5: Pembelajaran Abad ke-21 Melalui pendekatan Rangka Kerja Metodologi Program DDS bagi Persepsi Pelajar

Analisis persepi pelajar pula mendapati majoriti responden pelajar semester akhir program DDS sesi Jun 2018 iaitu seramai 35 responden sangat setuju (54%) dengan Indikator 1; Pembelajaran Aktif (Active Learning) dan pembelajaran berasaskan masalah (Problem Based Learning) yang dilaksanakan dalam Program DDS, 74% sangat setuju bagi Indikator 2 melalui penglibatan industri dalam aktiviti kolaborasi, 71% sangat setuju dengan Indikator 3 iaitu melalui aktiviti penyeliaan projek pelajar oleh pensyarah, 71% responden sangat setuju bagi Indikator 4 iaitu aktiviti pembangunan projek pelajar yang dilaksanakan dan bagi Indikator 5, didapati analisis menunjukkan 54% pelajar sangat setuju dengan aktiviti yang melibatkan inovasi dan pengkomersialan.

Kesimpulan

Secara umumnya, rangka kerja metodologi yang dibangunkan ini telah menjadi satu aturan pelaksanaan kerja yang lebih tersusun kerana setiap indikator memainkan peranan tersendiri dalam menyumbang kepada keberhasilan graduan berkualiti. Disamping itu juga, secara tidak langsung, ia mencapai KPI yang telah disasarkan dalam setiap indikator. Pencapaian KPI bagi Pelan Strategik PTSS yang telah digariskan menerusi tujuh teras utama juga dicapai dengan mudah. Menerusi kerangka kerja ini, aktiviti mudahcara kepada staf lebih mudah dijalankan dan pelaksanaan diakukan dengan tersusun dan bersistematik. Bagi pelaksanaan program dibawah bidang tujahan CoT, semua indikator rangka kerja dapat dibangunkan menjurus kepada pencapaian KPI yang ditetapkan.

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FAKTOR YANG MEMPENGARUHI TINGKAH LAKU PELAJAR AKIBAT PENGGUNAAN MEDIA SOSIAL TIDAK TERKAWAL: PELAJAR POLITEKNIK NILAI

Seri Nian Akmad1a, Norfazila Ahmad2b, Nurzarina Mohd Zin3c

1Politeknik Nilai N.Sembilan, Malaysia

2Politeknik Nilai N.Sembilan, Malaysia

3Politeknik Nilai N.Sembilan, Malaysia

aseri_nian@polinilai.edu.my ,bnorfazila672@gmail.com , czarina_zain@polinilai.edu.my

Keywords : Kompetensi, Tingkahlaku Pelajar, Impak negatif, Media Sosial

Abstrak. Rangkaian media sosial telah mencipta satu fenomena di internet yang membantu mengekalkan hubungan dengan pengguna lain. Namun begitu, sejak kebelakangan ini terdapat segelintir golongan remaja yang terlalu obses dengan penggunaan media sosial sehingga mengakibatkan fenomena ketagihan media sosial. Oleh itu, kajian ini dijalankan untuk meninjau faktor-faktor media sosial terhadap tingkah laku sosial pelajar di Politeknik Nilai, Negeri Sembilan. Seramai 2585 orang pelajar Politeknik Nilai Sesi Jun 2018 dari Jabatan Perdagangan, Jabatan Kejuruteraan Mekanikal dan Jabatan Agro Bioteknologi & Industri dan hanya 366 orang pelajar telah dipilih secara rawak sebagai responden kajian ini. Instrumen kajian yang digunakan adalah kaedah soal selidik. Data dianalisis secara statistik deskriptif dengan menggunakan perisian Statistical Package for Social Science (SPSS Versi 20.0). Dapatan kajian terhadap elemen kompetensi Impak Negatif Media Sosial dalam diri pelajar iaitu kompetensi Buang Masa, Tumpuan Belajar Terganggu, Kurang Masa Mengulangkaji, Sukar Bangun Awal dan Kurang Interaksi Dengan Ahli Keluarga adalah tinggi dengan nilai purata min 3.46, 2.71, 2.59, 2.42 dan 2.11 dengan nilai purata keseluruhan min kompetensi Impak Negatif Media Sosial tersebut berada di tahap tinggi iaitu 2.66. Kesimpulannya, media sosial banyak memberikan impak yang negatif kepada pelajar. Jadi, kesedaran yang tinggi perlu diterapkan kepada pelajar bagi membendung masalah-masalah tingkah laku sosial.

Pengenalan.

Media sosial merupakan saluran komunikasi digital yang mana para pengguna boleh berkongsi maklumat, berinteraksi dengan segera, berkomunikasi dengan dua hala dan penghantaran mesej yang cepat ke beberapa orang dalam masa yang sama. Kajian Scott & Maryman (2016) menyatakan bahawa penggunaan media sosial dianggap mampu untuk melakukan tindakan mobilisasi orang ramai supaya ikut serta dan menyokong kegiatan yang berhubung dengan perubahan sosial.
Menurut pakar psikologi dan kaunseling, Prof Dr Mohamed Fadzil Che Din sebahagian besar remaja menjadikan aplikasi untuk mengakses perkara negatif dan tidak berfaedah (Berita Harian, 01 Mei 2015). Pembendungan kesan-kesan negatif ini dapat dilakukan dengan mendedahkan para remaja kita dengan nilai-nilai etika yang sewajarnya. Pendedahan terhadap nilai-nilai etika dan moral yang

baik akan menbentuk sebuah masyarakat yang memahami tentang keburukan dan kebaikan yang wujud daripada kesan perkembangan kemajuan di samping bertindak untuk menjadi penghakis daripada melakukan perbuatan yang tidak beretika (Mohammad Abu Bakar Bin Shis, 2011). Oleh hal demikian, kekerapan penggunaan media sosial adalah wajar diambil serius dalam kalangan pelajar Politeknik Nilai agar dapat dibendung supaya ianya tidak menjejaskan prestasi akademik dan sahsiah pelajar.

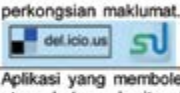
Penyataan Masalah. Program atau kempen kesedaran tentang keburukan ketagihan media sosial kurang diberi pendedahan malah hampir tiada dari pihak pengurusan intitusi pengajian. Menurut Fazlinda & Mohammad Siraj Munir kesan ketagihan yang paling ketara adalah pembaziran masa. Hal ini terjadi kerana media sosial merupakan medium yang sangat mudah untuk menghabiskan waktu terluang mereka.

Objektif Kajian

1.Melihat budaya penggunaan media sosial di kalangan pelajar.
2.Melihat hubungan kekerapan penggunaan media sosial dengan sikap pelajar di Politeknik Nilai

Sorotan Kajian.

Media sosial merupakan saluran komunikasi penting masa kini untuk membolehkan pengguna berhubung antara satu sama lain dan bertukar pandangan Andreas M. Kaplan & Michael Haenlein (2010). Laporan Unit Pemodenan Tabdiran dan Perancangan Pengurusan Malaysia, (2015) menyatakan terdapat pelbagai kategori penggunaan media sosial yang digunakan secara meluas seperti dalam Jadual 1:

BIL.	MEDIA SOSIAL	KETERANGAN
1.	Rangkaian Sosial	Aplikasi yang membolehkan seseorang pengguna berhubung dengan kumpulan atau rangkaian pengguna yang mempunyai minat atau latar belakang yang sama. Contoh Facebook, Linkend, Whatapps, Twitter, Telegram 
2.	Aplikasi Bookmark Sosial	Aplikasi Bookmark Sosial membolehkan pengguna untuk menyimpan dan mengelola alamat pelbagai media sosial dan maklumat yang terdapat di internet. Kebanyakan aplikasi ini membenarkan pengguna menggunakan fungsi tag bagi alamat media sosial untuk memudahkan carian dan perkongsian maklumat. 
3.	Berita Sosial	Aplikasi yang membolehkan pengguna memuat naik pautan atau bahan berita kepada artikel bagi membolehkan pengguna untuk mengundi popularity bahan yang dimuat naik. 
4.	Perkongsian Media	Aplikasi yang membolehkan pengguna memuat naik dan menyebarkan bahan multimedia seperti video dan imej. Fungsi tambahan seperti profil dan komen pengguna juga terdapat pada sesetengah aplikasi perkongsian media. 
5.	*Microblogging*	Aplikasi yang membolehkan pengguna berkongsi mesej atau status ringkas yang kemudiannya akan disebarkan kepada pengguna yang telah melanggan untuk menerima maklumat tersebut. 
6.	*Blog Comments and Forum*	Forum dalam talian yang membenarkan pengguna berkomunikasi dengan mengemukakan mesej berkaitan topik yang dibincangkan. 

Sumber: Penerapan Etika Penggunaan Media Sosial Dalam Sektor Awam (2015)

Kesan Negatif Media Sosial. Menurut Holden (2001), pelajar masa kini lebih gemar menghabiskan masa berjam-jam di hadapan komputer, semata-mata untuk mencari kepuasan diri dengan melayari internet. Menurut beliau lagi, sekiranya tidak dikawal dengan baik ia akan menjadi masalah besar kepada sistem pendidikan. Ini adalah disebabkan oleh obsesi kanak-kanak dan remaja khususnya terhadap internet dan media sosial pada awal sekitar tahun 2000 telah mendorong mereka menghabiskan masa di kafe siber. Amat malang sekali apabila pelajar sekolah juga yang sepatutnya berada di sekolah untuk mengikuti pembelajaran sanggup ponteng sekolah semata-mata untuk aktiviti seperti 3G, chatting, permainan video dan pelbagai lagi aktiviti yang tidak bermanfaat.

Mitchell dan Beard (2010) pula mendapati bahawa terdapat hubungan antara penggunaan media sosial dan ketagihan terhadap media sosial tersebut dalam kalangan pelajar. Semakin banyak penggunaan media sosial, semakin meningkat tahap ketagihan pelajar. Pelbagai kriteria dan terma telah digunakan untuk menggambarkan ketagihan media sosial termasuk ‘Internet dependence’ ‘technology addiction’, ‘Problematic Internet Use (PIU), dan ‘Pathological Computer Use’ (Aziz, 2013)
sembilan
.

Rekabentuk Kajian. Kajian yang dilakukan adalah dalam bentuk deskriptif tinjauan bagi mendapatkan maklum balas daripada responden tentang tahap kompetensi impak negatif media sosial dalam diri pelajar di Politeknik Nilai dan tahap kekerapan penggunaan media sosial.

Pensampelan Kajian. Populasi kajian terdiri daripada 2585 orang pelajar Politeknik Nilai iaitu pelajar dari Jabatan Kejuruteraan Mekanikal (JKM), Jabatan Perdagangan (JP) dan Jabatan Agroteknologi dan Bio-Industri (JAB) pada Sesi Jun 2018. Daripada jumlah itu, seramai 366 orang pelajar dipilih secara rawak pada minggu ke -12 pengajian sesi perkuliahan semester tersebut sebagai responden kajian. Untuk kajian ini, jumlah responden diperolehi daripada jadual Krejcie dan Morgan dalam buku Y.P Chua (2014) Kaedah Penyelidikan (Buku 1). Edisi Ketiga. McGraw-Hill (Malaysia) Sdn bhd.

Instrumen Kajian. Instrumen yang digunakan untuk kajian ini adalah instrumen kompetensi impak penggunaan media sosial yang manapenggunaan soal selidik dalam kajian ini praktikal dan berkesan untuk populasi yang besar serta memudahkan pengumpulan maklumat yang diperlukan (Chua, 2011). Sebanyak 14 soalan telah dibangunkan iaitu diadaptasi daripada kajian yang telah dihasilkan oleh Shabir (2014)’ The Impact of Social Media on Youth’ Responden diminta menjawab soalan dengan mengisi borang soalselidik kompetensi impak negatif media sosial berdasarkan skala Likert 1 hingga 5 (1:sangat tidak setuju, 2:Tidak Setuju, 3:Kurang Pasti, 4:Setuju, 5:Sangat Setuju. Borang soalselidik dianalisa secara deskriptif menggunakan perisian Statistical Package for Social Science (SPSS Versi 20.0).

Analisis Dan Keputusan. Jadual 1, menunjukkan tahap interpretasi skor min secara purata daripada analisis secara statistik deskriptif dengan menggunakan perisian SPSS Versi 20.0 yang akan digunakan untuk mengkategorikan nilai purata min.

Jadual 1 : Interpretasi Skor Min

Korelasi antara	Interpretasi
1.00 – 2.33	Rendah
2.34 – 3.66	Sederhana
3.67 – 5.00	Tinggi

Sumber : Jamil Ahmad (2002). Pemupukan Budaya Penyelidikan di Kalangan Guru: Satu Penilaian.

Hasil analisis yang ditunjukkan dalam Jadual 2 yang memaparkan jumlah peratus terhadap 5 tahap kompetensi impak negatif medial sosial dalam diri pelajar.

Jadual 2 : Jumlah purata min keseluruhan bagi lima kompetensi impak negatif media sosial

PERKARA	ITEM	MIN
Kompentensi Impak Negatif Media Sosial	Sukar bangun awal	2.4232
	Kurang interaksi dengan ahli keluarga	2.1082
	Tumpuan belajar terganggu	2.7164
	Buang masa	3.4589
	Kurang masa mengulangkaji	2.5901

Analisis menunjukkan purata keseluruhan skor min adalah 2.66 dan berada pada tahap yang sederhana. Skor min tertinggi diperolehi daripada item “Buang Masa” iaitu 3.46 diikuti elemen Tumpuan Belajar Terganggu (2.71), Kurang Masa Mengulangkaji (2.59), Sukar Bangun Awal (2.42) dan Kurang Interaksi Dengan Ahli Keluarga (2.11).

Perbincangan Kajian. Dapatan hasil kajian menunjukkan bahawa impak negatif media sosial terhadap pelajar Politeknik Nilai berada pada paras sederhana iaitu pelajar banyak membuang masa dengan melayari media sosial yang tidak berfaedah dan ini seterusnya mengakibatkan kemerosotan di dalam pembelajaran mereka. Mereka lebih banyak menghabiskan masa dengan melayari laman-laman sosial yang tidak membawa kesan kepada peningkatan tahap akademik yang

baik. Ini disebabkan media sosial amat mudah diakses oleh para pelajar. Mereka boleh mengakses media sosial di mana sahaja dengan kadar yang amat murah. Perkara ini telah diakui oleh Qingya (2011) yang menyatakan bahawa ramai pelajar menghabiskan masa dalam media sosial dan mengakibatkan ibu bapa bimbang bahawa anak-anak mereka menghabiskan banyak masa di media sosial dan tidak cukup masa untuk belajar. Boleh dikatakan kesemua pelajar pada masa kini mempunyai telefon pintar sendiri disebabkan faktor kemudahan untuk komunikasi, atau komputer berinternet. Namun, disebabkan banyak faktor menarik yang menyebabkan pelajar mudah leka untuk menghabiskan masa berjam-jam terutamanya untuk tujuan hiburan. Apabila pelajar sering kali menghabiskan banyak masa di media sosial, maka mereka terdedah kepada ketagihan yang melampau dan sukar untuk dibendung.

KESIMPULAN

Kepesatan media sosial akan terus berkembang seiring dengan peredaran waktu. Media Sosial adalah perkara yang tidak mampu kita halang atau kekang perkembangannya. Menidakkan media sosial moden dalam kehidupan kanak-kanak dan remaja bererti 'membunuh' perkembangannya dalam era digital serta globalisasi. Justeru, sokongan dan kerjasama daripada semua pihak amat diperlukan bagi memastikan perkembangan mereka dalam persekitaran yang sihat dan selamat. Selain ibu bapa, peranan dan tanggungjawab ini juga tidak terkecuali kepada pihak kerajaan selaku pembina dasar, pihak politeknik, komuniti sesebuah tempat, masyarakat sekeliling dan pihak yang terlibat secara langsung mencipta dan merancang media sosial. Semua pihak harus menggalas tanggungjawab untuk memastikan kanak-kanak dan remaja memperoleh manfaat daripada kebanjiran sumber media social yang ada di segenap persekitaran kehidupan mereka. Oleh yang demikian, semua pihak diharapkan dapat memainkan peranan masing-masing dan memberikan sumbangan dalam konteks perkembangan kanak-kanak serta remaja yang merupakan aset penting dan bakal mewarisi masa depan negara.

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An Exploratory Study on Performance Measurement Practice at Waqf Institution

J.A Defiva1, a, Eliyanora2,b and Hidayatul Ihsan3,c

1Politeknik Negeri Padang, Padang, Indonesia

2Politeknik Negeri Padang, Padang, Indonesia

3Politeknik Negeri Padang, Padang, Indonesia

ajenyasradefiva@gmail.com, bnorabuan93@gmail.com, chidayatul@pnp.ac.id

Keywords: Performance; Waqf; Accountability

Abstract. The call for waqf revitalization in the last few years demands for great accountability of the mutawalli (waqf manager). It is indisputable that as the public institution waqf should be responsible to the wide range of stakeholders. There are actually various ways in discharging accountability which among others is through performance measurement. However, as far as the waqf study is concerned, there is lack of evidence as to how performance measurement is practiced in waqf institutions. This study, therefore will explore that issue through a case study at Wakaf Daarut Tauhiid Bandung, Indonesia. Particularly, this study aims at investigating as to how performance measure is practised at waqf institution. Data were obtained through in-depth interviews, observations, and documents review. Further, this study adopts the dimensions of performance measurement proposed by Noordin et al, namely efficiency, social effectiveness, maqashid al-sharia, and sustainability and growth as the conceptual lens. The results of the study show that the dimensions of performance measurement have been applied by Wakaf Daarut Tauhiid. However, the mutawalli can develop its own performance indicators, to be in line with organisational values, objectives, targets and strategies.

Introduction

The potential of waqf in Indonesia is quite large and believed to have a significant impact on the socio-economic development. Currently, it is estimated that the potential of waqf assets in Indonesia reaches IDR 2,000 Trillion per year, which indicates its ability to contribute to the country development [1]. Based on data from the Indonesian Waqf Board, up to January 2017 total waqf assets in the form of property and land reached 4.4 billion square meters with an estimated economic value reaching Rp 370 Trillion [2].

In the concept of waqf fiqh, the principal of waqf must be maintained, so that the benefits can be transferred to the beneficiaries. Therefore, waqf manager (Mutawalli or nazhir) must be able to carry out the mandate by implementing waqf programs that have been planned. To see whether a waqf program is running or not in accordance with its designation, it is necessary to measure the

performance of each program. To some extent, a good performance of waqf is indicated by the ability of the mutawalli in ensuring the perpetuity of the waqf value and the sustainability of the benefits to the beneficiaries. This research, therefore, is aimed at exploring as to how mutawalli measures its performance in managing waqf.

Literature Review

Definition of Performance Measurement

In the process of planning and decision making, one of the important things should be done by management is to set the organisational performance standards. Performance can only be measured if an individual or group of individuals within the organisation has predetermined success criteria. Performance is pivotal for every organisation, because it is a reflection of the company's ability to manage and allocate its resources [4]. Thus, performance appraisal is a systematic and continuous effort to ensure that the company is on the right track [5]. Organizational performance reflects the success of an organization within certain period of time while the results of the performance measurement can be used as input to make improvements of the organization in the future.

From an Islamic perspective, performance measurement is often discussed in the context of accountability and management. Within the scope of accountability, performance plays important role. Organizational performance measurement is one of managerial tools to improve the quality of decision making and accountability [6]. In other words, one of the mechanisms of accountability is performance measurement and evaluation. According to Ebrahim [7], performance measurement and evaluation aims to assess the extent to which program objectives and goals have been achieved and are very important in determining funding for the future. In the scope of management, performance measurement can assist top management in implementing managerial decisions to achieve a balance between the suffixes and requirements of the world with the spirit of monotheism.

Dimension of Waqf Performance Measurement

As far as waqf management is concerned, there are no performance measurement indicators to measure the performance of waqf institutions and mutawalli in Indonesia. In fact, by evaluating performance, waqf institution can monitor its level of achievement in line with organisational goals, objectives and strategies. Due to the fact that the existing performance measurement literature is very rare, this study will therefore use the performance measurement dimension proposed by Noordin et al [8] as the main reference. Those dimensions can be explained briefly as follows:

a. Efficiency

Efficiency refers to the relationship between inputs used to provide charitable activities and the level of activity delivered to the intended beneficiaries [8]. Efficiency can be done by reducing the costs incurred by the company on the possibility of a business that will fail [9]

b. Social Effectiveness

The effectiveness of a non-profit organization arises from evaluation and identification related to the focus on a process [5]. In addition, social effectiveness measures the ability of an organization to meet the needs of the community through the implementation of activities and services by using existing resources in a socially responsible manner [8].

c. Maqashid Al-Sharia

Maqashid al sharia is one of the indicators of the performance of waqf institutions that differentiate with conventional performance indicators. The aim or maqashid of Islamic law aims to safeguard human interests and needs in the world and the hereafter [8].

d. Sustainability and Growth

Sustainability and growth measures the level of financial health of waqf institutions with the aim of ensuring the seriousness of waqf institutions in facing uncertain economic conditions [8].

Research Method

Research Design

This research was carried out with qualitative approaches and case studies as research design. Researchers chose Wakaf Daarut Tauhiid as the object of research. Basically, the justification for choosing the object of this research is, because the Wakaf Daarut Tauhiid is one of waqf institutions that manage waqf professionally. In addition, the dimensions of performance measures for waqf institutions proposed by Noordin et al [8] are used in this study as conceptual lens. As explained in the previous section, the dimensions of performance measures encompass efficiency, social effectiveness, maqashid al-sharia, sustainability and growth.

Data Collection and Analysis

Data collection methods that researchers use in this study are in-depth interviews, observations, and review documents. Interviews were conducted in semi-structured and open ended question. Meanwhile, series of participant observations were conducted. Some documents such key performance indicators, waqf news, and mutabaah forms were collected to supplement the data gathered.

In analysing data, thematic analysis was used. The findings were grouped into three themes, including: basic themes, organizing themes, and global themes. Basic theme is a basic idea that arises from data that has been converted into text. Constructions of basic themes that have similarities in patterns form an organizing theme. Further, the global theme is the final conclusion formed by several organizing themes [10].

Profile of Waqf Daarut Tauhiid

Daarut Tauhiid Foundation was initiated by a small group of recitation led by KH. Abdullah

Gymnastiar (Aa Gym), at Geger Kalong Girang, Bandung. In 1999, Pusat Pengembang Wakaf (PUSBANG) was formed which focus on waqf. Other than waqf, the PUSBANG was also concerned on management of zakat, infaq and sadaqah. Later, in 2009, waqf was separated from Zakat, Infaq, Sadaqah (ZIS) institution. Over time, in 2016, Pusbang Waqf changed to Wakaf Daarut Tauhiid which focuses on collecting and managing waqf funds.

Findings and Analysis

Mutawalli's Perception on Performance Measurement

Performance measurement is very important, because it will enable organization to set up the benchmark of its success in carrying out activities. This is justified by the former Head of Secretariat:

"...[performance measurement]at non-profit [organisations] I think is very important. Managing money, which does not belong to us, that money belongs to the ummah, so measuring performance on its management is [part of] trust and professionalism. Because this is not a matter of profit or not profit, but the trust, because [we] manage the ummah's funds."

In addition, the Managing Director of the waqf also stated that performance measurement is important to implement, because to it will enable the mutawalli to see how far the performance of the institution is in line with its mission.

Dimensions of Performance Measurement

In conducting performance measurement, a measure is needed to assess the level of achievement of the goals, objectives, and strategies that have been set. Wakaf Daarut Tauhiid actually uses some Key Performance Indicators (KPIs) to evaluate its staff. However, these KPIs has not comprehensively been able to capture all waqf matters. Therefore, to see the performance of Daarut Tauhiid Waqf, the researchers used the performance measurement dimensions proposed by Noordin et al [8]. The results of the interviews will be discussed below:

1. Efficiency

Waqf efficiency in Wakaf Daarut Tauhiid refers to the scope of the institution in collecting waqf funds and the time period needed by the institution to collect waqf funds. Pertaining to the time period for collecting waqf funds, it depends on the program. In addition, the institution also controls the assets of waqf, both those are inside and outside Wakaf Daarut Tauhiid area. To control assets that are outside the area, Wakaf Daarut Tauhiid collaborates with DT Peduli. As revealed by the following Fundraising Director:

"Yes, asset control. The first asset control was later helped by friends from DT Peduli, DPU. So some of our assets outside Bandung are cooperated with DPU or DTP friends, because they also manage..."

2. Social Effectiveness

Social effectiveness is related to the ability of an organization to meet the needs of the community by using available resources. When the program is run successfully, but there is still a request from the community or congregation, the waqf program will be run again. As revealed by the following Fundraising Director:

"Yes, when the program has finished, it is finished in the sense that the target of 20,000 manuscripts has been fulfilled, now why are we holding it again, because there are still many requests from the public, and it is still interesting to say this Quran waqf"

Then the form of benefits received by the institution when the program is implemented is trustworthy to return their assets to the institution. This is in accordance with the statement given by the Program Director.
"The trust will come back from muwakif towards the waqf institution. For example and there were some incidents after the waqf endowed the land and we ran the program and succeeded and finally the muwakif reaffirmed the other assets"

The statement given by the Director of the Program regarding trustworthiness, was justified by one of the representatives who represented the Daarut Tauhiid Waqf Institute in the following interview quote:
"Alhamdulillah, the treasure that we entrusted was truly utilized, truly trustworthy, because there was always a notice that the mandate given by the wakifs was his form"

3. Maqashid Al-Sharia

Maqashid or the purpose of sharia is to maintain the benefit of society which is divided into three forms of interest, namely daruriyyah, hajiyyah, and tahsiniyyah. Regarding maqashid al sharia, the waqf daarut tauhiid institution is oriented towards the fulfillment of pesantren facilities and infrastructures and supports da'wah activities, such as quotations of interviews with the Program Director below:

"Consideration Based on the need for facilities and infrastructure in the pesantren itself. Because the waqf institution is given the mandate by the mutawalli / foundation in addition to managing existing waqf assets, it also prepares the need for infrastructure facilities to support DT's mission"

In addition, in terms of establishing waqf designation, Wakaf Daarut Tauhiid has its own division for waqf funds. As said by the Fundraising Director in the following interview:
"Mauquf 'alaih? For what we want to achieve in the meantime, we have 60, 10,10, 10 portions. So it's 60 for you to buy, 10 for operational, 10 for maintenance, and 10 for investment. Well, for the 60's, to use it, it's used"

4. Sustainability and Growth

Next is to measure the sustainability and growth of waqf. Daarut Tauhiid Waqf Institute optimizes the process of collecting waqf funds both offline, online, and through socialization and waqf education to various regions. In order for the waqf program to be carried out properly, Wakaf

Daarut Tauhiidapplies a 5% rule of waqf funds used for operational costs and waqf socialization. "So in the waqf program, there are 5% for operations and socialization, now the meaning here is simply that when the waqf is 100 thousand rupiah, the waqf value is 95 thousand rupiah, and 5 thousand rupiah for operational costs and socialization, used for matters relating to the programs concerned"

Analysis

Nazhir Perspective Related To Performance Measurement

In general, Wakaf Daarut Tauhiid as waqf manager (mutawalli) agrees on the importance of performance measurement as a form of institutional performance evaluation. The belief in the importance of performance measurement is recognized by the institution by doing various ways to assess its performance with the aim of being able to know the benchmark of its success in carrying out its operational activities, and by performing performance measurement, the institution can also evaluate and improve performance that supports the improvement of the institution in the future. Performance measurement carried out by Wakaf Daarut Tauhiid so far has been part of the evaluation of the Wakaf Daarut Tauhiid, using Key Performance Indicators (KPI). Basically, the purpose of evaluation is not only to evaluate the performance of the project, but also to facilitate the learning process for the organization. Therefore, evaluation must emphasize long-term organizational achievement rather than short-term quantitative targets [7]

Dimension of Performance Measurement

In realizing good performance, Daarut Tauhiid routinely evaluates and controls the waqf assets it manages. This is shown in the dimension of performance measurement that researchers use to see the performance of Wakaf Daarut Tauhiid. In addition, Wakaf Daarut Tauhiid also optimizes waqf services to create waqf comfort in representation.

In addition, the concept of benefit is the goal of sharia which is shown by Wakaf Daarut Tauhiid by focusing on fulfilling pesantren facilities and infrastructure as well as supporting da'wah activities. The concept of benefit will provide a large contribution if implemented in sharia economic development activities [11]. The ability of non-profit organizations to create economic and social values is considered as the main stream of organizations [12]. One of the efforts carried out by the Wakaf Daarut Tauhiid to maintain the essence of waqf is to produce waqf assets. besides the waqf continues to grow and develop, this method is also a form of responsibility shown by the institution to waqf.

In an Islamic perspective, performance measurement is part of Accountability. Accountability is an important role because it is the basis for measuring performance, because in conducting performance measurements, the broad reporting will be provided by Mutawalli to Wakif. This reporting is a form of accountability from Mutawalli. Mutawalli's accountability can be seen as Islamic accountability called dual accountability. Dual accountability means that people as caliphs are responsible to God and to all the resources entrusted. Dual accountability is more appropriate for waqf, because the waqf agreement is based on religious motivation and involves the public

interest [13]. Wakaf Daarut Tauhiid has understood the essence of accountability. The form of accountability shown by Wakaf Daarut Tauhiid is in the form of routine reporting to wakif related to the acceptance of waqf, endowments, the implementation phase of waqf, until if there is a resignation of the implementation of waqf programs.

Conclusion

This study aims to see and understand the performance indicator model in waqf institutions. For this reason, a case study was carried out at the Wakaf Daarut Tauhiid. In this study, the performance indicators proposed by Noordin et al (2017) are the conceptual framework. These indicators include efficiency, social effectiveness, maqashid al sharia, and sustainability and growth. The results of this study indicate that this performance indicator can be applied to Wakaf Daarut Tauhiid, and in general the mutawalli has understood the importance of assessing the performance of the institution. Therefore, this research implies that there is a need to set up performance measurement for waqf institutions. Perhaps, the Indonesian Waqf Board as the waqf regulator in Indonesia can develop a standardized waqf performance measurement. In addition to this, the upcoming research can explore more evidences as to how performance measurement is practised at waqf institutions.

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PENERIMAAN PELAJAR DALAM PENGGUNAAN GARIS PANDUAN PROSES PERKEMBANGAN IDEA DI DALAM REKABENTUK KREATIF

S. Basar1, a, N. Johari2,b

1Politeknik Ibrahim Sultan, Johor, Malaysia

asuhailabasar@gmail.com, bjoharinorro@gmail.com

Kata Kunci: Garis Panduan; Bidang Kreatif; Alat Bantu, design thinking, design activities

Abstrak. Sebuah hasil karya kreatif yang baik adalah terhasil daripada garapan idea yang pelbagai dan perlu diperhalusi pada setiap proses penghasilannya. Cabarannya adalah untuk memperbaiki kualiti disiplin setiap pengamal bidang kreatif agar tidak melangkaui proses-proses wajib di dalam menghasilkan hasil karya mereka. Oleh itu penyelidik membuat pendekatan menggunakan satu medium garis panduan proses perkembangan idea di dalam rekabentuk kreatif sebagai kaedah melaksanakan pengajaran dan pembelajaran dalam bidang kreatif ini. Hasil dari pendekatan tersebut juga adalah perlu seiring agar dapat digunapakai oleh semua bidang kreatif yang ada di Jabatan Rekabentuk & Komunikasi Visual, Politeknik Ibrahim Sultan khususnya. Bagi memperhalusi kajian ini kaedah kajian kualitatif di gunakan dengan melakukan satu document review terhadap garis panduan yang dibentuk dan telah di aplikasikan kepada pelajar-pelajar dalam Kursus Creative Thinking, Fundamental of Art & Design, Illustration dan juga Creative Portfolio yang mana mereka adalah terdiri daripada pelajar di antara semester satu hingga semester enam. Hasil daripada kajian yang dilaksanakan, mendapati bahawa kualiti hasil karya kreatif mereka lebih memberi impak kualiti yang maksimum berbanding pelajar-pelajar yang tidak mengikut atau menggunakan garis panduan yang telah dibina. Selain daripada itu juga para pelajar dapat melaksanakan tugasan mereka dengan lebih cepat dan juga mudah diselia oleh para pensyarah itu sendiri.

Pengenalan

Secara teorinya para tenaga pengajar di Jabatan Rekabnetuk dan Komunikasi Visual telah menerangkan dengan jelas mengenai kepentigan dan keperluan mengikut garis panduan di dalam proses penghasilan seni kreatif ini. Malah tenaga pengajar juga sering mengaplikasikan secara manual langkah-langkah tersebut setiap kali waktu pengajaran dan pembelajaran berlangsung. Walau bagaimanapun para pelajar sering mengambil langkah mudah dengan mengabaikan proses-proses penting yang telah ditunjuk ajar oleh para pensayarah mereka. Akhirnya kualiti hasil karya kreatif mereka tidak mencapai tahap seperti mana yang telah ditetapkan.

Menghasilkan sesebuah karya di dalam bidang seni kreatif tidak kira samada dalam bentuk 2 Dimensi mahupun 3 Dimensi ianya perlu melalui proses percambahan idea yang bersistematik. Keperluannya adalah untuk mendapat hasil rekaan akhir yang berkualiti dan mecapai tahap yang dikehendaki. Langkah-langkah tersebut secara kesuluruhannya sering di kenali didalam dunia seni kreatif sebagai Design Thinking. Manakala kandunganya pula terdapat beberapa langkah penting lainnya yang perlu dituruti agar hasilan akhirnya adalah mengikut kehendak yang bertepatan

mengikut projek yang dilaksanakan. Permulaan bagi kajian ini adalah dengan menghasilkan satu garis panduan berdasarkan kepada rangka kerja design thinking.

Rangka kerja ini mengintegrasikan pemecahan classic creative problem-solving (CPS) dengan metodologi seni dan reka bentuk ;

Rajah 1; A Framework for Design Thinking, Creativityarwork.com (2016)

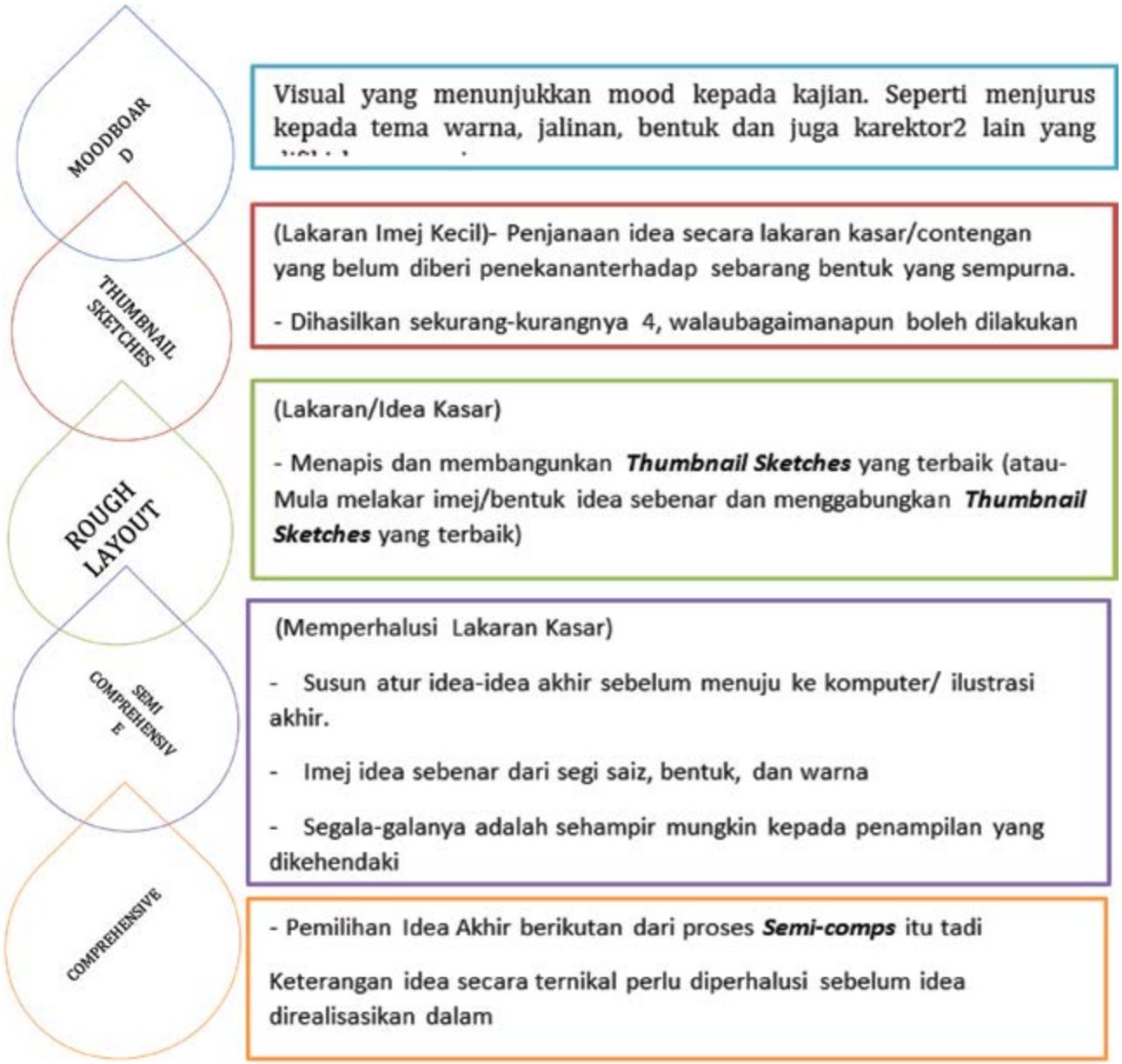


Kajian yang dilakukan adalah menjurus kepada satu proses sahaja iaitu pada proses Ideate (perkembangan idea) yang mana ianya dibincangkan lagi secara constructive dan didalami agar dapat diaplikasikan dengan mudah oleh para pelajar mahupun pereka dan pensyarah yang telibat secara langsung dan tidak langsung di dalam dunia seni kreatif ini. Maklumat garis panduan yang diterima secara teori di garapkan secara visual dan praktikal agar dapat digunapakai oleh mereka.

Ideate (Perkembangan Idea) adalah merupakan cara proses rekaan di mana ianya bertujuan untuk menghasilkan satu alternatif rekabentuk radikal yang mana pada dasarnya ia mewakili proses yang sangat “meluas” dalam penghasilan konsep rekaan. Melangkaui penyelesaian yang jelas dan cuba memanfaatkan perspektif kolektif. Menemui kawasan penerokaan yang tidak dijangka. Mewujudkan kelancaran (kelantangan) dan kelenturan (variasi) dalam pilihan inovasi. Dapatkan penyelesaian permasalahan yang jelas dari pemikiran pereka dan menjana kreativiti yang berbeza-beza. Di sinilah pereka boleh meneroka idea-idea liar, sambil cuba untuk terus mengulas topik yang dipilih.

Dalam memenuhi keperluan ini, maka kajian terhadap aplikasi manual telah dilakukan, ianya sebagai pemudahcara di dalam interaksi dua hala secara visual terhadap para pelajar agar mereka tidak mengelak dari mengabaikan proses-proses penting di dalam perkembangan idea.. Garis Panduan Perkembangan Idea ini diberi nilai secara visual (gambar) untuk memudahkan para pelajar dan pengkarya berkarya dengan lebih efisyen. Garis Panduan perkembangan idea yang perlu diikuti oleh para pereka profesional dan juga yang masih berada didalam sistem pendidikan

ini ialah:



Rajah 2; Garis Panduan Perkembangan Idea Secara Teori

Sorotan Kajian

Memberi pemahaman tentang rekabentuk idea yang dijana oleh pereka/pelajar terhadap pelanggan mahupun pensyarah (dalam proses PnP) secara visual, konkrit mahupun abstrak adalah sangat penting dalam menghasilkan sesebuah karya mengikut kehendak dan standard yang ditetapkan. Perbincangan secara meluas mengenai kepentingan proses penghasilan idea ini telah diperkatakan oleh beberapa pengkaji/penulis yang mengatakan bahawa secara tradisinya lakaran secara freehand ini dianggap sebagai teras utama dalam penghasilan karya seni kreatif

(Bilda and Demirkan, 2003). Kaitannya di sini adalah apabila para pelajar mula memandang ringan dengan keperluan mempunyai kemahiran menjana idea secara freehand terlebih dahulu sebelum di transformasi secara digital di dalam perisian grafik yang mereka perlukan seperti perisian ADOBE dan lain-lain perisian 3 dimensi.

Kebanyakkan orang berpendapat bahawa proses merekabentuk semudah kita hendak mencantikkan sebuah kotak yang hanya perlu dibalut atau dilapik dan dihiasi dengan lapisan veneer seperti yang mereka mahukan. Tapi itu bukan cara seorang pereka untuk menghasilkan rekaan mereka. Rekabentuk adalah bagaimana ianya berfungsi. (Steve Jobs 1955-2011). Walaubagaimanapun melalui pemerhatian dan pengalaman mengajar para pelajar Diploma Program Rekabentuk Grafik di Politeknik Ibrahim Sultan menunjukkan bahawa kesedaran terhadap perkara ini dipandang ringan oleh mereka. Para pelajar sering meninggalkan proses-proses utama di dalam perkembangan idea dalam menyiapkan hasil tugasan yang telah diberikan.

Menurut .(Rafiq Elmensy, 2016) Design thinking adalah satu metodolgi berpusatkan pengguna yang digunakan oleh pereka untuk menyelesaikan masalah dan mencari penyelesaian yang diinginkan oleh pengguna. Ianya adalah satu proses yang berasaskan strategi yang dipandu oleh pengguna yang bertujuan untuk memastikan bahawa mereka berada di tengah-tengah peringkat proses reka bentuk, bermula dari menentukan masalah, berakhir dengan menyampaikan penyelesaian dalam bentuk produk akhir, dan mendapatkan maklum balas pengguna yang akan menjadi sebahagian daripada proses berulang yang berterusan yang akan digunakan untuk memperbaiki produk atau perkhidmatan yang direka pada masa akan datang. Maka bersesuaian dengan garis panduan yang telah dihasilkan dimana ianya menajwab segala tuntutan dimana pengguna turut serta semasa proses-proses mrekabentuk dilakukan.

Rekabentuk Kajian

Kajian ini dilaksana berdasarkan kepada Instructional Design Model (ADDIE) yang mana ianya merupakan satu kaedah methodology yang sistematik dan sesuai dengan kajian yang kami lakukan



Rajah 3: Instructional Design Model (ADDIE)

Kaedah Kajian

Kaedah kajian yang digunakan pula adalah merupakan satu Kaedah Kualitatif – document review, dimana produk inovasi (Garis Panduan Proses Perkembangan Idea Di Dalam Rekabentuk Kreatif) diberikan kepada pelajar Diploma Creative Technology dan Diploma Rekabentuk Grafik untuk digunapakai bagi subjek Fundamental of Art and Design, Portfolio dan juga Ilustrasi Grafik. Setelah produk inovasi ini diedarkan kepada para pelajar, mereka diberi penerangan terperinci mengenai produk tersebut, kemudian para pelajar dikehendaki menggunakan garis panduan tersebut dengan betul agar dapat menfaatkan produk inovasi itu secara maksima.

Data dikumpul dan dianalisis menggunakan kaedah QIS (Qualitative Information System/ Document Review).

Description	Score
Ideal: the practice are presents	4
Primary: the programme is achieving above the standard	3
Benchmark: Minimum standard	2
Below benchmark: the minimum standard	1
The practice is not present	0

Carta 1 ; Intrumen Penilaian Bagi Penggunaan Garis Panduan Proses Perkembangan Idea di Dalam Rekabentuk Kreatif.

Struktur Instrumen Penilaian Skor adalah seperti berikut; · Skor 0 menunjukkan kelemahan pelajar dalam menyelesaikan masalah dalam merekabentuk Skor 1 menunjukkan standard minimum pelajar dalam menyelesaikan masalah merekabentuk. · Skor 2 Menunjukkan pencapaian melepasi penanda aras paling mnumum oleh pelajar dalam menyelesaikan masalah merekabentuk. · Skor 3 Menunjukkan pencapaian diatas tanda aras tahap yang lebih pencapaian pelajar dalam menyelesaikan masalah merekabentuk. · Skor 4 Menunjukkan pencapaian paling Ideal oleh pelajar dalam menyelesaikam masalah merekabentuk.

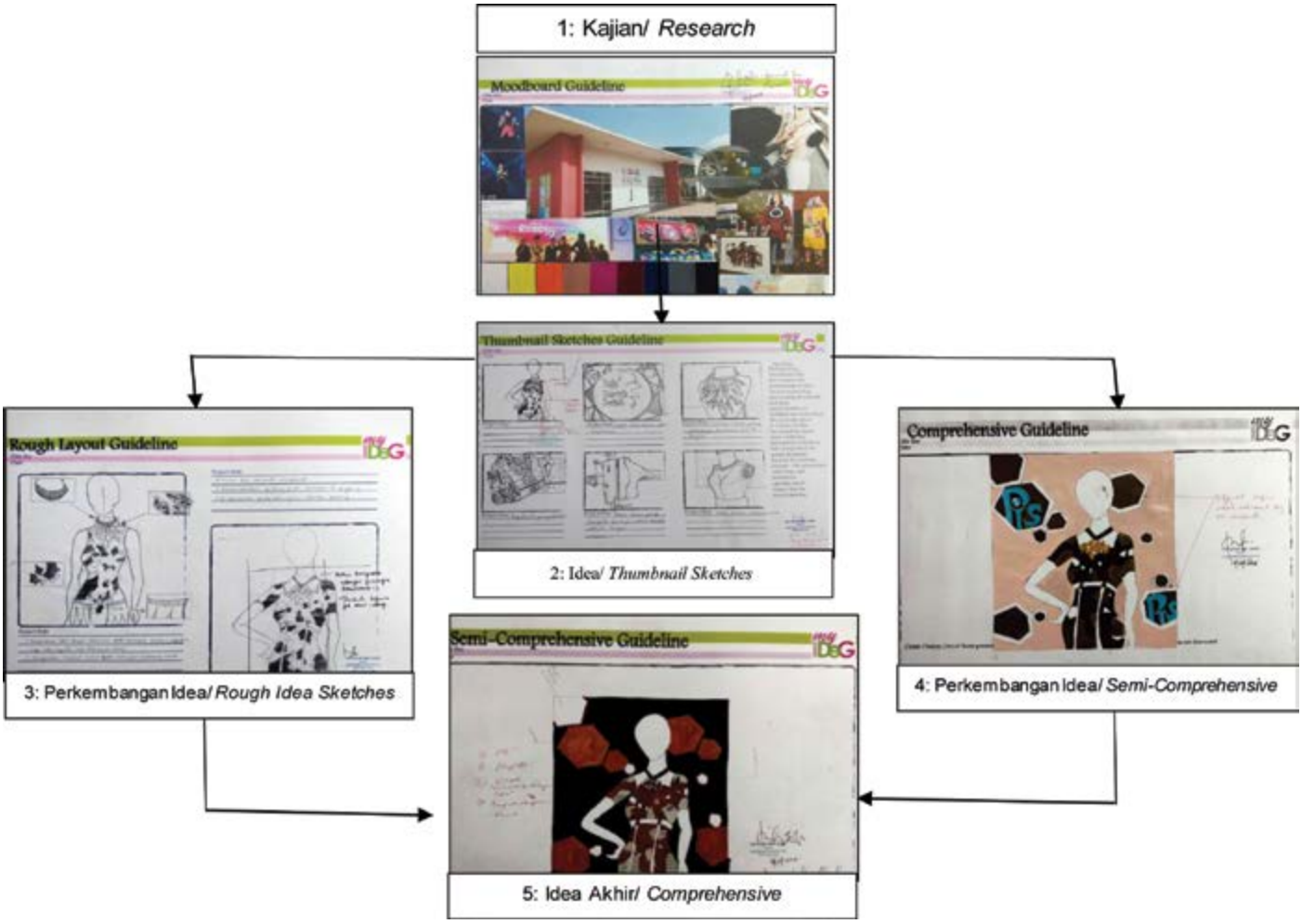
Sampel dan kaedah pengumpulan data

Jumlah pelajar yang telah diuji dengan kaedah ini adalah seramai 70 orang pelajar yang terdiri dari diploma kreatif teknologi digital dan diploma rekabentuk grafik. Dengan menggunakan carta Krejie dan Morgan (1970), kesemua pelajar ini dipilih sebagai sampel kajian. Setiap orang pelajar menerima set garis panduan yang sama.

Programme	Course	Respondent	Percentage
DCT 1A	Diploma Kreatif Teknologi Digital	24	34.29%
DRG 2A	Diploma Rekabentuk Grafik	28	40.00%
DRG 6B	Diploma rekabentuk Grafik	18	25.71%
Total	3	70	100%

Carta 2: Bilangan Sampel dan Peratus Penglibatan Pelajar

Analisis Data



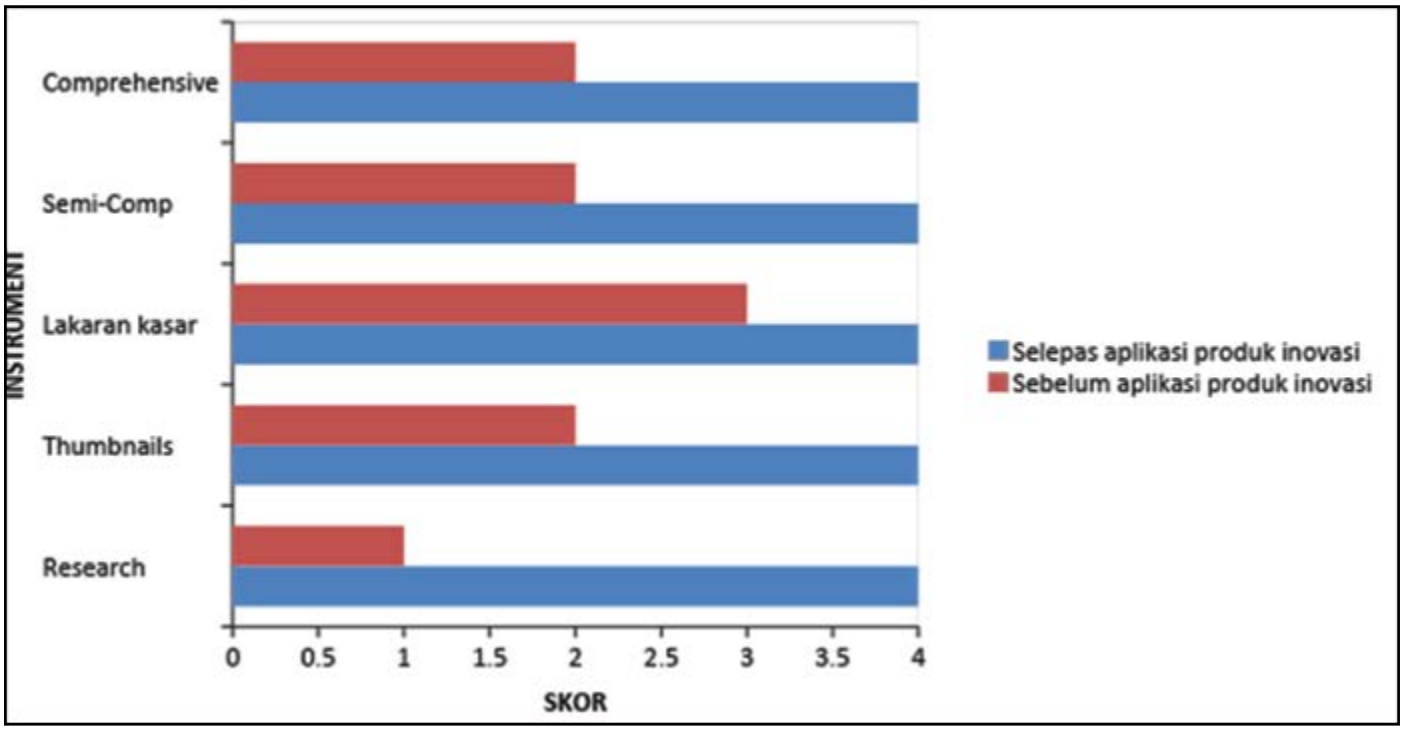
Rajah 4; Contoh Document Review yang telah dilakukan kepada para pelajar yang terlibat

Hasil dapatan

70 buah dokumen telah dikenalpasti dan dipilih untuk dianalisis. Pemilihan dokumen adalah berdasarkan kepada kelas kreatif semasa mengikut ujian selama 3 sesi dari tahun 2016 hingga

Bil.	Tajuk	Sem	Year
1	Creative thinking Final project	Jun 2018	2018
2	Creative Portfolio	Jun 2017	2017
3	Illustration final Project	Dis 2016	2016

Carta 3: Analisis dokumen



Carta 4: Purata skor bagi dokumen yang dipilh.

Kaedah Hasil daripada kajian yang dilaksanakan, mendapati bahawa kualiti hasil karya kreatif mereka lebih memberi impak kualiti yang maksimum berbanding pelajar-pelajar yang tidak mengikut atau menggunakan garis panduan yang telah dibina untuk pelajar-pelajar yang diuji. Selain daripada itu juga para pelajar dapat melaksanakan tugasan mereka dengan lebih cepat dan juga mudah diselia oleh para pensyarah itu sendiri.

Kesimpulan

Adalah menjadi satu tanggungjawab bersama dalam membantu para pensyarah dan bakal pereka yang bakal dilahirkan di dalam memudahcara kaedah Pengajaran & Pembelajaran, Program Rekabentuk Grafik, Jabatan Rekabentuk & Komunikasi Visual, Politeknik Ibrahim Sultan. Kebanyakkan kursus-kursus di dalam Program Rekabentuk Grafik ini memerlukan kemahiran melakar secara freehand semasa proses perkembangan idea ini dijalankan. Inovasi ini dilakukansebagai pemudahcara kepada pensyarah dan pelajar untuk hampir keseluruhan kursus yang adadi dalam program ini seperti Kursus Ilustrasi, Kursus Typography, Kursus Pembungkusan, Kursus Portfolio

dan Projek Semester Akhir selain boleh digunapakai juga oleh Program RekabentukFesyen & Pakaian serta Program Rekabnetuk Industri. Malahan boleh digunasama juga oleh para pereka industri di dalam proses perkembangan idea untuk menghasilkan hasil karya seni kreatif yang lebih berkualiti dan mengikuti standard permintaan pasaran semasa.

Pengkajian terhadap penambahbaikkan pada produk inovasi adalah terbuka kepada pengkaji luar untuk sama-sama dapat memberi idea dan digunapakai oleh semua peringkat dan tidak tertakluk penggunannya hanya kepada bidang seni kreatif sahaja.

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Path Planning Algorithm for A Car-Like Robot Based on Cell Decomposition Method.

O. Nurhanum[1, a] and J.M.Yazid[2, b]

[1]Mechanical Engineering Department, Politeknik Ibrahim Sultan, Johor, Malaysia

[2]SMK Taman Scientex, Pasir Gudang, Johor, Malaysia

[a]nurhanumomar@gmail.com , [b]myazidjamil@gmail.com

Keywords: Cell decomposition method; Car-like robot; Offline path planning; Obstacle avoidance.

Abstract. This study propose an obstacle avoiding path planning algorithm based on cell decomposition method and applied Dijkstra's algorithm for a car-like robot which has strict constraints on the curvature. The free space of the robot is exactly partitioned into cells. Then, the algorithm computes a shortest path for the robot. This study also employ kinematic modeling and Bezier curve to get a smooth path. The algorithm can obtain a curvature bounded path with near shortest curve length while taking cell decomposition as reference skeleton. The C-space concept has been applied in this situation. The obstacles on the map are expanded according to the size of car-like robot, so that the robot could be treated as points on this map and the coordinates of the map is corresponding to these points. The simulation and experimental result shows the algorithm can obtain the collision free path which satisfies the curvature constraint and approaches the minimal curve length for a car-like robot.

Introduction

Path planning for a mobile robot is to find a collision-free route, through the robot's environment with obstacles, from a specified start location to a desired goal destination while satisfying certain optimization criteria. Most of existing path planning methods, such as the visibility graph (VG), voronoi diagram (VD), cell decomposition (CD), and the potential field (PF) are designed with the focus on static environments, in which there are only stationary obstacles [1]. However, in practical systems, robots usually face dynamic environments, in which both moving and stationary obstacles exist.

The main problem in a motion of the robot is when there are many obstacles in their workspace environment. This problem faced especially when the obstacle block the robot path and cause the robot operations interrupted and stopped. The obstacles can also in moving or stationary condition during the robot moves. This factor actually creates a major problem to the robot. Most of the programs installed on the robot are fixed and difficult to alter.

Cell decomposition (CD) is most popular method and widely used especially for outdoor environments because of their simplicity. It is also advantages to decompose the free space into as few cells as possible, in order to make search of the corresponding graph faster. CD methods partition

the free space into convex, non-overlapping regions, called cells, and then employed techniques, such as the Dijkstra algorithm, to search the connectivity graph for a sequence of adjacent cells from the initial point to the goal. Generally, working with multiresolution CD is beneficial when one is primarily interested either in offline or online implementation. A multiresolution scheme can keep the size of the resulting graph search tractable so that its search can be achieved with the limited on-board computational resources, while keeping the required accuracy [2, 3, 4].

An impressive amount of research on path planning for mobile robot focuses on simple robot dynamics, either fully actuated or underactuated with differential-wheel driven structure (close to unicycle) [5, 6, 7]. But in this study will be focus on car-like robots for offline path planning. The purpose of this study is to develop an algorithmic method for constructing a solution to the navigation problem for a car-like robot. This study is proposed to carry out path planning algorithm using CD method through an environment containing obstacles bounded by simple polygons. Besides that, to model the CD method on a car-like robot and develop the algorithm that can reach a target position without colliding with obstacles during movement.

Methodology

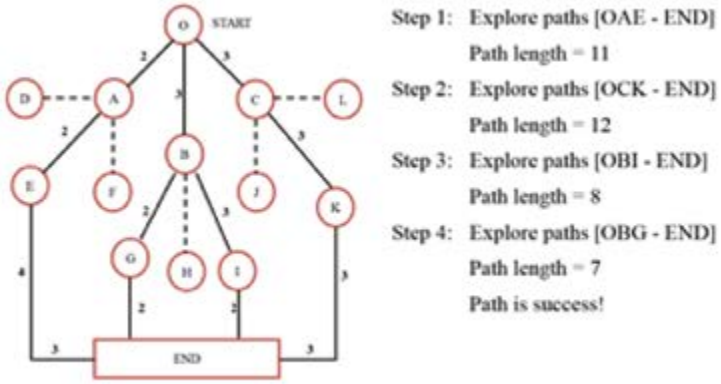
Environment Modelling Based On Cell Decomposition. In this method, the configuration space (C-space) will be divided into a finite number of cells. The cells are discrete and non-overlapping but adjacent to each other, either rectangular or polygonal shape [8]. If the cell contains an obstacles (or a part of an obstacles), it is indicated as occupied. Otherwise, the cell is indicated as free obstacles. The connectivity graph, and hence the feasible paths, are built by joining adjacent cells, for example by connecting their midpoints.

Dijkstra's Algorithm. Dijkstra's algorithm is a frequently used path planning algorithm for mobile robot navigation. For a given source vertex in the graph, the algorithm finds the path with lowest cost (the shortest path) between that vertex and other vertices as shown in Figure 1. It can also be used to find path with lowest costs from one source vertex to single destination vertex by stopping the algorithm once the shortest path to the destination vertex has been determined [9,10].

The starting point and ending point are set so that the CD can construct a path. There are a lot of path candidates from the starting point to the ending point. Dijkstra's algorithm is used to calculate the shortest path from the candidates. This algorithm will find the minimal length and use the simple calculation. In addition, this algorithm is simpler, faster and efficient in terms of path finding. Once the node of each cell is identified, the boundary of each cell will be determined either has an obstacle or not. Cells that do not have obstacles will be selected as part of the route. Algorithm will find the shortest route and not violate any obstacles between the nodes. The algorithm stops when the shortest path has been found.

Path Tracking. Many researches focus on the curvature constrained path planning due to the kinematic constraints of the car-like robot. The car-like robot can only turn its orientation in a range and results in maximal curvature the robot, must obey [11]. If the planned path has curvature over the upper bound, the mobile robot fails to follow the path [12,13]. Another means to deal with kinematic constraints is to apply a path tracker. In this study, a path tracker that is considering

the car-like robot kinematic constraints is proposed and utilized [14]. In order to demonstrate the proposed path tracker, the pre-planned path as shown in Figure 2 is considered. The tracked path planned by Dijkstra's algorithm is composed of line segments and curves, which are shown in blue.



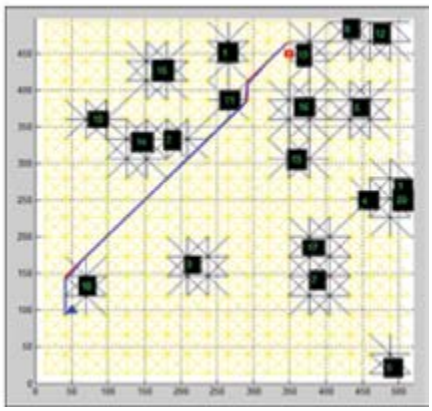


Fig. 1 Dijkstra's algorithm [9]

Fig. 2 The tracked path in blue using kinematic controller.

Bezier Curve. Unlike other type of curves like polynomials or cubic splines, Bezier curve is completely contained within the convex hull of its control points, which are used to define the Bezier curve. Through operation of control points, Bezier curve could be translated and rotated [15]. Bezier curves has fewer turning points, which are the points where the slope of the curve changes its sign, so that it is smoother than cubic splines and varies smoothly from the start point to the end point because of its continuous higher order derivatives. The Bezier curve passes through the start and final control points but not the intermediate ones, which define the start and the final orientation and the shape of the curve.

A Bezier curve of degree n can be represented as

$$P[t_0,t_1](t)=\sum_{i=0}^{n} B_i^n(t)Pi \quad (1)$$

Where Pi are control points such that $P(t_0) = P_0$ and $P(t_1) = P_n$, $B_i^n(l)$ is a Bernstein polynomial given by [16]

$$B_i^n(t) = \binom{n}{i}\left(\frac{t_1-t}{t_1-t_0}\right)^{n-i}\left(\frac{t-t_0}{t_1-t_0}\right)^{i}, \quad i \subset \{0,1,\dots\dots,n\} \quad (2)$$

Implementation using Matlab. The programmed algorithm of CD computed through the MATLAB software. The outcome can provide a feasible way of solving coverage problems, where a robot should traverse all possible configurations without hitting obstacles. Firstly, the environment was construct with the dimension displayed together with the obstacles are placed randomly. Initial position and target position was set into the environment as shows in Figure 3. The path lines of environment were determined based on the specified resolutions. The CD was implemented based on the free-space that exactly partitioned into cells that are stored in graph. The algorithm will identify all possible paths (free obstacles) and the routes should be through all the midpoint of cells (nodes). Figure 4 shows the output from the CD computed from the input in Figure 3.

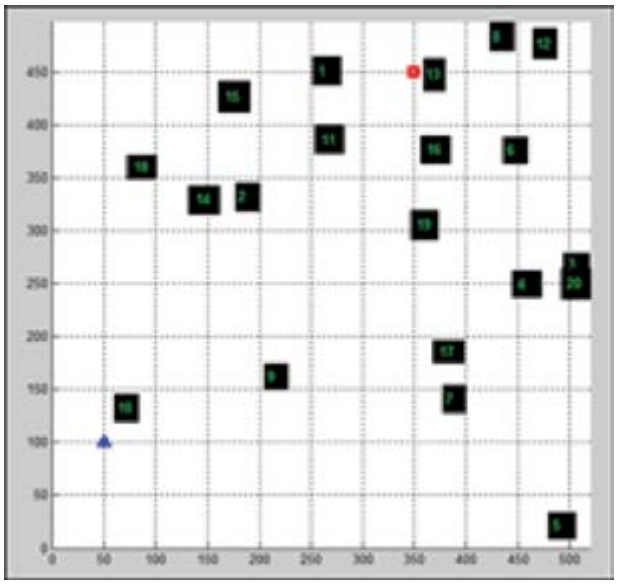


Fig. 3 The black rectangular shapes are the obstacles. The small blue triangle is starting point and the small red rectangular is the target point.

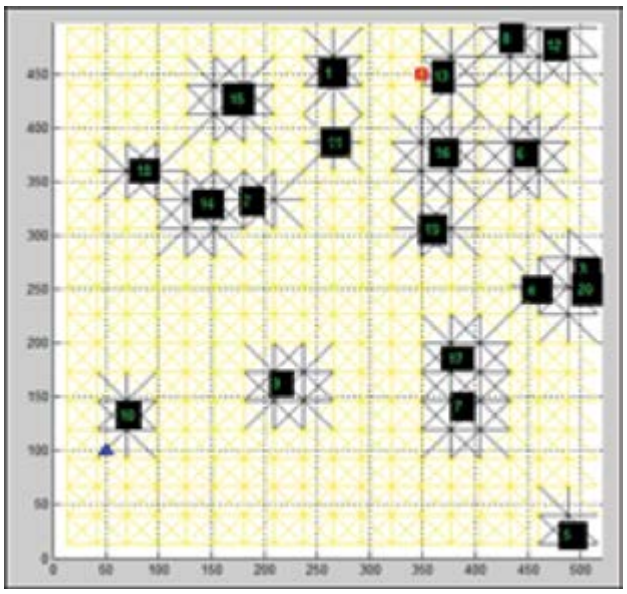


Fig. 4 The CD was implemented based on the free-space that exactly partitioned into cells.

The reference path was obtained by performing Dijkstra's shortest path algorithm on the CD. As shown in Figure 5, the yellow grid is the CD path and the magenta line is the final path of Dijkstra's algorithm. Kinematic controller was applied after consider the kinematic constraints on the curvature. Figure 6 show the tracked path in blue using kinematic controller.

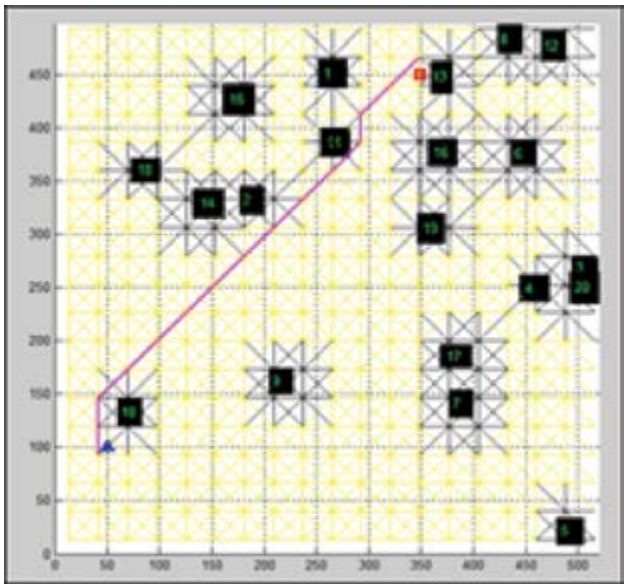


Fig. 5 The CD using Dijkstra's algorithm to find the shortest path.

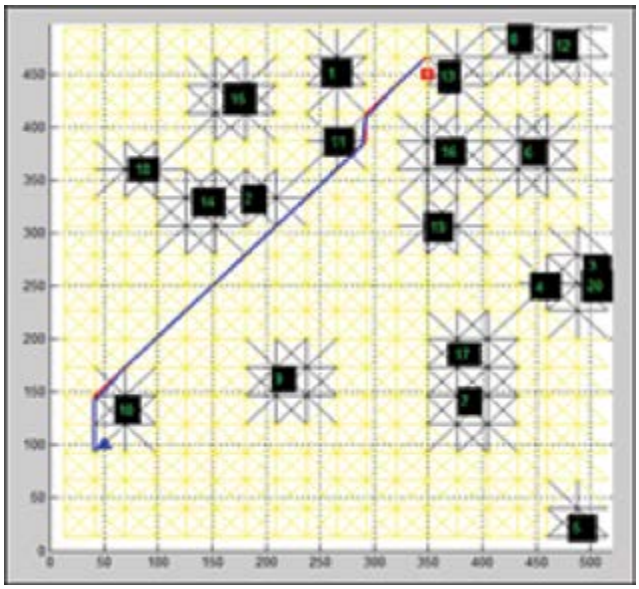


Fig. 6 A smooth path generated using kinematic control.

Then, Bezier curve was applied as a path smoothing technique to remove sharp turns at each waypoint in the remaining diagram as this curve has low computational loads and easy to generate. This advantages lead to a relatively fast calculation time. A smooth path generated using Bezier curve shown in Figure 7.

Generated Graphical User Interface (GUI) as shown in Figure 8 can be divided into four panels: display panel, parameters panel, output display and exploring panel. The workspace generated with obstacles, initial and target point, and piecewise linear path generated by cell decomposition,

Dijkstra's algorithm and Bezier curve will appear at display panel. Parameters panel allow user to set the workspace dimension, number of obstacles, starting point and target point. User can also choose to use kinematic path or Bezier path or both. Users can find out the value of products such as path length and computational time through the display panel output.

From the Matlab simulation result, CD will build a route that does not collide with obstacles. Dijkstra's algorithm is used to find the shortest path while Bezier curve was applied to construct the smooth path.

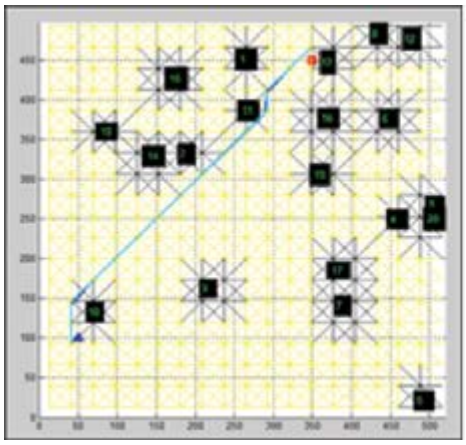


Fig. 7 A smooth path generated using Bezier curve. algorithm.

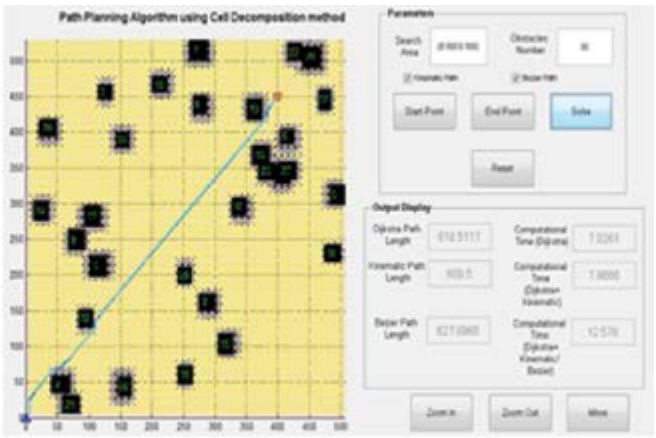


Fig. 8 GUI for path planning

Results and discussions

For the analysis, the dimension, starting point, target point, number and position of the obstacles is similar for every resolution. The first analysis performed was between resolution and computational time required to find a suitable paths. By altering the resolution, the computational time required also change as can be seen as in the Figure 9. The graph shows that the resolution is proportional to the computational time. It can be seen that if the resolution in increasing, the computational time increases.

The second analysis was carried out modifications between dimension and path length. In this situation, the starting point, target point, resolution, number and position of the obstacles is similar for every dimension. Based on the results of the analysis in Figure 10, it was found that path length is depending on the dimensional changes.

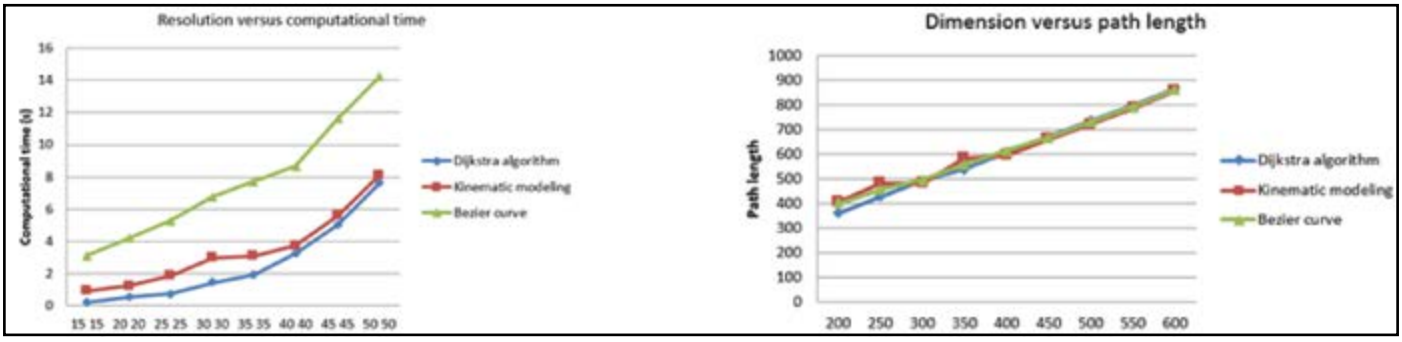


Fig. 9 Resolution versus computational time

Fig. 10 Dimension versus path length

The third analysis was carried out adjustment between number of obstacles and computational time. Based on the results of the analysis in Figure 11, it was known that the modification number of obstacles for the workspace not give very much effect on the computational time.

The fourth analysis was carried out adjustment between number of obstacles and path length. Based on the results of the analysis in Figure 12, it was known that the modification number of obstacles for the workspace will give an impact on the path length.

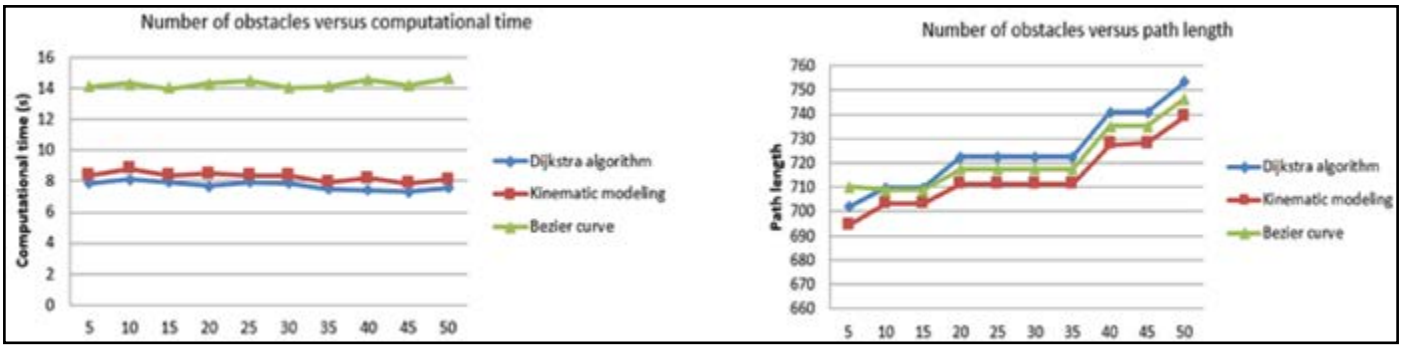


Fig. 11 Number of obstacles versus computational time

Fig. 12 Number of obstacles versus path length

A conclusion derived from the analysis is the computational time absolutely not depends on the size of the dimension and the number of obstacles. But from observation, it can be concluded that the computational time is very dependent on the value of the specified resolution. Computational time can be reduced by increasing the cell size, thus reducing the number of cells to search through. However, the length of the path was generated by Dijkstra's algorithm is proportional with enlargement of the dimensions and also increasing the number of obstacles.

Overall, the performance of the combination CD and Dijkstra's algorithm is relatively good since the path is safe and shortest between two points. In addition, kinematic model and Bezier curve implemented on piecewise linear as comparison to get a smooth path. Additionally, with the

tolerance around the obstacles, it helps the creation of routes from collision or entry the obstacles areas. It will also ensure that the routes created free-collision. The simulations show that the Bezier curve based smooth path planning algorithm proposed in this study could produce better smooth path.

Conclusions

In summary, this study was developed to facilitate the users who use the robot such as in industry. It will allow users to control the robot and can ensure that the robot does not collide with each other or collide with the obstacles. With the availability of this study, robots will be able to detect obstacles and can avoid collision. The algorithm was developed to be an advantage that can help the user as well as an alternative to avoid the problem recurring robot stuck or stopped. This will speed up the work required and help an industry to increase their productivity.
The idea of this study is to carry out path planning algorithm using a combination of CD method and Dijkstra's algorithm through an environment containing obstacles bounded by simple polygons. The path can be traversed by a car-like robot to move from starting point to target point as efficient as possible and guarantees collision avoidance with obstacles. Experimental results show that the algorithm produced can obtained the collision free path which satisfies the curvature constraints and approaches the minimal curve length.

As conclusion, this study was developed to meet the scope and objectives that has been set in the early stage. With the achievement of objectives and scope for this study, the problem statement presented has been resolved. This can be proved by the results obtained through the simulation process.

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Effect of thermal conductivity towards squeezed MHD insulating nanofluid in traction transformer over a porous surface

Deenesh Kumar Nalathambi[1,a], Khalid Hasnan[2,b]

Kandasamy Ramasamy [3,c] and Mohd Noh Dalimin[4,d]

[1, 2] Faculty of Engineering Technology, Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja, Batu Pahat, Johor, Malaysia

[3,4] Faculty of Applied Science and Technology, Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja, Batu Pahat, Johor, Malaysia

[a]deenkumar5055@gmail.com, [b]drkhalidhasnan@gmail.com, [c] future990@gmail.com, [d]noh@uthm.edu.my

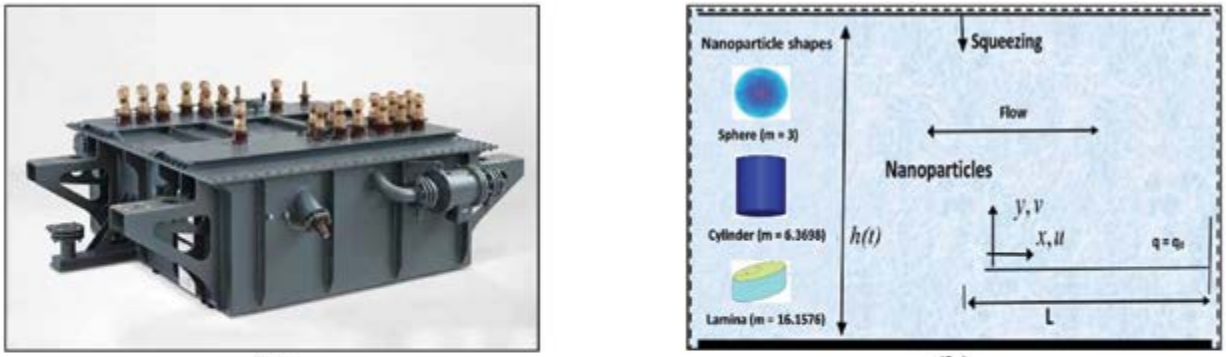
Keywords: Nanoparticles; Insulating fluid; Traction transformer; Heat transfer rate; Thermal conductivity

Abstract. Service life decrement of traction transformer due to high temperature caused by hysteresis, eddy current, iron, and copper loss is a big concern for rail industry. This paper discusses about the heat transfer rate of Magnetohydrodynamics (MHD) insulating fluid (crude/mineral oil) in the traction transformer of an Electric Multiple Unit (EMU) train, mainly for cooling purposes. The influence of different thermal conductivities (ks = 10, 100, 1000) on the squeezed MHD nanofluid of crude oil (mineral oil) based Aluminium Alloy (AA7075) nanoparticles with different shapes was investigated over a porous surface in the presence of thermal radiation and in respect to the influence of electric field via Maple software, numerically. Three typical shape of nanoparticles based on the nanoparticle shape factor are considered; sphere (m = 3.0), cylinder (m = 6.3698) and Laminar (m = 16.1576). The regulating partial differential equations (PDEs) are constructed into Ordinary Differential Equations (ODEs) by using Similarity transformation and then analysed numerically with shooting method coupled with Runge-Kutta Fehlberg formulation. Comparing the difference in thermal conductivity, shapes and influence of electric field, it was found that cylinder shape AA7075-crude oil nanofluid with thermal conductivity of 1000W/mK has the highest heat transfer rate (-θ = 0.85915683) over a porous surface wall, thus accelerating the cooling process compared to the base fluid solely. Thermal conductivity is found to give positive impact on particle heat transfer.

Introduction

Choosing a suitable insulating fluid is very important as the fluid effects the work and cooling efficiency of a traction transformer [1]. Traction transformer as shown in Fig.1(a) plays a main part to provide power for the Electric Multiple Unit (EMU) train. Utilising rated voltage in the range of 1.5 kV and 3 kV DC, temperature rise around the coil of this oil immersed transformer is unavoidable which leads to thermal aging and this accelerates the aging process of oil-paper insulation in operating traction transformers [2]. Few major contributors for heat generation in traction transformer are

hysteresis, eddy current, iron, and copper loss [3][4]. Insulating fluid which circulates between the coil system of the traction transformer and heat exchanger is driven by pumps [5]. Crude oil (mineral oil) is frequently used for cooling purposes and as insulating fluid in a traction transformer. The urge to increase the thermal conductivity has forced the researches to expand their work by suspending particles in the fluid [6] which lead to the work of pioneer researcher of nanofluid, Choi [7]. There were a lot of researches done regarding squeezing Magnetohydrodynamics (MHD) nanofluid bounded by two parallel plates or disks where fluid flow is compressed between two parallel plates [8]. The enhancement in heat transfer rate through few parameters such as Prandtl number, dimensionless temperature, dimensionless velocity and skin friction and experimental study on the Cu-engine oil nanofluid to measure thermal conductivity and viscosity were also investigated [9][10]. These previous researches and work have led to introducing nanoparticles into the insulating fluid of transformer [11] which includes traction transformer as well. Swedish physicist Hannes Alfvén (1908-1995) was referred to be the first scholar who have mentioned about MHD which brings the meaning of physical-mathematical work that covers the magnetic fields in dielectric fluid flow, in this case involving the dielectric insulating nanofluid [12]. It was observed that thermal conductivity and electrical strength of mineral oil and synthetic ester has been enhanced due to the addition of titanium oxide nanoparticles [13][14]. High attention was given to the increment of thermal conductivity of hybrid SiO2-graphene naphthenic mineral oil nanofluid as potential transformer oil [15]. This study includes the thermo physical and electrical properties of squeezed MHD nanofluid of crude oil (mineral oil) AA7075 nanoparticles as variables to investigate the heat transfer rate with the influence of electric field and difference in thermal conductivity of the nanoparticles.



(a) (b)

Fig.1. Traction transformer (a) and Physical significance of nanofluid flow and coordinate design (b)

Table 1 presents the thermopysical properties (density, specific heat, thermal conductivity,electrical conductivity and Prandlt number for AA7075 and crude oil.

Table 1 Thermophysical properties of the fluid and nanoparticle [16][17]

	ρ (kg/m³)	Cρ (J/kgK)	K (W/mK)	σ (S/m)	Pr
AA7075 (solid)	2810	960	173	26.77×10^{6}	
Crude oil (fluid)	860	1850	0.135	12×10^{-12}	188.56

Mathematic Modelling

The study involves the unsteady squeezed MHD crude oil based Aluminium Alloy (AA7075) flow along a pair of parallel surfaces where the circulating flow fluid along the coil area of a traction transformer is forcly-squeezed by a pump. The temperature profile and rate of heat transfer on the wall of the coil were investigated. As shown in Fig. 1 (b), the bottom wall is established along x-axis and the top wall, “y=” “h” _”0” /(“(s+bt” “)” ^(“-” “1” /”b”)) “=h(t)” . Under the attention that parameter such as magnetic parameter, thermal radiation and kinematic viscosity are constant, the governing equation are as follows:

$$\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}-0 \qquad \text{(continuity equation)} \qquad (1)$$

$$\frac{\partial u}{\partial t}+v\frac{\partial u}{\partial y}+u\frac{\partial u}{\partial x}+\frac{1}{\rho_{nf}}\left(\frac{\partial p}{\partial x}\right)=\nu_{nf}\left(\frac{\partial^2 u}{\partial y^2}\right)-\left(\frac{\mu_{nf}}{\rho_{nf}K}+\frac{\sigma_{nf}B_0^2}{\rho_{nf}}\right)u \quad \text{(momentum equation)} \qquad (2)$$

$$\frac{\partial U}{\partial t}+U\frac{\partial U}{\partial x}+\frac{1}{\rho_{nf}}\left(\frac{\partial p}{\partial x}\right)+\frac{\sigma_{nf}B_0^2}{\rho_{nf}}U=0 \qquad \text{(pressure gradient)} \qquad (3)$$

$$-\alpha_{nf}\frac{\partial^2 T}{\partial y^2}=-u\frac{\partial T}{\partial x}-\frac{1}{(\rho c_p)_{nf}}\frac{\partial q_r}{\partial y}-\frac{Q_0(T_\infty-T)}{(\rho c_p)_{nf}}-v\frac{\partial T}{\partial y}-\frac{\partial T}{\partial t} \quad \text{(Energy equation)} \qquad (4)$$

Boundary conditions are $v = v_0(t)$, $u(x,0,t)=0$, when $y=0.0, T=T_\infty$, $u(x,\infty,t)=U(x,t)$

Assuming as free stream funtion with Brownian motion, the similarity transformation can be considered as $\eta = y\sqrt{\nu_f^{-1}a}$, $\psi=\sqrt{a\nu_f}\,xf(\eta)$, $\frac{1}{a}=s+bt$, $\frac{\theta(\eta)}{(T-T_\infty)}=\frac{1}{\frac{q_0 x}{k_f}\sqrt{\frac{\nu_f}{a}}}$, $q(x)=q_0 x$, $u=\frac{\partial \psi}{\partial y}$ and $v=-\frac{\partial \psi}{\partial x}$

The Maxwell recognized on the nanofluid thermophysical assets are nominated as

$$(\rho c_p)_{nf}=\frac{k_{nf}}{\alpha_{nf}},\ \rho_{nf}=\varphi\rho_s+(1-\zeta)\rho_f,\ (1-\zeta)^{2.5}=\frac{\mu_f}{\mu_{nf}},\ (\rho c_p)_{nf}=\zeta(\rho c_p)_s+(1-\zeta)(\rho c_p)_f,$$

Partial Differential Equations (1) to (4) are transformed to Ordinary Differential Equation using OHAM method (analytical method) and similarity transformation coupled with shooting technique (numerical method). The elaborated Eg.1 to Eq.4 were then determined numerically and experimentally by giving various ks value, electric field and shapes factor to get the temperature profile on the wall as given in Fig.2(a) – Fig.2(c) and then represented in the bar chart as in Fig.3.

3. Result and Discussion

The results from both numerical and analytical are presented in Fig.2 and the heat transfer rate values are presented in Fig.3 for better understanding through graph, data and chart presentation

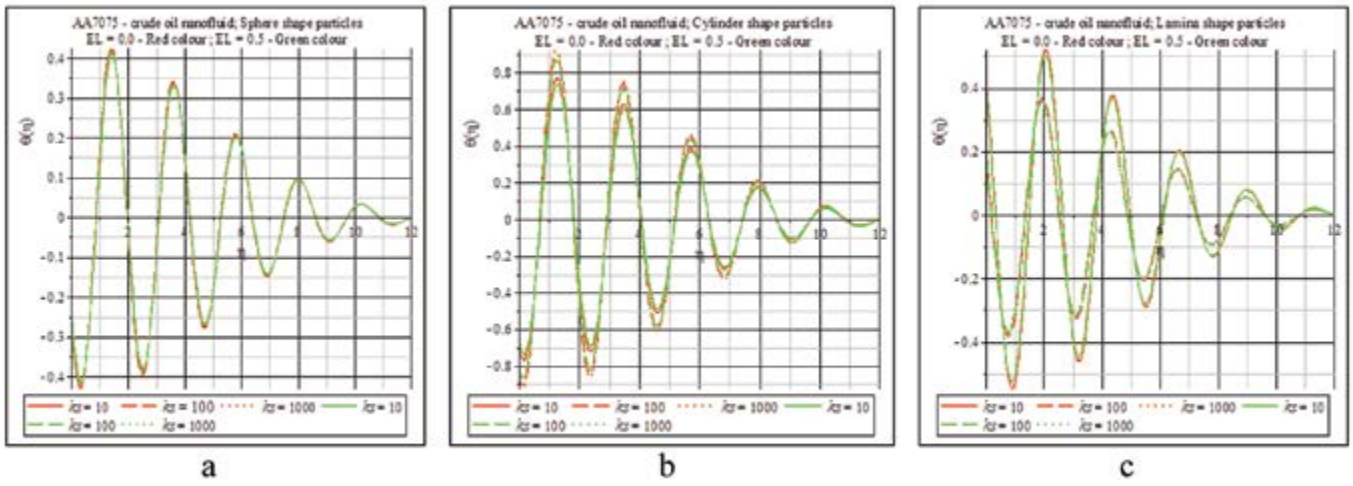
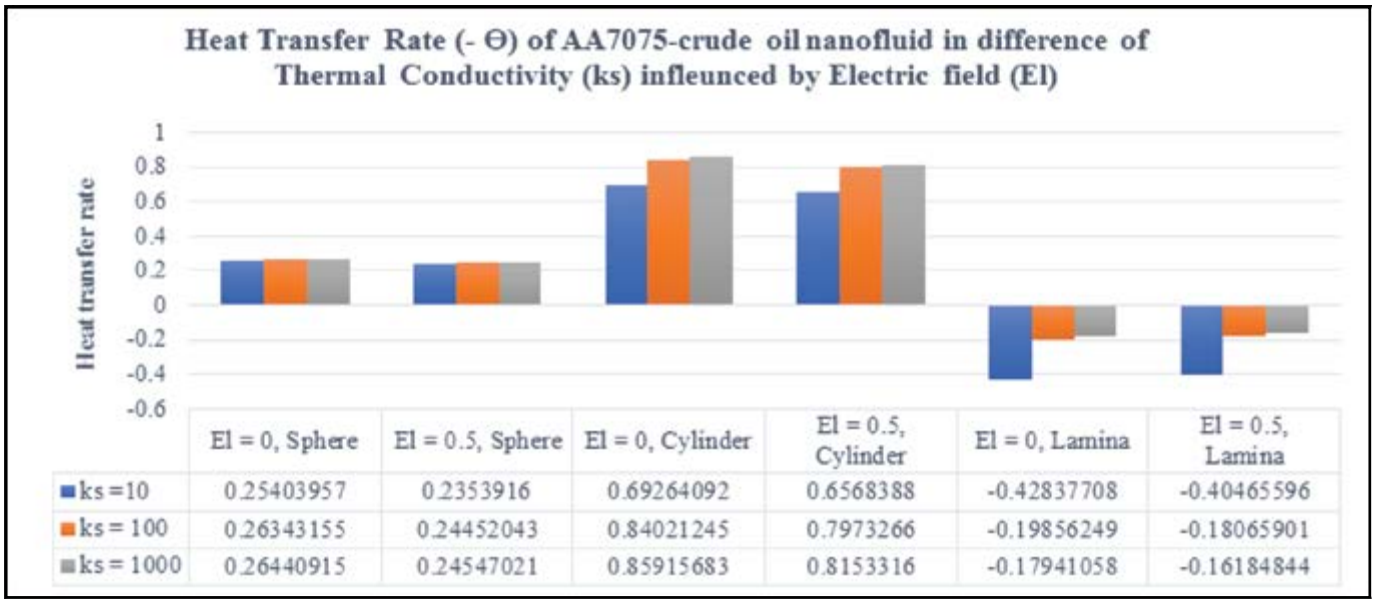


Fig. 2. Thermal conductivity effect on temperature profiles in the presence of crude oil with sphere shape particles (a), with cylinder shape particles (b) and with laminar shape particles (c)



	El = 0, Sphere	El = 0.5, Sphere	El = 0, Cylinder	El = 0.5, Cylinder	El = 0, Lamina	El = 0.5, Lamina
ks =10	0.25403957	0.2353916	0.69264092	0.6568388	-0.42837708	-0.40465596
ks = 100	0.26343155	0.24452043	0.84021245	0.7973266	-0.19856249	-0.18065901
ks = 1000	0.26440915	0.24547021	0.85915683	0.8153316	-0.17941058	-0.16184844

Fig. 3. Heat transfer rate of AA7075 crude oil nanofluid with different thermal conductivities

Table 3 Summary of findings & result based on Fig.2 and Fig.3

Findings	Present studies	Previous studies
Impact of thermal conductivity on AA7075-crude oil	Temperature profile when *ks* increase • Sphere and cylinder shape AA7075-crude oil nanofluid were dominant • Laminar shape AA7075-crude oil nanofluid less dominant	• Addition of nanoparticles will increase the thermal conductivity thus increase the heat transfer rate of crude oil [18] • Nanoparticles support the increase of oil dielectric properties [11] • Size and shape of nanoparticles give significant impact towards the heat transfer rate of fluid [19]
Impact of electric field on AA7075-crude oil	Temperature profile when *ks* increase • All shapes of AA7075 shows profound temperature profile regardless the impact of Electric field	
Impact of particle shapes on AA7075-crude oil	Temperature profile when *ks* increase • Cylinder shape AA7075 particles dominate the highest heat transfer rate region and heat transfer rate of laminar shaped AA7075 nanofluid falls in the negative region. • Sphere shape nanofluids also showed some changes in the heat transfer rate even though at the lower region.	
General discussion	Comparing the present studies and the previous studies, it supports that the addition of nanoparticles in crude oil will improve the heat transfer rate as the thermal conductivity is increasing due to foreign conductive bodies.	
Implication of study	This study which was done mathematically (numerically and analytically) will provide the temperature profile at the wall of the coil and the heat exchanger plate (fixed plate). The heat generated will disperse to the environment even faster and optimize the life of traction transformer. This modelling took part as an analytically experiment as well when various values of thermal conductivity and electric field were substituted in the equation to understand the impact.	

Conclusion

A mathematical model to investigate the heat transfer rate of squeezed MHD nanofluids are established. The effect of thermal conductivity in the influence of electric field for various shape of particles is studied. It lays a platform for the study of heat transfer characteristics and temperature distribution of nanofluid which can assist the real lab experiment in future. The conclusion drawn from the study results are as follows - the rate of heat transfer for cylinder shape AA7075-crude oil nanofluid (-θ = 0.85915683) without electric field (El = 0.0) and thermal conductivity (ks) of 1000Wm^(-1) K^(-1) is stronger compared to other AA7075-crude oil nanofluid or even the base fluid crude oil solely and is very suitable as insulating fluid for traction transformer. This selection

obeys the theory of heat (Fourier's Law for heat conduction) [20] where generally, particles with higher thermal conductivity are used as heat sink or cooling purposes. Future researchers are expected to venture into various types of nano-alloys to be dispersed in the insulating fluid to get the best dielectric and cooling fluid

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The Implementation of Android Phone in Blood Pressure Measurement for IOT Applications

B. Mustapha1, a, A.K.M. Akhir2,b , N.R.A. Mutalib3,c and J. Omar4,d

1Politeknik Sultan Salahuddin Abdul Aziz Shah, Shah Alam, Malaysia

2Politeknik Sultan Salahuddin Abdul Aziz Shah, Shah Alam, Malaysia

3Politeknik Sultan Salahuddin Abdul Aziz Shah, Shah Alam, Malaysia

4Politeknik Sultan Salahuddin Abdul Aziz Shah, Shah Alam, Malaysia

abaharuddin@psa.edu.my, bmaya@psa.edu.my, crofizah@psa.edu.my, djulaiha@psa.edu.my

Keywords: Blood Pressure; Measurement; Oscillometric; Home Care

Abstract. A Blood pressure is one of the fundamental vital signs, and its measurement is of great importance to medical professionals and the general public alike. Nowadays, there are several types of blood pressure meter available manufactured from various companies. In order to meet the demand on telemedicine and technology advancement, a new form of blood pressure meter is desirable. The proposed system suggests the use of android phone for displaying of blood pressure measurement and could be extended for other IOT applications. Hardware elements operate on oscillometric principle which gives the results in terms of systolic, diastolic and MAP (Mean Arterial Pressure). Furthermore, these results will be presented and displayed in numerical form on a smart phone. The device will be interfaced wirelessly using Bluetooth modules for better accuracy. Moreover, the measurement of systolic and diastolic will be stored in the database apps which is developed purposely for IOT applications. This application shows significant improvement on the overall performance and gives reliable results. The framework used to design this machine is easy to understand and it can be extended further to integrate with other health monitoring system.

Introduction

Blood pressure is one of most important measurements which indicate person's health condition. Abnormal blood pressure reading may lead to various diseases which can be prevented by treatment. Blood pressure related diseases are usually being referred as "silent killer". The consequence promoted can be either cardiac disorder or the malfunctions of our body systems. Considering these huge effects may be too harmful for human body, thus preventive action needs to be taken. High blood pressure is an epidemic disease which always a major concerns in developed countries. Statistic shows the great number of cases for the past decades, which triggers the insight to prevent and control this disease rather than cure it. Nowadays, the need for a reliable medical technologies and analysis is desirable, since the users prefer to experience their medical diagnosis themselves. Home monitoring provides an accurate record of measurements over time helps in planning an overall personal health regimen. Furthermore, blood pressure management is a step

towards a healthier lifestyle.

Research Related Work

The measurement of blood pressure is an important technique used by medical personnel for diagnosing and treating a wide range of non-communicable diseases and conditions. By measuring and especially monitoring a patient's blood pressure, medical personnel can be alerted to the related health condition at an early stage, increasing the likelihood of successful treatment. While indirect methods of blood pressure monitoring, such as with a pressure cuff and stethoscope, are often desired for quick pressure readings, these methods can be inaccurate by as much as 10 percent, making them undesirable for longer term blood pressure monitoring of more critical patients. Consequently, direct blood pressure monitoring methods are preferred for patients with serious or critical conditions due to their improved accuracy and easier long-term implementation. T.B. Plante et al. [1] estimates blood pressure (BP) using a technique in which the top edge of the smartphone is placed on the left side of the chest while the individual places their right index finger over the smartphone's camera. The low sensitivity for hypertensive measurements means that approximately four-fifths (77.5%) of individuals with hypertensive BP levels will be falsely reassured that their BP is in the non-hypertensive range.

In addition, Yamakoshi et al. [2] have developed a new method to recommend the applicability of human finger for non-invasive measurement of beat-to-beat systolic and diastolic pressure based on mechanical volume servo-control system using vascular unloading technique. This method was then approved for its validity and high accuracy. To improvise in the development of digital BP meter, W. B. Geake et al. [3] had proven that oscillometry technique is most accurate to determine systolic and diastolic pressure for non-invasive BP. Hence, test instruments can generate simulated oscillometric pulses in response to cuff inflation in such a way as to cover a wide range of conditions including variations in pulse rate, pulse strength, arterial pressure and also artefacts. This supports the fact of oscillometric devices gives better response in terms of functional evaluation. A newly designed blood pressure meter should comply with some standard or specifications. The Association for the Advancement of Medical Instrumentation (AAMI) has produced a set of de facto standard covering both automated and semi-automated BP meter. Moreover, the sensing systems read the cuff pressure, extract the pulse for analysis and hence determine systolic and diastolic reading. The significant of this invention was the ability to covers a wide range of blood pressure from 0 mmHg to approximately 300 mmHg.

Although variety of factors may distort the result, the proposed method has a potential to perform with high accuracy and reliability. J.C.T.B. Moraes et al. [4] discover in previous research, by using oscillometric method, the problem to extract the systolic, mean and diastolic blood pressure is related to the strategy used in the computational algorithm. This research demonstrates a new strategy to correlate several parameters and analyze it by using statistical method coded in MATLAB. As a result, there is a significant reduction in measurement time, larger rejection in motion artefacts, and arrhythmia as compared to the results obtained by using the conventional simulator. This research also has proven that the main parameters affecting blood pressure measurement were characteristic's ratios and arm circumference size. Moreover, a comparative study has been done by B. Mustapha et al. [5,6] to investigate the performance of commercial equipment with the

new system developed.

System Development

Proposed device consists of two main parts which are hardware and software. Hardware includes cuff, pressure sensor (Motorola), microcontroller (Arduino Uno), Bluetooth module and smartphone. Fig. 1 shows the block diagram of the proposed system.

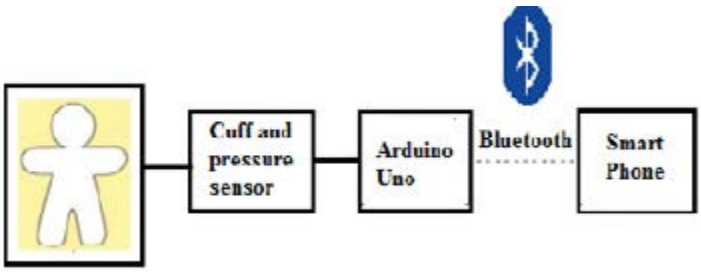


Fig. 1. Block diagram of a proposed system

The digitized signal from microcontroller is sent to the smart phone through Bluetooth for simplicity of the system. The application software is designed in interactive manner using MIT App Inventor. Patients could view and save their measurement data through android phone.

Furthermore, the data could be sent to their personal doctor or caregivers for further action. The application software and prototype of the developed system is shown in Fig. 2 (a and b).



(a) Application software using MIT App Inventor



(b) The prototype of the developed system

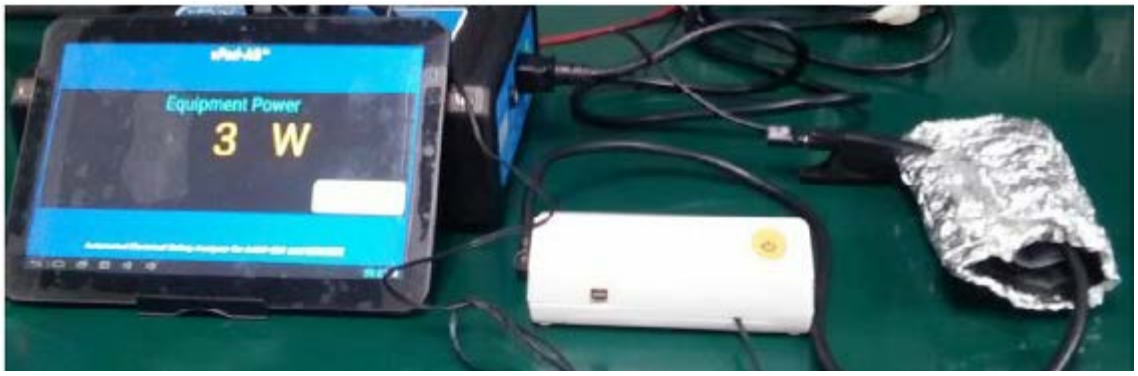
Fig. 2. Illustration of application software and the prototype of the developed system

The pressure sensor of the prototype has been verified using BP analyzer at calibration laboratory

to meets with the requirement standard of blood pressure measurement. Electrical safety test have being carried out to ensure the machine prototype is applicable to use. Fig. 3 (a and b) depicts the partial results of load current and power used for the prototype.



(a) Load current result of the developed prototype



b) Resulted power for the developed prototype

Fig. 3. Electrical safety test results for power and load current of the developed system

In this work, the oscillometric principle have being applied for determining the systolic and diastolic measurement as much recommended for digital blood pressure monitor. The systolic pressure (Ps) and diastolic pressure (Pd) are measured when the amplitudes of oscillation reach at certain percentage of deflation pressure as shown in Figure 4. The ratio of systolic pressure and diastolic pressure are given in the Eq. 1 and Eq. 2 [7].

Ps = As/Am (1)
Pd = Ad/Am

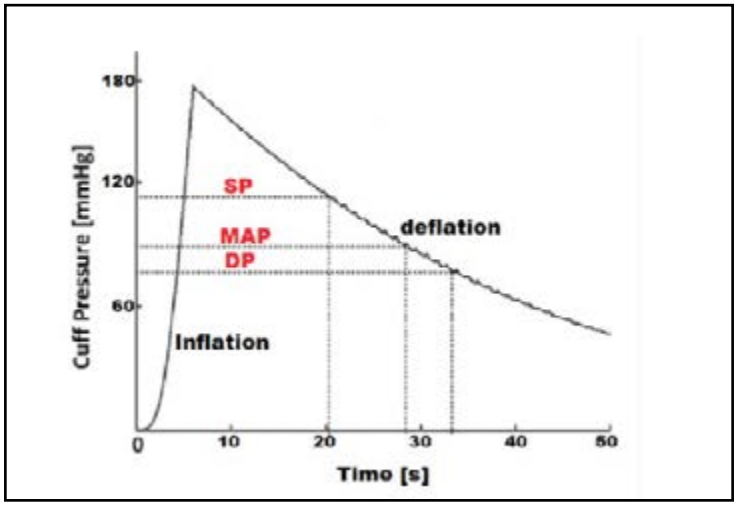


Fig. 4. Systolic and diastolic prediction using oscillometric method

Results and Discussions

Tests were done prior to each components involved to ensure its functionality for both hardware and software. The verification and calibration of the selected component are discussed. The systolic and diastolic measurement results obtained from the proposed system and selected commercial OMRON BP and WELCH BP is shown in Fig. 5 and Fig. 6.

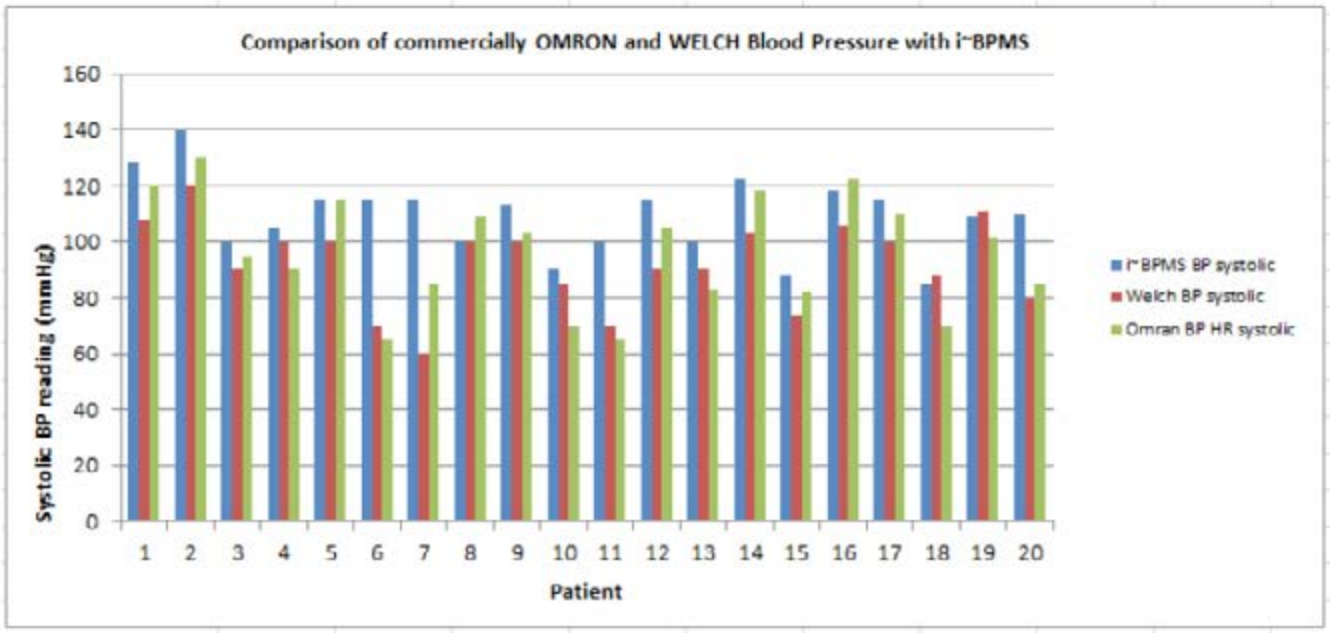


Fig. 5. Comparison of the systolic measurement

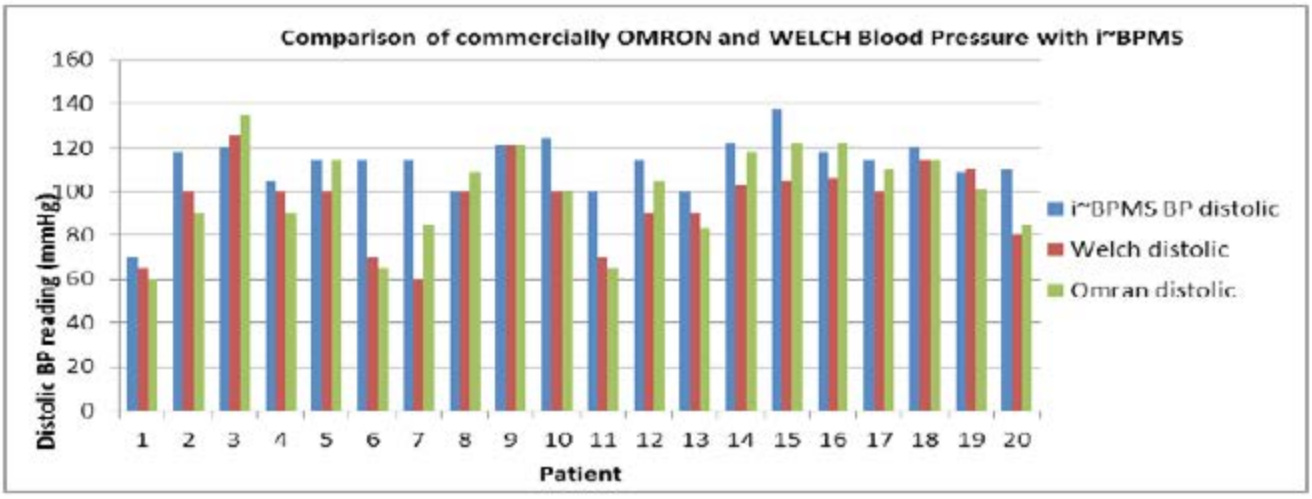


Fig. 6. Comparison of diastolic measurement

Based on the results, all machines gives small different values at all time of measurement for systolic and diastolic. However, it is considerably acceptable since the readings values is in standard range. According to the J. Handler [8], the reading of systolic and diastolic discrepancy occurred due to some factors such as cuff over clothing, back unsupported, distended bladder and arm unsupported sitting or standing. To ensure the usability of the developed machine, the reliability test for systolic and diastolic measurement has been carried out using statistic software package (SPSS) and the results show that Cronbach's Alpha value for systolic and diastolic is 0.564 and 0.603 respectively for reliability test between developed system and OMRON BP set. The Cronbach's Alpha test record 0.460 and 0.635 for the systolic and diastolic for reliability test between developed system and WELCH BP set. The average percentage difference for the systolic and diastolic blood pressure between two commercially Blood Pressure machine (OMRON and WELCH) and developed system is identically ± 0.95% and ± 1:32% respectively, which is very small and still in the acceptable range. The proposed device could be used for commercialization of BP measurement and future reference for technical students and researchers.

Conclusion and Future Work

There are three major conclusions can be drawn from this project. Firstly, the developed device exhibits a full working system. The system which operates on oscillometric principle is suitable to be located at any medical institutions such as private clinics, government hospital and even can be employed at home. It is also suggested that by using this instrument, people may save their time to travel, and get their blood pressure being check regularly. Indirectly, this shows the benefit of proposed system to meet the demand of health. Secondly, the developed device adapted the wireless technology and using smart phone which enable the user to view the previous results of blood pressure at any time on the smart phone. This makes the results more valuable for future reference. Thirdly, it can be seen that the machine proposed new prototype for medical instrument which can be used as a medium for Telemedicine application. Furthermore, this instrument has a potential to be improved in the future.

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PERCEPTIONS OF POLITEKNIK IBRAHIM SULTAN STUDENTS TOWARDS COLLABORATIVE LEARNING IN ENGLISH CLASSROOM

A.E MUHAMMAD ALHAFIZ1,
1GENERAL STUDIES DEPARTMENT, POLITEKNIK IBRAHIM SULTAN, PASIR GUDANG JOHOR
am.alhafiz.amatesa@gmail.com

Keywords: Collaborative learning; ESL; Problem solving; supportive learning environment; peer coaching.

Abstract. The aim of the study was to understand the perceptions of ESL learners in Politeknik Ibrahim Sultan towards collaborative learning. This research was conducted by using qualitative method since the study emphasized on each respondent's learning experiences with collaborative learning strategy. The data were collected through a simple narrative approach by using interview questions. The researcher observed prepared notes and recorded interview responses from each respondent in order to understand their perceptions of collaborative learning. The finding of this study can benefit English educators to inspire and motivate their students with appropriate curriculum and learning environment. Based on this study, the results showed that students are to solve problem as a group compared to solve problem individually. Students were contented by peer coaching and peer review. Thus, by collaborative learning, students can use effective strategies into classroom activities.

Introduction

English has been a second language in Malaysia and many students learn English for passing school grade thus the joy of learning English is not presence in their course of learning the target language. It is important for learners to have the knowledge of the language in which they can understand, construct sentences with good grammar but also are appropriate in social contexts (Brown, 2007).

Collaborative learning (CL) is defined as an educational approach to teaching and learning that involves groups of students working together to solve a problem, complete a task, or create a product. In addition, as stated in (Brown, 2008) by Nayan, Shafie, Mansor, Maesin and Osman (2010) if students learn collaboratively, they will experience lively, successful and meaningful learning process and due to that, teachers can produce students with strong academic performance. Whenever students are actively engaged in a learning process, they will have better understanding and able to retain the knowledge in their long-term memory.

Research Objective

The aim of this study is to:

investigate students' perception toward collaborative learning in an English classroom.

Literature Review

Collaborative Learning and Teaching

In social constructivist approach emphasizes that the social contexts of learning and the idea that knowledge is mutually built and constructed from the involvement with others that creates opportunities for students to evaluate and refine their understanding (Gauvin & Parked, 2010) as stated in (Santrock, 2011). Collaborative learning provides experiences in which a crucial mechanism to the learners to develop their thinking. The social interaction in CL helps the learners to share ideas and working together from various performance levels to achieve common goal enhance communication and problem-solving skills. By using collaborative teaching strategy, teacher can help learners to acquire second language by giving more autonomy to the students to use their logical thinking skills and actively engaged in the classroom.

Working together in CL also helps to improve students' learning. According to Nayan et. al (2010), collaboration means to practice safe environment where working together with diverse group of people who have a common interest or issue and these people need to make discoveries and identify possible solutions. In CL, second language learners can use this opportunity to enhance their oral skills and experience conflict of goals and tasks. Apart from that, shy students can lower their anxiety and improve their participation, exposing them with second language environment and also expressing their opinions. According to (Brady, 2010) as stated in (Ackers, 2017), classrooms need to become learning communities that value thinking and support every student during learning process; in these communities, reflection and collaboration are necessary. Therefore, implementation of CL in classroom does help students in improving their learning and second language acquisition

Peer Coaching

Peer coaching offers teachers opportunities to share ideas, to strengthen their teaching skills, encourage one another to create a better learning environment for their students. According to (Chen, 2018), through peer coaching, teachers are able to recognize and to respect in term of linguistically and culturally diversity which help teachers and learners to create flexible schedule for collaborative activities. Besides, teachers should be able to provide support and facilitate individual needs by valuing students' culture background. Thus, it will improve students' participation in CL because they are sharing their personal cultural context through teachers'

collaborative instructions.

Each second language learner has their prior knowledge and when participating in CL, they are able to develop new cultural and social information in the activity since they come from different family and educational background. The benefit of peer coaching is it will help teachers to improve and to develop certain area in the instructions. This is because, according to (Bowman and McCormick, 2000) as stated in (Chen, 2018) peer coaching helps and provide opportunities to refine reaching skills through immediate feedback and through experimentation with alternate strategies

as the results of informal evaluation.

Motivation

Motivation plays an important role in language learning. According to (Wang, 2016) motivation is defined as some kind of “internal drive” that encourages somebody to pursue a course of action. Through collaborative learning, learners will be motivated to communicate with others and able to improve their oral communication. Wang (2016) also stated that CL can help to reduce anxiety and construct expectancy-value where even though
students feel anxious but allowed to participate, it will reduce their anxiety and promote participation and language learning. Students with an increase of self-confidence and self-esteem will boost learner’s efforts in learning language and a greater willingness to take risks or continue to attempt to make other people understood.

Students participated in collaborative learning can improve their achievement and it is closely linked to self-determination. The use of technology has been popular in teaching and learning, students in this decade should be able to communicate with others actively and even via virtual communication. Thus, it will foster autonomy in English learning. Through CL also, students become more independent, responsible and help them to know that success requires efforts, thus it will increase their intrinsic motivation.

Methodology

The study was conducted by using qualitative approach in which by interviewing the respondents with open questions. This qualitative research design used semi-structured interview since the study emphasized on each respondent’s experience and their story. Sixteen students participated in this study. All of them are from different department in Politeknik Ibrahim Sultan namely Department of Mechanical Engineering, Department of Electrical Engineering, Department of Tourism and Hospitality and Department of Design and Visual Communication. Each department represented by four students and eight students in semester 1 and eight students in semester 4. From their demographic background three students are from suburban area and the remaining are from the city. The qualitative study was collected by doing an individual interview. The data collection was through face-to-face interview, phone interview and also through online communication. Each interview took around 20-35 minutes for two weeks. The researcher observed, take notes and recorded interview responses from each participant in order to understand their perception in collaborative learning.

The researcher analyzed the qualitative data from observation, note taking and interview. The data were transcribed, organized, coded, compared and contrasted the differences and similarities of participants’ interview responses. Each participant has their pseudonym for protecting their privacy and confidentiality.

Findings

Based on the data collected, most of the respondents stated that they had positive learning

experienced in collaborative learning. The respondents were given a group task where they have to solve a problem by innovating a product or system. The respondents were able to discuss, exchanging ideas by using the target language even though some of them were not fluent. During collaborative learning activity was carried out the lecturer facilitated the groups and provide direction in their discussions. Respondents helped each other as a group. One of the participants stated that "CL is a really helpful to me" and then he explained that he enjoyed the learning process and with the assistance of the lecturer, he feels motivated and be more confident to speak in English. Apart from being motivated with the presence of lecturer in assisting the learning process, students also agreed that they felt motivated when each of the team member offered an endless support and try their best to make sure their group members understood the concept.16 participants agreed that CL really help them to develop their thinking more compared to individual learning. CL makes learning interactive compared to traditional instruction environment. Students have the opportunity to communicate, exchanging ideas, defending ideas and be an active learner.

According to Brown, (2008), CL is like Problem-Based Learning (PBL), emphasized student-centered task and these help in the development of generic and life-long learning skills. In order to be a good student, a student should know about the responsibilities. In CL strategy, students will be assigned with work and this give them the feel of responsibility and committed as they do not want to let down their team members by bad performance. One of the respondents stated in the interview, "not all assignments are easier to be done in a group" this is due to the nature of the assignments and student's experience from the previous group work. It is important for group leader to assert his or her authority in a group positively in order for the task to be fulfilled in the time framed assigned as mentioned by (Greenfield, 2003) in Arumugam, Galea, Mello and Dass, 2013). Therefore, group interaction and understanding are very important to ensure cooperation in a group.

Learning English has always been described as challenging by many. However, with implementation of CL in the classroom, students are free to express themselves, contribute opinion and improve their communication. Thus, it makes learning become easier and problem can be solved effectively. Some students are very shy to speak because they want to avoid of making mistakes. In collaborative learning, students feel motivated and less anxiety as the group members are very supportive. All respondents agreed that, working in CL has made them become more confident and motivated to use the target language.

Overall, the findings have showed the importance of collaborative learning. Firstly, collaborative learning does not just help the students but also assist the instructors in improving their teaching skills by interacting with the students during the class. Secondly, student's participation plays an important role in second language learning. In addition, lecturers' support and monitoring can create positive learning environment in class thus motivates the shy students to try to communicate in the target language. Next, the respondents also stated that, learning how to work in a group also teaches them on how to complete the task on time and making the task easier to be done in groups. Numerous researches have been done previously and many results showed that if students were given the chance to work collaboratively, they were able to perform better as stated in Brown, 2008.

Conclusion

In conclusion, collaborative learning does bring positive experience to the students as they quickly realized that they are able to solve problems as a group rather than doing it as individuals. Next, through collaborative learning also, students are able to be trained to collaborate with each other and to give feedback on each other's work. Feedback is very important, as it will make learning more meaningful. Learners' motivation will also improve as students feel safe in the collaborative learning environment thus it reduced the anxiety. Instructor's facilitation also make students feel motivated to learn as students can refer and help them with the group discussion. Students are able to communicate and express their ideas in collaborative learning and improve their oral English.

Apart from that, students are able to work together and brought effective strategies in the classroom activity. Classroom activity should be more interesting, as suggested by (Dornyei, 2001) in (Brown, 2008) in order to make students learning become more engaging and stimulating these four techniques can be implemented in the instructions :

a. Make tasks challenging
b. Make task content attractive by adapting it to the students' natural interest or by including novel, intriguing, humorous elements,
c. Personalize learning tasks; and
d. Select tasks that yield tangible finished products.

Last but not least, when language instructors assist students learn collaboratively, they have more chances to understand students' needs and know how to help their students' learning. Teachers' facilitation and students' participation develop students' logical thinking, social network and communicative skills. Although, there is no 'the perfect methodology', CL is one instructional method that significantly facilitates the academic acquisition, social and generic skills.

Recommendations

After conducting this research, the researcher has recommendations related to the implementation, advantages, and disadvantages of collaborative learning method for the students, lecturers, and future researchers.

For students

The students of Politeknik Ibrahim Sultan are able to use the target language even though some of them are still trying to learn. Therefore, the researcher hoped that they could make use the collaborative learning as a platform to improve their learning in English.

For lecturers

Lecturers should use collaborative learning in their lessons. They should be able to identify suitable activity that can be carried out in a classroom. Lecturer must be aware about their role in collaborative learning and how collaborative learning should be implemented in the classrooms.

For Future Researcher

The future researchers are recommended to explore the research about collaborative learning more in depth in the future. They are also recommended to explore collaborative learning in computer-mediated communication in which used by many institutions.

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CREATIVE ENGAGEMENT DALAM PENGAJARAN DAN PEMBELAJARAN MELALUI PENGGUNAAN GALERI ASPIRASI KREATIF DI POLITEKNIK IBRAHIM SULTAN

M.A Ismalyza

Politeknik Ibrahim Sultan, Pasir Gudang, Johor Darul Ta'zim, Malaysia

ismalyza69@gmail.com

ABSTRAK: Galeri Aspirasi Kreatif menyediakan ruang pengajaran dan pembelajaran bagi para pelajar di Jabatan Rekabentuk Dan Komunikasi Visual. Oleh itu, objektif kajian ini bertujuan untuk meneroka peranan Galeri Aspirasi Kreatif di Jabatan Rekabentuk Dan Komunikasi Visual, Politeknik Ibrahim Sultan dalam melaksanakan pembelajaran secara *creative engagement*. Penggunaan galeri ini telah merubah perspektif persekitaran kreatif dalam pengajaran dan pembelajaran di kalangan para pelajar dan pensyarah di Jabatan Rekabentuk Dan Komunikasi Visual (JRKV). Dapatan kajian mendapati bahawa suasana pengajaran yang menyeronokkan dengan adanya galeri sebagai *platform* untuk para pelajar dan pensyarah berhubung secara kreatif dan kolektif dengan mempamerkan karya seni (*Art Work*), Pembentangan (*Presentation*) , Bicara Seni (*Art Talks*), Syarahan (*Lecturing*) dan Sesi Kritik (*Creat Session*). Namun begitu, keterbatasan penggunaan Galeri Aspirasi Kreatif adalah ruang terhad dan masa.

Kata kunci: galeri, pelajar, pensyarah, pengajaran dan pembelajaran, *creative engagement*

Pengenalan

Galeri adalah ruangan atau gedung tempat mempamerkan benda atau karya seni. Galeri terbahagi kepada Galeri Perseorangan, Galeri Terbuka atau kombinasi di antara kedua-duanya.

Definisi *creative engagement*:

Mempelajari tentang seni dari karya seni sebenar di galeri telah dilihat sebagai sesuatu yang berharga kepada para pelajar di semua peringkat rendah sehingga ke peringkat universiti. Kerjasama antara sekolah dan galeri seni adalah kunci untuk mencapai pengajaran dan pembelajaran seni yang berjaya, di mana pelajar dan kanak-kanak memperoleh kemahiran yang berbeza seperti komunikasi, ekspresi diri, kritikan dan penilaian estetika menurut (Al-Radaideh, 2012).

Jesteru itu, seiring dengan peredaran zaman abad ke 21, pelaksanaan pengajaran dan pembelajaran tidak lagi berpaksikan kaedah konvensional seperti syarahan di bilik kuliah dan mentelaah buku di perpustakaan semata-mata. Begitu juga dengan kelebihan galeri. Galeri telah Galeri telah melalui proses transformasi sejajar dengan kehendak dan kemahuan masa kini. Galeri sangat penting untuk pendidikan seni, hal ini kerana apabila melihat, menyentuh dan melihat objek asal merupakan sumber inspirasi artistik yang paling mendasar berdasarkan pandangan (Al-

Radaideh, 2012). Galeri adalah untuk melaksanakan strategi pembelajaran yang berbeza sebagai bengkel dan pelbagai pembelajaran aktif memberikan pengalaman pelajar berbeza yang tidak mungkin diperolehi di tempat lain.

Oleh yang sedemikian, kewujudan Galeri Aspirasi Kreatif dilihat berpotensi dalam menyediakan ruang pembelajaran secara creative engagement kepada para pelajar dan pensyarah di Jabatan Rekabentuk dan Komunikasi Visual.

Objektif & Skop Kajian

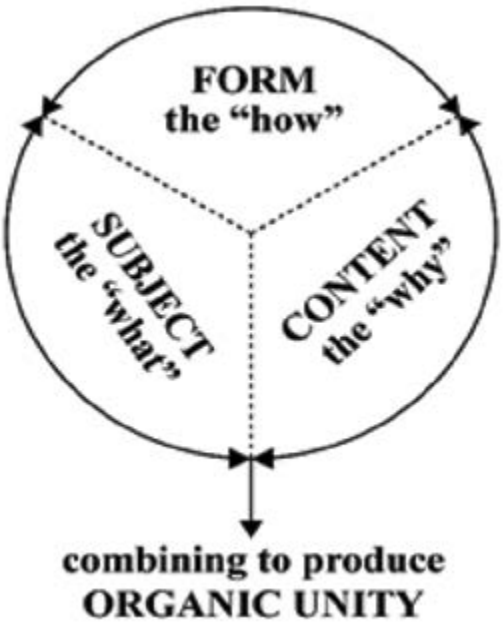
Objektif kajian ini bertujuan meneroka peranan Galeri Aspirasi Kreatif di Jabatan Rekabentuk Dan Komunikasi Visual dalam melaksanakan pengajaran dan pembelajaran secara creative engagement pada Sesi Jun 2017, Disember 2017 dan Sesi Jun 2018. Menerusi penerokaan ini para pelajar dapat bereksperimentasi bagi meningkatkan kefahaman visual communication bagi mencetuskan idea dan kreativiti visual design melalui aktiviti creative engagement.

Permasalahan Kajian

Berdasarkan pengalaman dan pemerhatian pengkaji, para pelajar cepat bosan dan hilang tumpuan apabila proses pengajaran dan pembelajaran hanya berlaku di bilik kuliah, bengkel, makmal komputer dan dipersekitaran jabatan contohnya bagi kursus Art History dan Fundamental of Drawing (sekadar menyebut beberapa kursus). Malahan menurut (J. Beegle, 1991) strategi pengajaran dan pembelajaran yang digunakan didalam sistem politeknik sehingga ke hari ini terdiri daripada pengajaran secara kuliah, latih tubi dan demonstrasi penyelesaian masalah oleh guru yang berpusatkan pensyarah tidak lagi relevan dan konduksif.

Selain itu, kesukaran para pelajar terutamanya pelajar Semester Satu bagi program diploma dan sijil khas bagi kursus-kursus teras apabila diberikan tugasan seperti kajian visual. Hal ini kerana, persepsi setiap pelajar adalah tidak sama, setiap individu mempunyai interpretasi yang berbeza. Para pelajar perlu mengetahui dan memahami secara jelas asas perhubungan di antara The Three Components Of Art dan The Principles Of Organization. Rujuk Rajah 1 & 2. (Ocvrik, 1998) bagi meningkatkan kefahaman visual communication untuk mencetuskan idea dan kreativiti visual design bagi menyempurnakan tugasan Penilaian Berterusan.

Justeru itu, penerokaan galeri telah membuka ruang kepada para pelajar dan pensyarah menerusi persekitaran kreatif membuat visualisation dan observation melalui hasil karya seni art work yang di pamerkan merangkumi semua bidang seperti rekabentuk grafik, fesyen dan industri. Hasil karya yang dipamerkan merupakan Pameran Projek Pelajar Semester Akhir (VISCOM SHOW) yang terpilih dan pemberian pensyarah sebagai koleksi di Galeri Aspirasi Kreatif.



Rajah 1: Tiga komponen asas seni.

Sumber: (Ocvrik, 1998).

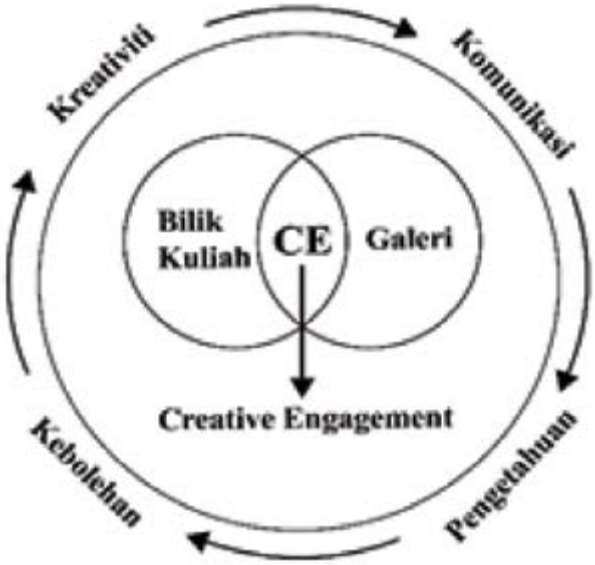


Rajah 2: The Principles of Organization.

Sumber: (Ocvrik, 1998).

Metodologi Kajian

Kajian kualitatif ini menggunakan instrumen pemerhatian iaitu penglibatan secara langsung pengkaji sebagai pensyarah dan kurator di Galeri Aspirasi Kreatif serta menggunakan rakaman visual dan nota lapangan. Konsep participant observation merupakan elemen penting dalam semua kajian kualitatif.



Rajah 3: Kerangka konsep kajian.

Model creative engagement yang diwujudkan dengan menghubungkan teori kreativiti, penglibatan dalam pembelajaran, affective neuroscience dan falsafah menurut (Anderson, 2018).

Dapatan Kajian Dan Perbincangan

Kewujudan Galeri Aspirasi Kreatif di JRKV telah mewujudkan satu persekitaran kreatif dalam pembelajaran kepada semua pelajar dan pensyarah.Pelajar dapat berhubung secara aktif dan kolektif dengan galeri ini. Proses pembelajaran secara creative engagement juga dapat dilaksanakan dan tidak lagi tertumpu di bilik kuliah, makmal, bengkel atau perpustakaan. Para pelajar berpeluang menimba pengalaman berbeza apabila berada di Galeri Aspirasi Kreatif. Pelbagai aktiviti pembelajaran creative engagement dilaksanakan berupaya dan berjaya meningkatkan pengetahuan, kemahiran, kreativiti dan komunikasi melalui aktiviti creative engagement seperti mengadakan sesi syarahan, perbincangan dan pembentangan pameran bertema serta pengisian ilmiah seperti bicara seni dan sesi kritik. Aktiviti dapat dihuraikan seperti Jadual 1 di bawah.

Jadual 1 : Aktiviti creative engagement.

No.	Aktiviti	Penerangan Pelaksanaan	Hasil
1.		Perbincangan proses melakar lukisan akhir bersama penyelia dan pelajar bagi Festival Layang-Layang Sedunia ke 23 pada tahun 2018 bagi kursus *Fundamentals of Drawing* bagi sesi Jun 2017 seramai 10 pelajar.	Pelajar dapat meningkatkan kemahiran melakar.
2.		Sesi bicara seni bersama Prof. Madya Jang Suk Joo yang bertemakan *Metaphor of Nature* bagi kursus *Creative Digital Photography* bagi sesi Disember 2017 seramai 20 pelajar.	Pelajar dapat meningkatkan pengetahuan dalam bidang fotografi.
3.		Perbincangan berkumpulan bagi kursus Ilustrasi bersama pelajar kemahiran khas (KRG) dalam pembikinan rakaman video bagi pertandingan e-DOLA PIS pada tahun 2018 bagi sesi Jun 2018 seramai 10 pelajar.	Pelajar dapat meningkatkan kebolehan dalam menghasilkan sebuah video.
4.		Pembentangan projek akhir pelajar bagi kursus Prologue to Graphic Design bagi sesi Jun 2018 seramai 33 pelajar	Pelajar dapat meningkatkan kemahiran berkomunikasi dan keyakinan diri dalam sesi pembentangan.

KESIMPULAN DAN CADANGAN

Galeri Aspirasi Kreatif menyediakan ruang kepada para pelajar untuk mereka membuat preparation, exercise, research, observation sebelum atau selepas kuliah bagi meningkatkan dan memantapkan pengetahuan mereka melalui The Language Visual Experience dan dapat berapresiasi dari sudut persepsi yang berbeza menerusi creative engagement. Namun begitu, terdapat dua kekangan yang dihadapi di galeri iaitu ruang dan promosi. Galeri tidak dapat menampung jumlah pelajar atau pelawat yang ramai dalam satu satu masa. Selain itu, kurang promosi di jabatan dan PIS. Para pelajar dan warga Politeiknik Ibahim Sultan tidak mengetahui kewujudan galeri. Justeru itu, bagi tempoh jangka masa panjang kurator galeri merancang untuk berkolaborasi dengan Balai Seni Negara. Balai Seni Negara akan menjadi pioneer dan feeder. Galeri Aspirasi Kreatif akan mewujudkan e-gallery dalam masa akan datang. Kajian lanjut yang lebih komprehensif akan diteruskan bagi memantapkan peranan galeri dalam mewujudkan persekitaran kreatif.

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DC-DC Buck Converter for Photovoltaic Application

Kamarudin Kamit1, a, M. F. Husny Yusof1,b and M. Azali Zainal Abidin1,c
1Department of Electrical Engineering, Politeknik Ibrahim Sultan, Pasir Gudang, Johor, Malaysia.
akamaruddinkamit@gmail.com, bfaizhusny@pis.edu.my, cmohdazali@pis.edu.my

Keywords: Converter; Photovoltaic;

Abstract. This paper deals with the development of dc-dc buck converter for photovoltaic application utilizing peripheral interface controller (PIC). DC to DC buck converter was designed for photovoltaic (PV) application which controlled by PIC 16F877A microcontroller, so the output voltage is regulated to a constant value (12Vdc) whatever its input is in the range of 12Vdc to 18Vdc. A pulse width modulation (PWM) signal from microcontroller was used to control the duty ratio of the switching signal for the buck converter. Each component and each parameter of the proposed circuit was well calculated using the equations and with a 12W photovoltaic system. The simulation was carried out by using LT Spice and PROTEUS ISIS Professional Tool while the coding of the programming was done in CCS Compiler. The simulation results show the output voltage for buck converter is 12Vdc for input photovoltaic (PV) 13Vdc, 15Vdc and 16Vdc while the experiment results show the output voltage is 12Vdc when the input photovoltaic (PV) regulated from 12Vdc to 18Vdc.

Introduction

Towards the 21st century, there is an increasing demand for energy resources in a human daily life. Undeniable, petroleum contributes to the main energy source used by humans. However, with the advancement of technology, people began looking for alternatives methods to replace the existing sources with the renewable sources such as from the sun, wind and water. Now, solar energy is getting attention because the amount of sunlight obtained can produce energy that works well. In this research, solar energy is used as a source of energy and photovoltaic (PV) is a tool that will absorb the energy from sunlight. Photovoltaic technology (PV) is a system that consists of a PV array that serves to convert the energy of sunlight into a direct current (DC) of electricity. PV on the control system is also capable of storing the converted DC electrical energy through the battery charger. It also allows the circuit to supply the energy to the load that can be used as a DC motor, and other home appliances. In addition, a power electronics circuit is utilized as a part of a PV charge controller to get the most astounding productivity, accessibility and dependability. The utilization of power electronics circuits, such as different DC to DC converters topologies like buck converter, boost converter, buck-boost converter and others converter topology as power molding hardware can give a fancied current to charge battery successfully.

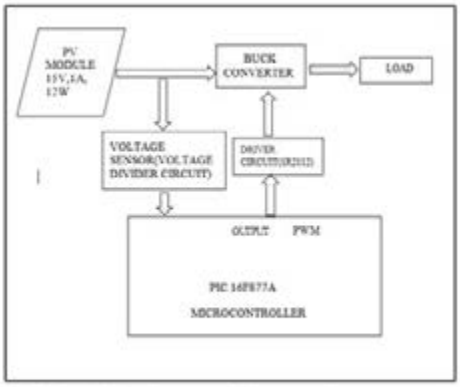

Fig. 1: The block diagram of the overall process

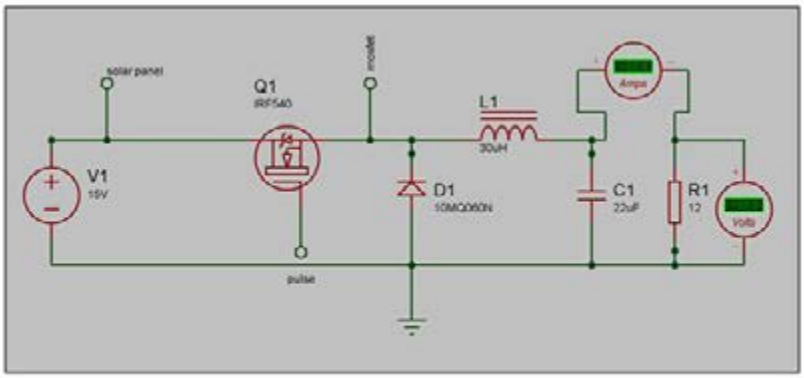

Fig. 2: DC-DC Buck Converter with PV panel design using PROTEUS ISIS Professional

Numerical Analysis

Buck Converter Analysis. Fig. 1 shows the block diagram that consists six stages of the overall process. The first stage is the photovoltaic (PV) module. Next is a buck converter circuit followed by microcontroller circuit, driver circuit, voltage sensor circuit and load.
DC-DC Buck Converter supplied with Photovoltaic (PV) panel circuit design. Design of DC-DC Buck Converter circuit is considered as a continuous current operation mode, CCM as shown in Fig. 2. The decision of exchanging frequency and inductance will influence the continuous current in buck converter outline. Only for basic review about DC-DC Buck Converter, as the exchanging frequency increment, it can lessen the span of inductor with a specific end goal to create CCM and diminish capacitor size to cutoff output ripple in buck converter plan. Table 1 shows the estimations strategy and equations utilized as a part of request to decide the estimations of the required segments in Buck converter outline. This DC-DC Buck Converter circuit is expected to create an output voltage of 12Vdc from a contribution of 15Vdc.

C Programming Language.

PIC microcontroller will only be worked when it has been programmed by the programming language. Similarly, as other microcontroller like an Arduino and Raspberry pie. However, the programming language has been used since many decades by the programmers to rely on their own expertise. About 40 years ago, C language was first introduced by Dennis Ritchie and it has been improved over time until today. When 16F877A PIC microcontroller is programmed by using CCS compiler and linked with software PROTEUS ISIS Professional, it will run right in and the output from a design can be seen. In this light, the functionality of the selected gate driver IR2112 / IR2110 for switching MOSFET IRF540N can be confirmed after the PWM signal provided by the microcontroller and duty cycle. Fig. 3 shows a flow chart of the PWM.

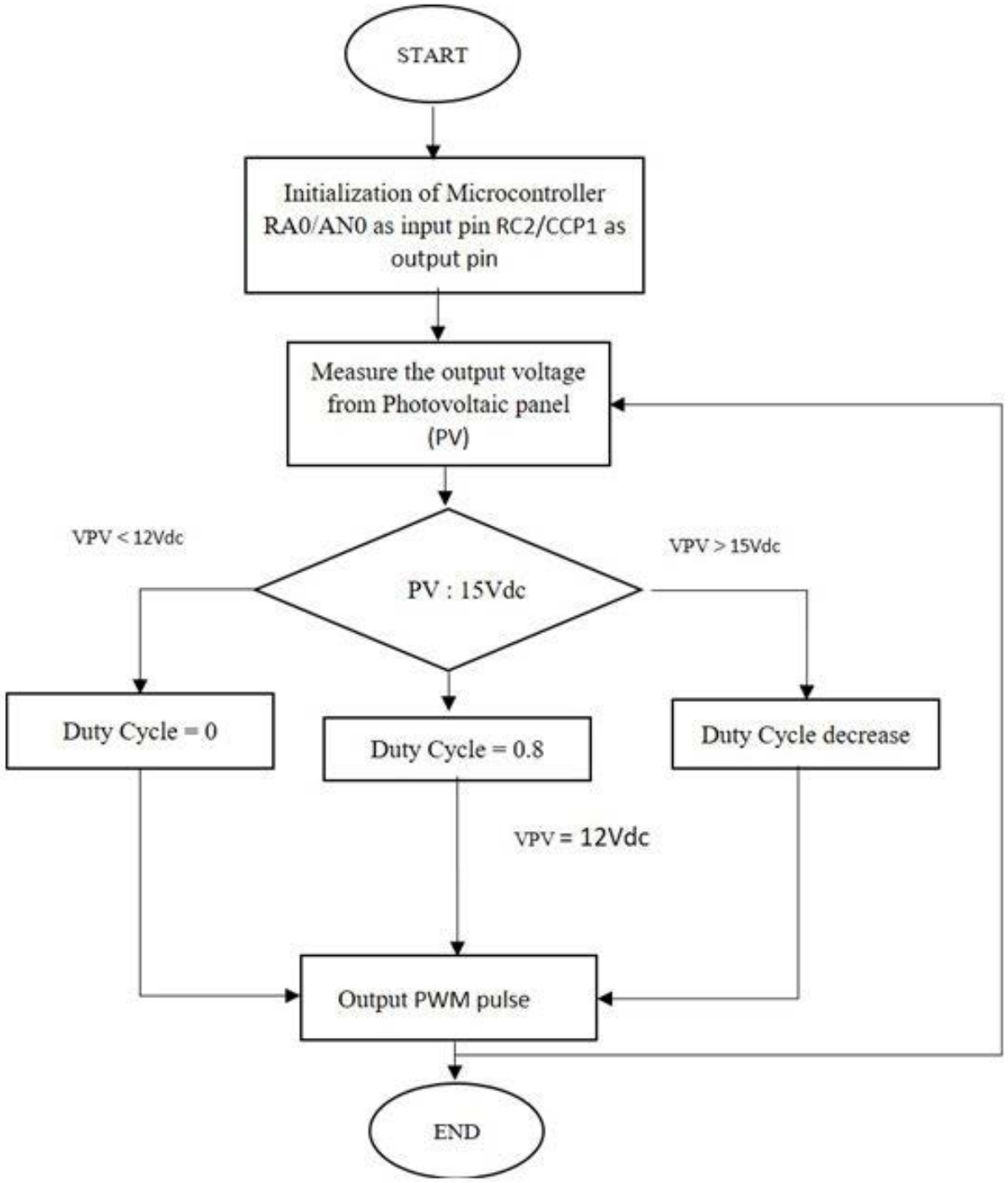

Fig. 3: A flow chart of the Pulse Width Modulation

Table 1: The estimations strategy and equations utilized

Step	Numerical Analysis	Step	Numerical Analysis
1.	Determine the duty cycle, D to obtain the required output voltage. Where, D = Duty cycle, V_o = Voltage output and V_d = Voltage input	4.	To ensure CCM let inductor be 25% greater than minimum inductor value L = 1.25Lmin L = 1.25(24μH = 30μH
2.	Determine the resistor values depends on the power input value. Power input from solar panel : 12 Watt Vout : 12Vdc $P\ in\ \ P\ o\ u$,tideal power $12\ w\ a\ t\ t\ \ 12\ w\ a\ t\ t$ $P\ o\ u\ t\ \ V\ o\ u\ x\ I$ $I\ \ \frac{P\ o}{}$ $I\ \ \frac{12}{12}$ $I\ \ 1A$ Determine the value of R, $R\ \ \frac{V\ o\ u\ t}{}$ $R\ \ \frac{12}{1A}$ $R\ \ 12\Omega$	5.	The average current and the change in current $i\ L\ \ \frac{V\ o}{}$ $i\ L\ \ \frac{12}{12}$ $i\ = 1A$ $\Delta\ i\ L\ \ \frac{V\ in\ \ V\ o}{}\ D\ T$ $\Delta\ i\ L\ \ \frac{15-12}{30\mu H}\ (0.8)\ \frac{1}{50k}$ $\Delta\ i\ L\ \ 1.6A$
		6.	The maximum inductor current $I\ m\ a\ x\ i\ L\ \ \frac{\Delta\ i\ L}{}$ $I\ m\ a\ x\ 1A\ \ \frac{1.6A}{}$ $I\ m\ a\ x\ 1.8A$
3.	Determine minimum inductor, L min size. The switching frequency and inductor size selected for CCM is f = 50 kHz with load resistor, RL= 12 Ω/12W $L\ m\ in\ \ \frac{1-D}{f}\ R$ where: L min = Minimum inductor D = Duty cycle f = Frequency R = Resistor $L\ m\ in\ \ \frac{1-0.8}{2(50k}\ 12$ $L\ m\ in\ \ 24\mu H$	7.	The minimum inductor current $I\ m\ in\ i\ L\ \ \frac{\Delta\ i\ L}{}$ $I\ m\ in\ 1A\ \ \frac{1.6A}{}$ $I\ m\ in\ 0.2A$
		8.	The capacitor if output ripple not exceed 2% $C\ \ \frac{1-D}{L\ \frac{\Delta\ V\ o}{}\ f}$ Where: L = Inductor D = Duty Cycle F = Frequency $R\ ip\ p\ fea\ c\ t\ o\ r\ \ \frac{\Delta\ V\ o}{}$ $C\ \ \frac{1-0.8}{8(30\mu H\ \ (0.02)(50k\ )}$ $C\ \ \frac{0.2}{12000}$

Simulation Results.

Simulation analysis is done and the results are described through the voltage response taken. The results show an approximate reading in comparison to the numerical calculation analysis. The simulation reading of the DC-DC Buck Converter supply with Photovoltaic (PV) energy response voltage is at 15V. Initially the output power across resistive load (RL) is overshoot and it has become steady state after reach approximately at 40ms. The output waveform in Fig. 6 shown a power value of 12W.

become steady state after reach approximately at 40ms. The output waveform in Fig. 6 shown a power value of 12W.

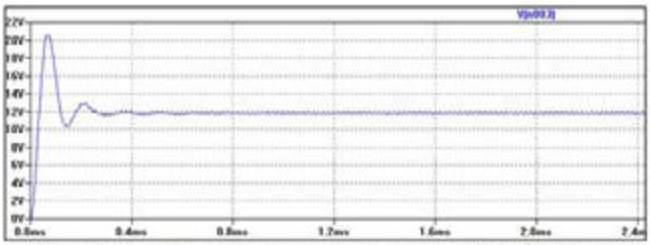

Fig. 4: Output voltage across capacitor (C1) and Resistive Load (RL)

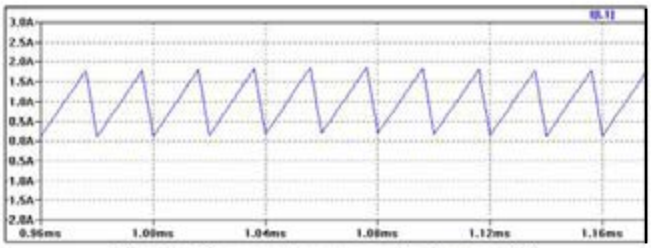

Fig. 5: Current across Inductor (L)

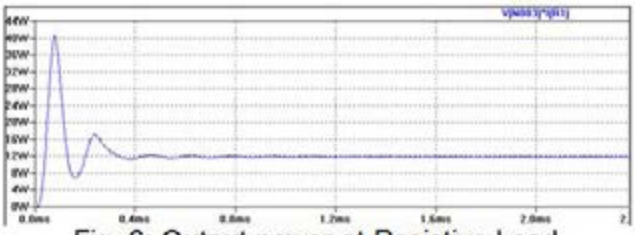

Fig. 6: Output power at Resistive Load

Measurement Results.

There are several things and parameters have been changed in order to complete the measurement setup as shown in Fig. 7 – Fig. 9. A Photovoltaic (PV) has been replaced by a DC Power Supply as an incoming input due to an insufficient current from PV. Besides, the design of the circuit also has been changed to a low current and a low power. Based on the simulation results, the output current value of this circuit is 6A for a load of 2Ω. In order to support this high current, a new DC-DC Buck Converter has been designed with an output current 1A for a load of 12Ω. Table 2 shows a design parameter involved in a new DC to DC Buck Converter Circuit.

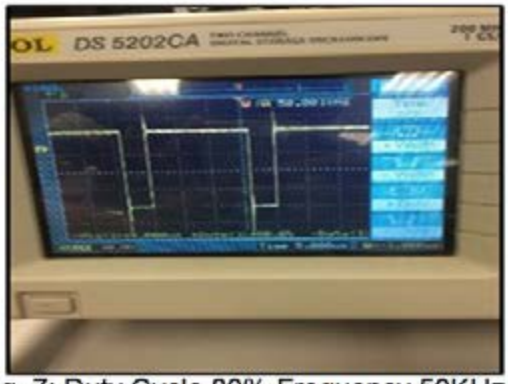

Fig. 7: Duty Cycle 80% Frequency 50KHz

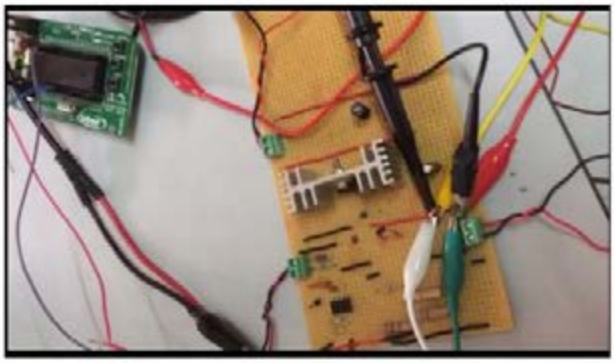

Fig. 8: Measurement of the output voltage diode by using an oscilloscope probe



Fig. 9: Comparison between Vin (PIC) and Vo (RL)

Table 2. The output voltage obtained from the measurement with R load of 12Ω

Vin DC Power Supply	Vin Digital multimeter	Vin PIC16F877A	Voutput (RL)	DutyCycle (D)
14.7V	15V	3.82V	12.1V	80%
14.5V	14.9V	3.75V	12.1V	81%
14.4V	14.7V	3.72V	12V	82%
14.3V	14.67V	3.74V	12V	82%
14.2V	14.53V	3.70V	12V	83%
14.1V	14.4V	3.67V	12V	83%
14.0V	14.32V	3.65V	12V	84%
13.9V	14.25V	3.63V	12V	84%
13.8V	14.08V	3.58V	12V	85%
13.6V	13.91V	3.55V	12V	86%
13.5V	13.86V	3.52V	12V	87%
13.4V	13.71V	3.49V	12V	88%

Conclusion

A new DC-DC Buck converter has been managed to generate 1A of 12W power and 12 Ohm of R load. It has successfully reduced the output power and also decreased the amount of load in the circuit. Thereby, it is expected capable to generate a PV current 6A of 80W to improve the drawbacks from the conventional DC Power supply. In addition, a PWM signal from a microcontroller was successfully control the duty ratio of the switching signal for the buck converter.

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Loss factor and tensile properties of green composites

R.B. Yusoff 1,a, H.Takagi 2,b and A.N. Nakagaito2,c

1Polytechnic of Tun Syed Nasir Syed Ismail, Pagoh, Malaysia
2Tokushima University, Tokushima, Japan
arosniyu@gmail.com, btakagi@tokushima-u.ac.jp, cnakagaito@tokushima-u.ac.jp
Keywords: Coir; Bamboo; Kenaf; loss factor; damping.

Abstract. Green composites made from plant fibers (kenaf, bamboo and coir) and polylactic acid were prepared by a hot-pressing technique in a unidirectional configuration. Green composites of Coir/PLA, Kenaf/PLA and Bamboo/PLA were fabricated based on 40 to 70 wt.% fiber content. Loss factor and tensile properties were evaluated. Optical microscopy and scanning electron microscopy were used to observe their microstructural failures. The results show that Coir/PLA had 142% higher of loss factor values compared to Kenaf/PLA and Bamboo/PLA. The deformability of coir fiber yields a higher value of loss factor property in the green composites. Tensile properties of Kenaf/PLA show the higher tensile strength and stiffness up to 70wt.% fiber content than Bamboo/PLA, followed by Coir/PLA, presenting the compatibility of kenaf reinforced PLA in the green composites. The addition of kenaf and bamboo fibers in the green composites may increase, the strength properties. In contrast, the increment of coir fibers in the green composites may not increase the its strength.

Introduction

Plant fibers are promising materials for various purposes in green composites, which are eco-friendly compared to petroleum-based polymeric composites. However, plant fibers are strongly distinct from each other by properties due to growing regions. Therefore, the compatibility of natural fibers with the matrix resin is the biggest concern in order to make them suitable reinforcement for the various application (automobiles, constructions, interiors and customer-based products).

Currently, it is expected to be extensively used to replace synthetic fibers (carbon, aramid and glass fibers) based on environmental and low-cost factors rather than on their mechanical properties. Plastic companies in developed countries lead to use natural materials to alleviate environmental impacts due to non-degradable constituents in their customer-based products. The availability of plant resources and good performance as well as improvements in plant fiber composite materials pave the relevant class in engineering materials [1].

The performance of green composites is a weighed sum of the individual components. The orientation of the fibers, fiber content and fiber aspect ratio are influenced in high performance of green composites. Tensile properties are the most concerned in composites research for durability and safety requisition. Damping loss factor is a phenomenon in mechanical system where absorbed and dissipated of vibration energy during oscillation [2]. It is beneficial to estimate the amount of damping loss factor even though the complexity of this dynamic behavior is far from complete

understanding.

In this paper, the results of unidirectional green composites is presented, evaluating the three kinds of plant fibers, coir, kenaf and bamboo reinforced matrix as green composites. The study is to reveal the damping loss factor and tensile properties for future purposes.

Method

Material. Coir fibres were received from Kamenoko-Tawashi Nishio-Shoten Co., Ltd. Japan with an average cross-sectional area of 0.11 mm2 and density of 1.20 g/cm3. The bamboo culms were freshly harvested in Anan City, Tokushima, Japan and bamboo fibers were extracted by steam-explosion method. The average cross sectional area and density of bamboo fibers are 0.15 mm2 and 1.23 g/cm3, respectively. Kenaf cultivated in Kelantan, Malaysia were supplied by Lembaga Kenaf dan Tembakau Negara (LKTN). Dried kenaf bast fibers with density of 1.18 g/cm3 and average cross-sectional area of 0.01 mm2 were used. All fibers were used as-received condition without any surface treatment [3]. The matrix used was polylactic acid (PLA), supplied by Myioshi Oil & Fat Co. Ltd., Japan. The melting point is 167o to 170oC and its density is 1.23 g/cm3.

Fabrication. Untreated coir, bamboo and kenaf fibers were used for green composites fabrication. All fibers were cleaned to eliminate of the non-cellulosic substances on fibers' surfaces. Firstly, each type of fibers was cut into 210 mm long pieces and the weight were measured. For bamboo fibers, wet wiping cloth was applied. Then, the each fiber types was added with PLA emulsion. Secondly, they were dried at room temperature for 24 hours. Prior to hot pressing, the fibers and PLA were further dried in an oven for 1 hour at 105oC. Finally, a hot-pressing method was used to mold the green composites. The specimens were stored in a controlled-room before testing.

Results and discussion. As shown in Table 1, loss factor of coir/PLA shows the highest values compared to both Kenaf/PLA and Bamboo/PLA, accounting for 174 (x10-4). This value shows significant when compared to non-degradable of synthetic composites (Coir/PP). It assumed that at a low fiber content, the deformability of coir fibers yield the higher loss factor. Bamboo/PLA and Kenaf/PLA obtained the similar amount of loss factor, accounting for 72 (x10-4). In addition, tensile strength and Young modulus exhibit a strong correlation with fiber content up to 70wt.% for Kenaf/PLA and Bamboo/PLA (Figure 2). It is assumed that the coir fibers are incompatible with PLA matrix and less dependent upon the rise in fiber content. The compatibility of kenaf fibers and PLA matrix produces high strength of Kenaf/PLA tensile properties. Interfaces between PLA matrix and reinforcing plant fibers, field emission scanning electron microscopy was used. Fig. 3 shows failure mechanism of the hybrid green composites the Coir fiber and kenaf fiber have better interlocking than bamboo/PLA (Fig.3(a-b)). Bamboo fiber produced weak interfacial between fiber and matrix as evidenced by voids surrounding the fibers (Fig.2(c)).

Table 1. Properties of green composites and coir/PP composites

Composites	Loss factors (η) 10^{-4} 10^{-4}	Damping (ζ)	Refs.
Coir/PLA (60 wt.%)	174	0.868	Present study
Kenaf/PLA (60 wt.%)	72	0.35	Present study
Bamboo/PLA (60 wt.%)	72	0.35	Present study
Coir/PP (5-30 %)	500-580	0.025-0.03	(Gelfuso et al., 2014)

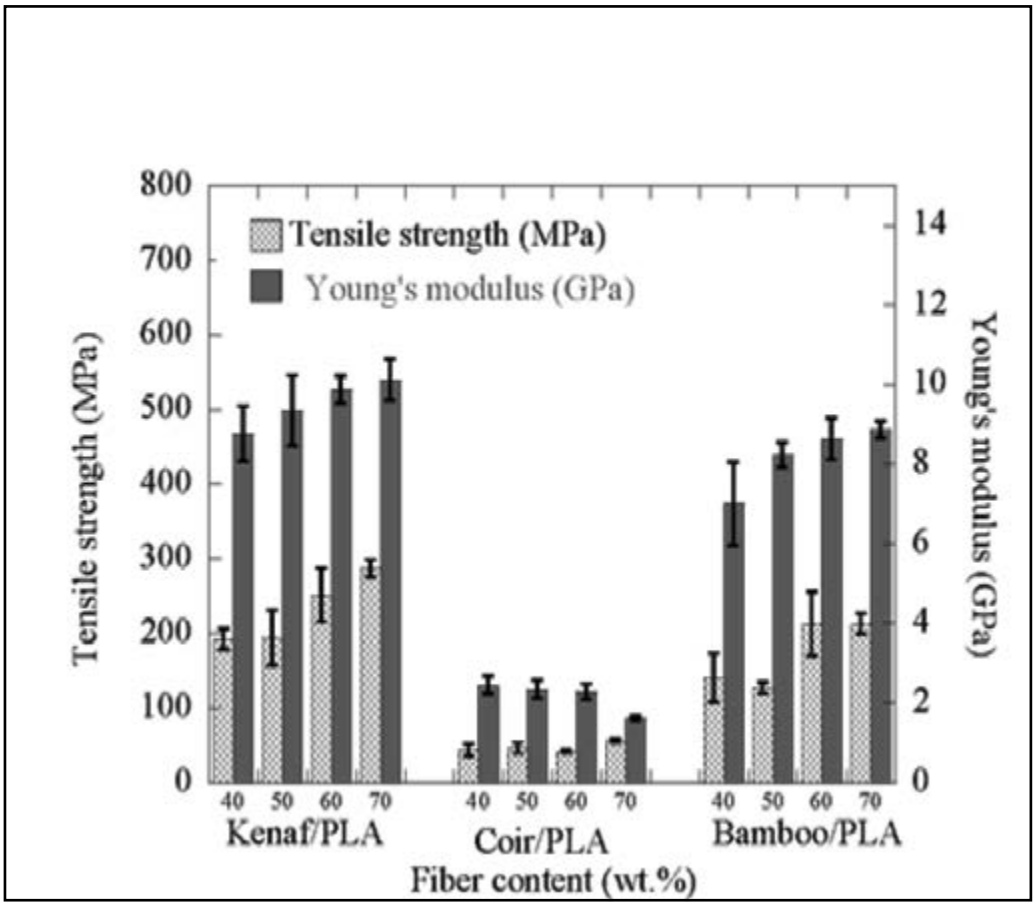

Fig. 2. Tensile properties of Kenaf/PLA, Bamboo/PLA, Coir/PLA

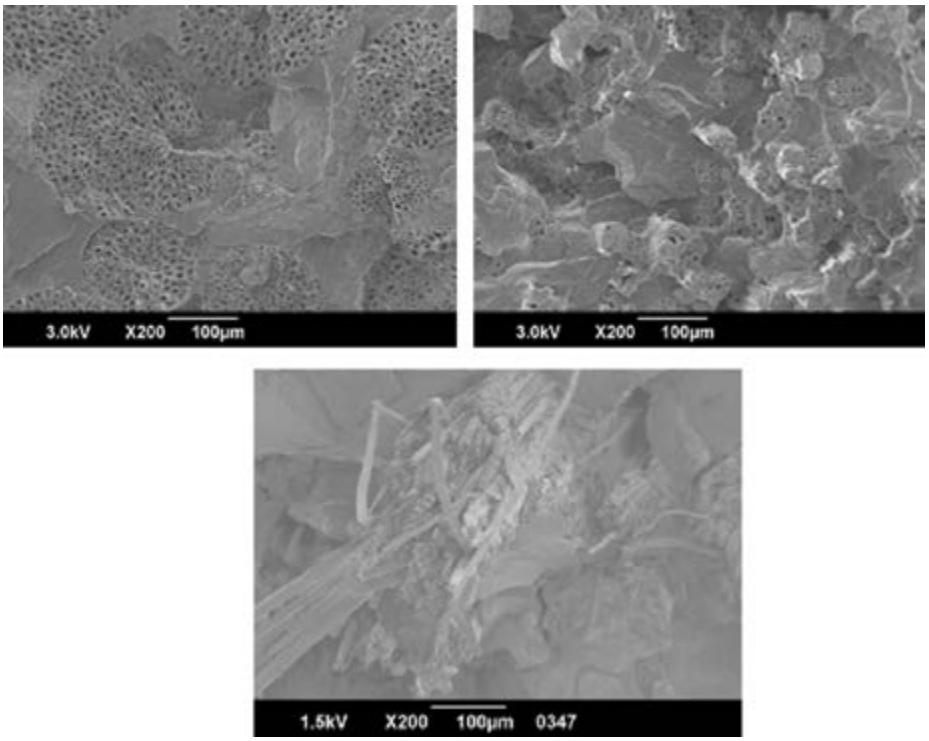

Fig. 3. Microstructure of (a) Coir/PLA, (b) Kenaf/PLA, (c) Bamboo/PLA,

Conclusions.

The unique property of plant fibers is potential to yield a higher loss factor than those of synthetic composites. Plant fibers allow for embracing a more diversified mode to attenuate sound wave energy, which is useful for energy absorption. Therefore, composites made from coir, bamboo and kenaf fibers reinforced polylactic acid (PLA) are promising materials to be used as some parts of mechanical systems based on this study. Both high loss factor and mechanical properties of plant fiber could replace synthetic composites for future dynamic systems. Abundantly available at low cost and an acceptable performance may lead to green technology environment becomes successful.

Acknowledgements

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Improvement of System Acquisition Scheme for Fast Scanning in Heterogeneous Network

F.Adlan1, a, M.Ismail2, b and N.Zainal3, c S.Bohanudin4

1,4Department of Electrical Engineering, Politeknik Sultan Salahuddin Abdul Aziz Shah, Selangor, Malaysia
1,2,3,4Faculty of Built and Environment, Department of Electrical, Electronic & System, Universiti Kebangsaan Malaysia, Bangi, Selangor, Malaysia
afazida@psa.edu.my, bmahamod@fkab.ukm.my, cnasaruddin@fkab.ukm.my

Keywords: System Acquisition; Scanning; Heterogeneous Network; Lte/Lte-A

Abstract. In LTE/LTE-Advanced networks system information (SI) acquisition is one of the compulsory parts for arriving handover (HO) to closed subscriber group femtocells. Degradation to the service quality of user or radio link failure is a result of long measurement gaps and unnecessary/unplanned SI acquisition during handover. In this paper, we run simulations on existing SI acquisition schemes and compare it to the improved SI acquisition scheme. Additionally, we propose an improved SI acquisition scheme to reduce the latency of the SI acquisition gap which caused to reduction of time during consideration and valuation of the HO phase. Simulation results show that the performance of proposed scheme significantly better performance than the existing SI acquisition schemes.

Introduction

The increasing capacity of mobile broadband data subscribers introduced challenges to the operators in terms of providing sufficient radio resources, increasing system capacity to manage network traffic loads and maintaining the performance and service quality to various user levels. Several measures taken to accommodate the increasing number of subscribers including implementation of efficient modulation and coding schemes as well as increased the radio spectrum. Conversely, in the most crowded environments, these measures are not sufficient enough to prevent the deterioration of the system performance. One way to overcome this issue is to densify the existing macro networks by adding more sectors which known as heterogeneous networks. Heterogeneous Networks (HN) scenario was adopted for the 3GPP Long Term Evolution (LTE)/ LTE-Advanced (LTE-A) systems with the deployments of the femtocell. Femtocells are small base stations operated under LTE macro cells, also known as evolved Node Bs (eNBs) [1]. This scenario is projected to help the improvement of end user data rate, promote seamless mobility and reducing delays.

Evolved Node Bs transmits low powers to covers limited areas and can be accessed in three modes: closed subscriber group (CSG) mode, open mode and hybrid mode. In CSG mode, the cell services limited to the particular member only while open mode operates as macro cell to serves all users without any restriction and the last mode, hybrid, offers priority and gives privilege to member users. In LTE system, CSG, Hybrid and Open cells will shares the range of 504 physical identities (PCI) where Hybrid and Open will get the most numbers to compare to limited range that reserved

for CSG cells. Seems the HeNBs is smaller and cover small areas under eNB cells, there will be various numbers under one cells and this can lead to PCI confusion as many HeNBs have the same identity. PCI confusion can leads to the problem of HeNBs misidentification while eNB, trying to determine the correct target CSG cell for handover, based on the user equipment report. To resolve the doubt on target cell identity, UE needs to obtain cell global identity (CGI) of CSG cell. This can be done by reading the SI of the target cell and compare it with CSG white list [2, 3] to reduce HO failure.

During the acquisition of SI, the UE has to release its connection to the serving eNB, and no data packets are received or transmitted during this period. The service interruption due to the SI acquisition is called the measurement gap. In 3GPP LTE, the acquisition of SI may require a measurement gap of up to 160 ms long [4]. Long gaps may degrade quality of services specifically for real time services such as video conferencing or voice over IP. Therefore introduction of new mechanism that could help to avoid or reduce interruptions on real time services would be an advantage to the system. Still, the part of SI acquisition and its detail was left open in technical specifications of 3GPP LTE [5, 6]. In this paper, we propose a mechanism to require the SI that helps to reduce the measurement gap and improve the service interruption.

System Information Acquisition Methods in 3GPP LTE/LTE-A. In LTE system, SI divided into two parts. The first part built-in the master information block (MIB) and the second comprises in system information block type I (SIB1). MIB contains basic information of target cell such as bandwith, antenna configuration, frame number and more while, SIB1 contains CSG ID, cell selection criterions and schedulling information of other SIBs [7]. To read and decode SIB1, UE has to verify the basic information of target cell that contained in MIB. To read both MIB and SIB1, UE has to disconnect from eNB and this is known as service interruption time. SIB1 is transmitted in 20 ms periodically whilst MIB interleaved over 40ms. The worst scenario comes when UE missed the information of MIB packet as it received the control message from eNB and resulted of long waiting time from the cycle repetition to read the MIB again. Fig. 1 illustrate the best and worst scenario which such case will increase the measurement gap, prolong the HO process and caused drawback of the system performance in terms of quality of service (QoS).

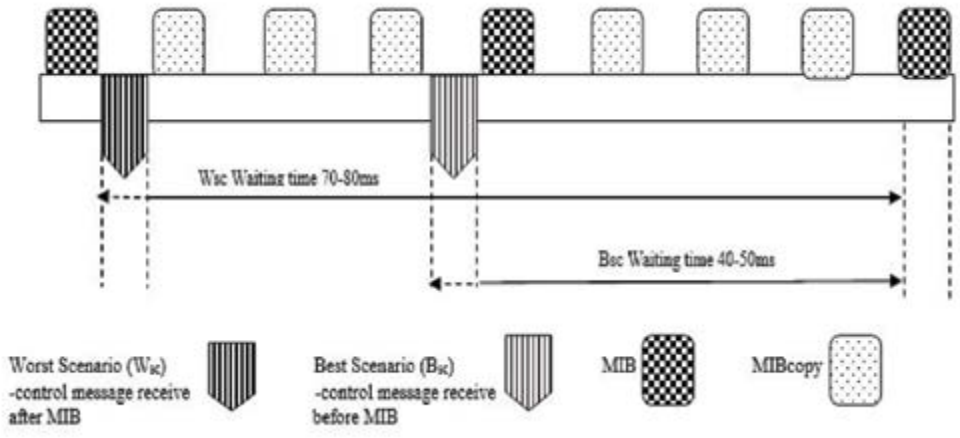

Fig. 1. Worst and Best Scenarios of MIB Update

In worst scenario depicted in Fig.1, UE missed the MIB set and need to wait for the second transmission of the subsequent set of MIB to have permission to read the SIB1. This resulted the long waiting time from 30-40ms. This waiting time will increase the measurement gap which prolong the HO evaluation phase that leads to degradation of service quality of users[7]. In the other hand best scenario showing that message control received slightly before the MIB packet and the waiting time was only 1-10 ms.

Proposed System Information Acquisition Scheme. In this section, we propose a simultaneous SI acquisition scheme (SSIAS) for incoming user that need to handoff to CSG cells. The method used is to detect and rank the neighboring target cell before requesting MIB packets from all target cells. This request will be simultaneous for all neighboring HeNBs. In other words, a UE acquires the MIB of all the neighboring cells in a given amount of time and read the SIB at the same time. Therefore the worst case scenarios can be avoided and thus the overall process of HO will be fast and precise. The selection of the femtocells is based on signal strength and service type.

Table 1. Algorithm Pseudo Code.

Algorithm SSIAS Algorithm

Start

1: Received control message from eNB
2: Missed MIB packets?
3: No, read MIB, SIB and HO.
4: Yes, check neighbor HeNB,
5: ***for*** *i-n* HeNBs ;
6: **sort** (best HeNBs based on criterion)
7: **acquire** (MIB, cell *i*), dismiss incoming SIB
read (MIB, cell *i*),
8: **read** (SIB, cell *i*), acquire SIB dismissed,read SIB
9: **select** (best HeNB)
10: **check** registered UE ?
11: No, waiting time, HO.
12: Yes, HO.
13: ***end for***

end

The SSIAS scheme uses different method of SI acquisition between femtocells. UE acquires the MIB packets from all the target cells. Then, the UE sorts the target cells based on criterions selected. Next UE will read the concurrent SIBs from target cells. In the case of missing MIB, the SIB that received will be retransmit after MIB successfully arrived. In other words, all SIBs will be received but only it will not be in the right order. Algorithm 1 is the pseudo code of the proposed SSIAS method can be referred in Table.1. Measurement gap used in this paper is the same as [8, 9] For SSIAS, delay can be derived as below:

$$Delay_{time} = R_{MIB.all} + R_{SIB.all} + W_{SIB} + {}_{r}T_{SIB} + RR_{time} \quad (1)$$

Where Delaytime is the average delay for proposed method, RMIB.all and RSIB.all are the time duration while receiving the MIB and SIB packets from the list of potential HeNBs.The mean value of RMIB.all is ncell (½) (1+10) for minimum dan maximum time difference of MIB which is 1ms and 10 ms, respectively. As for SIB packets that broadcast every 20ms the mean value will be ½ (ncell + 20) WSIB is the waiting time for SIB packets, while rTSIB and RRtime respectively are retransmission of dismissed SIB and time acquired for radio resource control message. RRtime value is considered 10ms for it is referring to the length of frame. Since we simulate to detect the best 6 HeNBs/eNBs and choose the best to HO, the analyse of

$$rT_{SIB} = \sum_{i=1}^{\infty} 20.i\, P_{SIB1} \quad (2)$$

where 20 is 20ms, the time needed to receive the missed SIB and i , is the number of SIB to be retransmitted. In this paper we will only consider the success MIBs and SIBs transmission without any of packet dismissed by the UE.

Performance Evaluation. This study performs the simulation to evaluate the SSIAS performance to be compared with the conventional method. Simulation was done by using the Matlab Software with the parameters listed in Table.2. The handover strategy consider RSSI, the velocity of the UEs, the SINR, the capacity bandwidth the one Femtocells can accept and user type. The threshold is the minimum level required for the handover from Macrocell to Femtocells [10].

Table 2. SSIAS Simulation Parameters

Parameters	Scenarios
Cell	51 Hexagon cells 51 Macrocell BS 1000 Femtocells BS (randomly deployed)
Macrocell Radius	1 km
Femtocell Radius	20 m
Macro Tx Power Femto Tx Power	46dBm 20dBm
Propagation model	Same cluster: $L = 127 + 30 \log 10\, R$ Others: $L = 128.1 + 37.6 \log 10\, R$
System frequency	2Ghz

Simulation will start with the movement of UEs moving randomly approaching the Macro and

femtocells. UEs divided into three groups of users which are Ncsg: non-member of CSG, Hcsg: hybrid member of CSG and Mcsg for the member that will be given privilege to HO to the femtocells. UEs was set with the random speeds at mean 3m/sec.

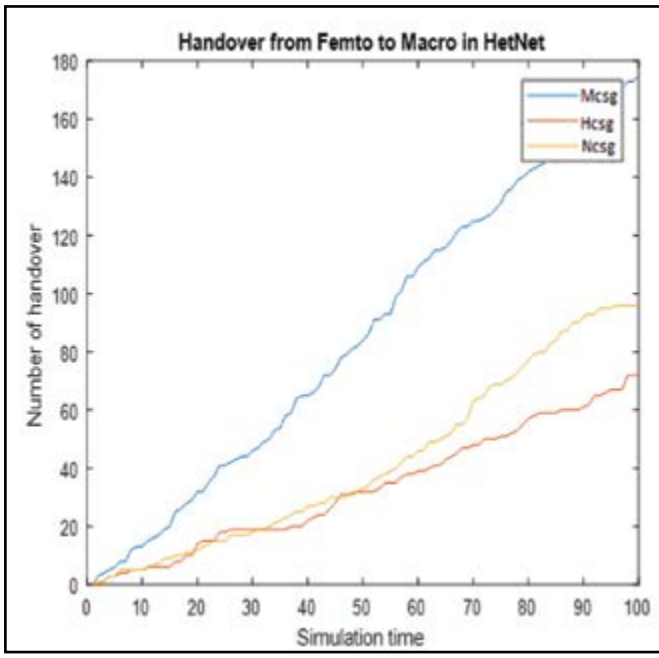

Fig.2. HO from Femto to Macro

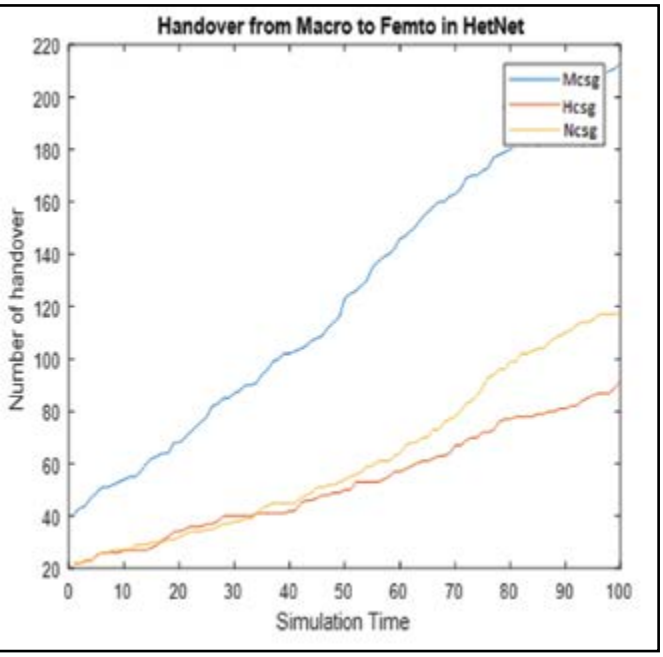

Fig.3. HO from Macro to Femto

The numbers of HO activities which depicted in Figure 2 showing that as the CSG member experienced highest HO activities while medium for Hybrid CSG and lowest for the non-member of CSG. The same result showed in the HO activities from Macro cells to Femtocells in Figure 3. 175 HO activities from femtocells to macrocells for CSG member recorded during simulation and 210 HO vice versa. Thus the delay time calculated in this paper does not consider the retransmission of SIB which we will focus it in the future work. Delay and service interruption for each group can be analysed in Figure 4.

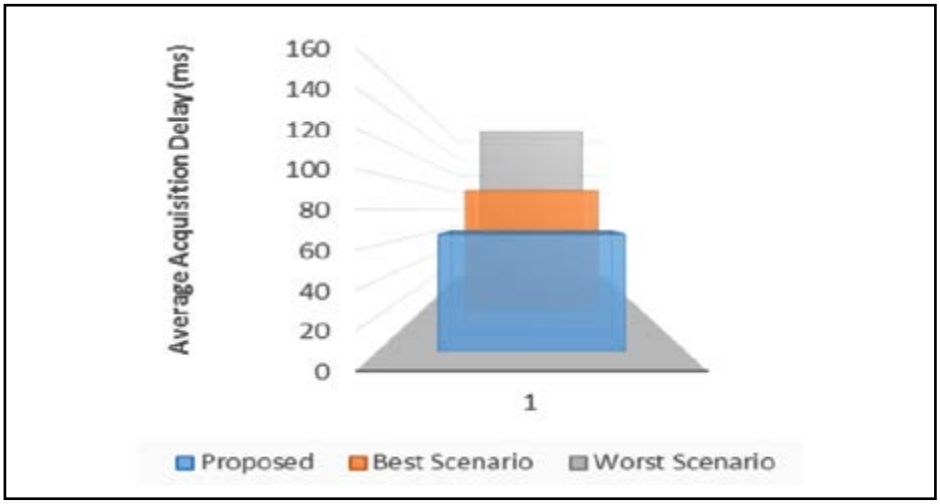

Fig.4. Acquisition Delay

Fig 4. Shows the acquisition delay when a UE start the HO mechanism. Acquisition delay is the highest factor that contribute to the HO delay. The proposed method SSIAS shows the lowest acquisition delay compared to Worst and Best scenario of conventional method.

Conclusion. In this paper we proposed an improvement HO process using the proposed SI acquisiton for UEs movement towards the CSG cells. Simulation developed to compare the proposed algorithm with the existing algorithm, in terms of reducing the time required, while handover to the femtocells. The existing method was suitable for the user that receiving or engaging with the non real time services. Unfortunately, it does not possible for real-time services which will lead to service interruption and prolonged the HO procedures. The result shown that HO time has reduce and improved to compare with the existing scheme and could maintains the best quality of service to the users. Thus the proposed scheme can provide a realiable services, reduce the HO time and improve the overall performance.

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Peranan Industri Dan Institusi Pengajian Tinggi (IPT) Dalam Meningkatkan Mutu Kurikulum Pelajar Aliran Teknikal

M.A Nurul1, a, R. Rafiuddin2,b dan Z. Norfarahi2,c
1Universiti Teknologi Malaysia, Skudai, Johor, Malaysia
2,3Politeknik Ibrahim Sultan, Johor, Malaysia
anurul.aini@utm.my, bakiera@gmail.com, cnorfarahi@pis.edu.my
Kata kunci: Peranan; institusi pengajian tinggi; industri; kuantitatif; temubual

Abstrak. Kajian ini dijalankan untuk melihat tahap kerjasama yang terjalin di antara pihak industri dan institusi pengajian tinggi (IPT) dalam meningkatkan mutu kurikulum pelajar aliran teknikal. Kajian ini dijalankan melalui kaedah soal selidik dan juga kaedah temubual bagi mendapatkan maklum balas dari responden. Kerjasama ini dinilai dari segi peranan IPT dan peranan industri yang telah, sedang dan akan dimeterai di antara kedua-dua pihak tersebut. Seramai 24 responden yang terdiri dari pihak industri dan penyelaras kurikulum daripada IPTA dan IPTS diambil bagi membantu dalam menjalankan kajian ini. Data-data kajian dianalisis dalam bentuk skor min bagi data kuantitatif dan pengekodan bagi data kualitatif. Kajian ini mendapati bahawa para responden bersetuju mengatakan bahawa sememangnya terdapat kerjasama yang tinggi di antara industri dan IPT dalam sesetengah aspek seperti penglibatan industri dalam mesyuarat pembangunan kurikulum IPT. Namun usaha memupuk kerjasama itu dapat lebih dilihat daripada sebelah pihak sahaja iaitu pihak IPT. Pihak industri hanya dapat dilihat benar-benar bekerjasama dalam menyediakan tempat kepada pelajar untuk latihan industri memandangkan mereka hanya mementingkan keuntungan dalam setiap yang mereka lakukan.

Pengenalan

Perkembangan pesat dalam sektor pendidikan tinggi dalam Negara sejak tahun 1990-an sudah membuahkan cukup banyak kepelbagaian, baik dari segi institusi, program, jurusan mahupun kaedah penyampaian. Pembangunan Pendidikan Malaysia (PPPM) 2015-2025 (Pendidikan Tinggi) turut menyentuh dan memberi penekanan terhadap pendidikan teknikal terutamanya bagi Lonjakan Keempat Graduan TVET berkualiti.

Institusi pengajian tinggi (IPT) kini bukan sahaja terbahagi kepada awam dan swasta tetapi juga tempatan dan luar negara serta badan-badan profesional. Bagi kepelbagaian program, para pelajar boleh memilih sama ada mahu mengambil program tempatan, usahasama atau berkembar dalam jurusan akademik, vokasional, teknikal mahupun latihan kemahiran.

Di kebanyakan negara termasuk Malaysia, pemisahan antara pendidikan akademik dan vokasional telah lama wujud. Dwi sistem yang diamalkan di negara kita bermula sejak pendidikan vokasional secara formal diperkenalkan pada awal abad ke-20. Walaupun pada akhir-akhir ini, terdapat usaha untuk merapatkan kedua-dua aliran pendidikan tersebut, namun hasilnya masih di tahap minimum [1]. Dwi sistem ini secara tidak langsung mewujudkan sistem ‘kelas’ dalam masyarakat di mana graduan dari aliran akademik menjadi pekerja profesional atau separa profesional kolar putih manakala graduan aliran vokasional menjadi pekerja mahir atau separa mahir kolar biru [2].

Masalah pengangguran di kalangan graduan universiti menjadi satu kebimbangan kepada pelbagai pihak dewasa ini. Menurut kenyataan rasmi Menteri Pendidikan Tinggi, Datuk Seri Idris Jusoh,dianggarkan terdapat 54,103 graduan yang menganggur pada 2016 disebabkan oleh masalah utama graduan yang gagal memenuhi kemahiran yang diperlukan oleh majikan [3].

Ini turut bertepatan dengan statistik dikeluarkan Jabatan Perangkaan Malaysia baru-baru ini, kadar pengangguran pada Januari 2017 adalah 3.5 peratus [4]. Hal ini menunjukkan walaupun Negara bergerak ke arah negara maju, isu ini masih berlaku dan memebri cabaran kepada pmbanguna negara di masa hadapan. Ketua Pengarah Jabatan Tenaga Kerja Semenanjung Malaysia (JTKSM), Datuk Mohd Jeffrey Joakim menyatakan kadar pengangguran Negara pada tahun 2018 masih di bawah paras terkawal iaitu 3.4 peratus [5].

Pihak Institusi Pengajian Tinggi juga sering dipersalahkan dalam hal ini walhal mereka mendakwa telah pun memberikan didikan yang terbaik dan berkualiti bagi memenuhi kehendak pasaran kerja. Sebagaimana yang dinyatakan oleh Pengarah Urusan Kolej Multimedia (MMC), Kuala Lumpur, Datuk Ir. Ahmad Zaini Mohd Amin pada pembentangan kertas kerja beliau kepada United National Educational, Scientific and Cultural Organization (UNESCO), MMC telah membuat kajian yang mendalam bagi memastikan graduan kelahiran mereka diterima baik pihak majikan terutamanya di bidang teknologi maklumat dan multimedia. Antaranya ialah dengan menyediakan kursus yang merangkumi hard skills, soft skills, penilaian dan akademik. Teknologi yang diaplikasikan di MMC juga adalah yang paling terkini bagi memastikan pelajar mereka tidak ketinggalan dan dipandang sinis oleh pihak lain [6].

Pihak majikan atau industri tidak boleh dipersalahkan dalam hal ini kerana sememangnya majikan perlu berhati-hati memilih pekerja yang benar-benar layak memandangkan kelulusan akademik belum tentu menjamin mutu kerja yang tinggi. Satu kaji selidik berkaitan dengan pekerjaan di bidang pembuatan masa kini dan akan datang di Connecticut telah dijalankan oleh Pertubuhan Industri dan Perniagaan Connecticut (CBIA) kepada kolej-kolej di sana pada awal tahun 2006. Para penyelidik mendapati bahawa pihak industri benar-benar menghadapi masalah dalam mencari pekerja yang mempunyai kemahiran tambahan yang diperlukan bagi memenuhi pasaran kerja yang berteknologi tinggi di sector pembuatan. Antara posisi kerja yang berada di tahap kritikal kerana ketiadaan pekerja yang layak ialah Pengaturcara CNC, Jurumesin CNC, Tool and Die Makers, juruteknik dan jurumesin am. Menurut penyelidik lagi, sekiranya tiada sebarang tindakan segera, masalah ini akan berlarutan dalam jangka masa 5 tahun akan datang yang pastinya akan mendatangkan kesan buruk terhadap pertumbuhan ekonomi negara mereka.

Dalam persoalan-persoalan yang telah dikemukakan ini, kita dapat lihat percanggahan kenyataan di antara pihak universiti dan majikan di industri walhal kedua-dua pihak inilah yang menjadi antara faktor utama bagi mengurangkan kadar pengangguran siswazah di Malaysia. Jadi, berdasarkan pernyataan di atas, satu kajian telah dibuat bagi mengenalpasti sejauhmana pihak IPT dan industri dapat bekerjasama dalam meningkatkan mutu kurikulum pelajar aliran teknikal bagi memastikan graduan yang dihasilkan IPT memenuhi kehendak atau keperluan pihak industri apabila keluar bekerja kelak.

Metodologi Kajian

Kajian ini menggunakan soal selidik dan temu bual sebagai instrumen kajian untuk mendapatkan data dan mengkelaskannya kepada sumber primer dan sekunder. Sumber primer merupakan data-data yang di kumpul oleh penyelidik sendiri melalui set borang soal selidik dan sesi temubual yang dijalankan . Selain daripada sumber primer, penyelidik juga menggunakan data-data yang diperoleh daripada bahan-bahan yang bertulis seperti buku, jurnal, majalah, akhbar, laporan, internet dan sebagainya. Data-data ini penting bagi menyokong maklumat-maklumat dalam bab kajian literatur dan perbincangan.

Dapatan Kajian

Kajian ini melibatkan 35 item soalan yang diuji secara kaedah statistik. Seramai 24 orang responden telah menjawab borang soal selidik yang telah diedarkan dan empat orang dipilih daripada kalangan mereka untuk ditemubual, iaitu pegawai atasan di industri dan penyelaras kurikulum IPT. Analisis kuantitatif telah dijalankan dengan menggunakan perisian Statistical Packages for Social Sciences (SPSS) Versi 11.5. Dua kategori responden telah menjawab dua set soal selidik yang berbeza iaitu set soal selidik IPT yang telah dijawab oleh penyelaras kurikulum IPTA dan IPTS manakala set soal selidik industri telah dijawab oleh pihak industri yang terlibat dengan pihak IPTA dan IPTS yang berkaitan. Jad. 1 merupakan dapatan daripada analisis yang telah dijalankan. Dapatan temubual yang diperolehi pula diperolehi daripada dua kategori responden iaitu pihak industri dan penyelaras kurikulum di IPT.

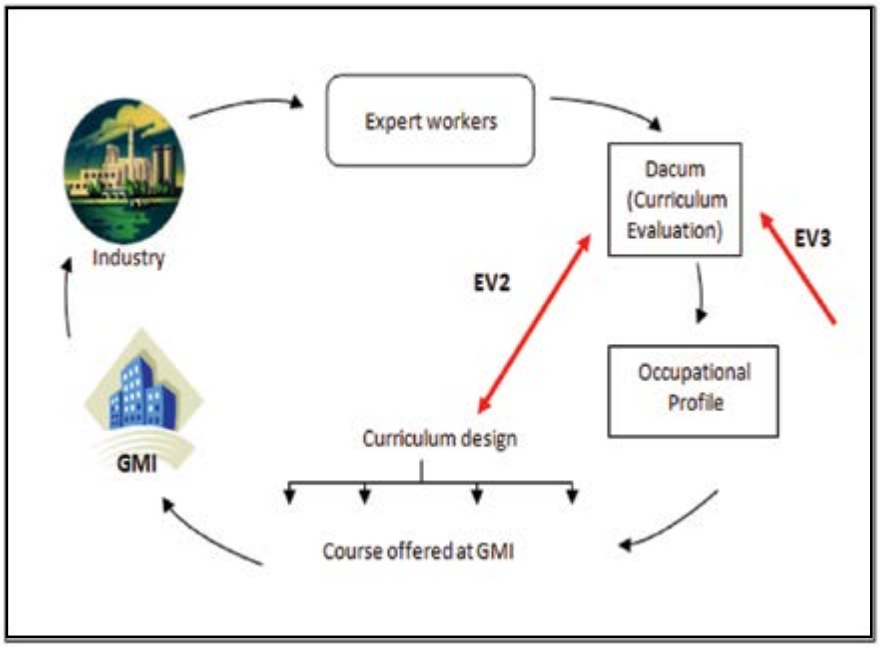
Jad. 1. Purata Keseluruhan Mengikut Kategori

No	Kategori	Purata Keseluruhan			
		Skor min		Tafsiran Min	
		IPTA	IPTS	IPTA	IPTS
1	Peranan Industri Terhadap Kurikulum IPT (Responden Industri)	4.166	3.917	Tinggi	Tinggi
2	Peranan IPT (Responden IPT)	4.66	4.923	Tinggi	Tinggi

Perbincangan Kajian

Kajian ini menggunakan soal selidik dan temu bual sebagai instrumen kajian untuk mendapatkan data dan mengkelaskannya kepada sumber primer dan sekunder. Sumber primer merupakan data-data yang di kumpul oleh penyelidik sendiri melalui set borang soal selidik dan sesi temubual yang dijalankan. Berdasarkan Jad. 1, jumlah skor min keseluruhan bagi peranan industri terhadap kurikulum di IPTA dan IPTS adalah tinggi iaitu 4.166 dan 3.917 masing-masing. Purata yang diperolehi menunjukkan bahawa industri sememangnya memainkan peranan dan memberi sumbangan terhadap pembangunan kurikulum institusi pengajian tinggi. Melalui temubual bersama responden daripada IPTS, industri banyak menyumbang dari segi kepakaran pekerja atau pengalaman peribadi dalam memberi input kepada pembentukan profil kerja (occupational profile) seperti yang

ditunjukkan di Raj. 1. Profil ini merupakan hasil yang diperolehi daripada proses dacum. Menurut Halasz (1994) yang kemudiannya telah diperbaiki (revised) oleh Thomas (2003), proses dacum atau developing a curriculum merupakan satu teknik menganalisis keesahan kerja dengan cepat [7]. Ia digunakan untuk menentukan tahap kompetensi yang harus ditunjukkan dalam disiplin kurikulum bagi sesebuah pekerjaan. Ia turut digunakan untuk membangunkan profil kerja bagi semua jenis pekerjaan. Teknik ini telah terbukti sangat efisyen melalui kajian dan perbandingan dengan kaedah-kaedah penganalisaan kerja yang lain.



Raj. 1. Proses Pembentukan Profil Kerja di GMI

Jumlah skor min keseluruhan bagi peranan IPT adalah tinggi kedua-duanya iaitu 4.66 bagi IPTA dan 4.923 bagi IPTS. Bagi kedua-dua IPT tersebut, item mewujudkan sistem mentor mentee antara pensyarah dan pelajar merupakan nilai skor min terendah berbanding item yang lain. Menurut penyelaras kurikulum IPTA dalam temubualnya bersama penyelidik, universiti hanya membudayakan sistem penasihat akademik (P.A) dengan pelajar. P.A akan memainkan peranan untuk memberikan khidmat nasihat yang berkaitan dengan pembelajaran mereka sepanjang tempoh pengajian di sesebuah institusi.

Responden temubual juga mendakwa pihak IPT ada menawarkan kurikulum mengikut kehendak dan bersesuaian dengan mereka. Namun, dapatan ini bercanggah dengan Syed Husman [8], di mana beliau menyatakan bahawa kebanyakan kursus yang ditawarkan adalah tidak relevan dengan keperluan semasa industri sejajar dengan perubahan pesat teknologi maklumat dan komunikasi (ICT) dan kemajuan teknologi. Ini kerana pendidikan komputer dan subjek kemahiran ringan (soft skills) tidak termasuk sebagai subjek wajib untuk semua kursus. Kekurangan aktiviti penyelidikan dan pembangunan (R&D) dalam PTV dan tiada program praktikal (usaha sama) dengan industri bagi sesetengah kursus juga merupakan menyumbang utama kepada masalah pengangguran ini.

Namun yang demikian, Syed Husman telah mengenal pasti keperluan/kehendak majikan

dalam mengubah persekitaran pendidikan teknik dan vokasional yang sedia ada. Latihan vokasional seharusnya menyediakan program pendidikan yang diurus sebaiknya yang menawarkan kesinambungan kursus yang berkait terus dengan persediaan individu untuk pekerjaan semasa/ akan datang dan untuk persediaan mereka sebagai usahawan. Kursus yang ditawarkan haruslah merangkumi sepenuhnya pelbagai kelas, kemahiran akademik, atitud kerja,kemahiran 'employability' asas dan kemahiran pekerjaan yang spesifik.

Kesimpulan

IPT berperanan untuk menerima kebanyakan idea yang dicadangkan oleh pihak industri. Ini kerana, idea-idea tersebutlah yang amat diperlukan bagi menjadikan graduan keluaran mereka benar-benar memenuhi kehendak industri yang mana secara tidak langsung, mengurangkan kadar pengangguran di kalangan siswazah. Selain daripada itu, peranan industri yang melibatkan diri dalam mesyuarat pembangunan kurikulum bersama penyelaras kurikulum di institusi pengajian tinggi dilihat sangat dominan dan dialu-alukan. Idea-idea dan cadangan pemurnian mereka akan diterimapakai oleh IPT dan dijadikan panduan serta rujukan bagi membolehkan pelajar keluaran mereka benar-benar memenuhi kehendak dan keperluan industri.

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Tribological Study Of Textured And Untextured Taper Die in Cold Extrusion Process

M.A. Nurul1, a and S. Syahrullail2,b
1School of Education, Universiti Teknologi Malaysia, Johor Bahru
2School of Mechanical Engineering, Universiti Teknologi Malaysia, Johor Bahru
anurul.aini@utm.my, b syahruls@mail.fkm.utm.my

Keywords: Textured surface; cold extrusion; metal forming lubricant; palm oil based lubricant; viscosity.

Abstract. Recently, there is a big concern for industries to maintain lubricant flow along the extrusion process. It is important in order to get the best quality of the final products. One of the most cost-effective methods is by surface texturing. In this research, surface texturing was embedded on a taper die sliding contact surface to explore its effectiveness on a finished product of cold extrusion process. Commercial extrusion oil was tested for cold extrusion processes. It was found that a textured taper die (TA) performed a diminished extrusion load than an untextured taper die (NA), and improved the performance of another test parameter. Based on the results, it is proven that surface texturing can be considered as an alternative approach to be implemented in the industry.

Introduction

Tribology is the study of friction, lubrication and wear between moving surfaces. It is an important part in metal forming processes in terms of lubrication as affecting tool and die life, material flow during forming, workpiece reliability and surface finish, costing, lubricant properties to machine elements and energy conservation [1].

An alternative approach had been implemented by few researchers to maintain lubricant flow along the metal forming process. Surface texturing is among the cheapest solution of modification die if compared with tool change, hot works and others. In extrusion die design, it has become increasingly common to add micro-pits to balance the metal flow. The balance of metal flow is particularly important for multiple cavities to die or sections with varying thickness in order to maintain a uniform velocity profile across the face of the die and thus minimize distortion of the extrudate [2]. Initially, micro-pits or also known as pocket die was designed for the manufacturing of a long and continuous profile by welding the subsequent billet transversely to the last billet remaining in the pocket. In this way, the extrusion process is run in the semi-continuous fashion, leading to reduce downtime and increased productivity [3].

Through an appropriate selection of lubricant, manufacturers can produce either smooth or rough surface depending on the demands. Changes in lubrication can alter the mode of deformation during forming processes and change the mechanical properties of the final product. Since the benefits of friction and lubrication control can be immense in metal forming, especially cold forming,

considerable effort has been directed to the measurement of friction for both general metal working conditions and specific metalworking processes so far [4].

This research is conducted to study an effect of a textured surface taper dies in cold work plane strain extrusion process. It is then compared with an untextured taper die in order to ensure whether the textured surface gives a big impact towards better surface roughness of sliding contact area, minimizing extrusion load, and at the same time reduces friction and wear during the extrusion process.

Methodology

Tapers die preparation and textured surface design. Tapers die are made in two conditions. As shown in Fig. 1, an untextured taper die is designated as NA and used for a comparison purpose. While textured taper dies on contacting surface is designated as PA. Each textured hole is spherical in shape with diameter 0.2 mm and 0.03 mm depth. The distance between the holes is kept the same, with 1 mm vertically and horizontally. Following texturing, the specimens are hardened until the temperature reached 1030°C for more than 5 hours and it is cooled in the open air until it reached the room temperature. The hardness of the material after heat treatment is 825.2 Hv.

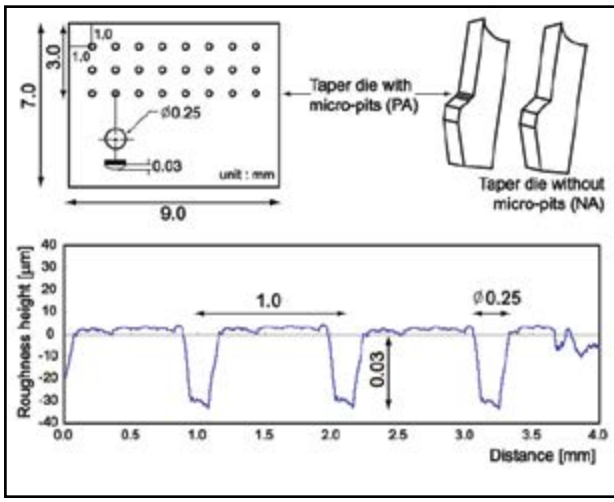

Fig. 1 Schematic of micro-pits indentation apparatus;

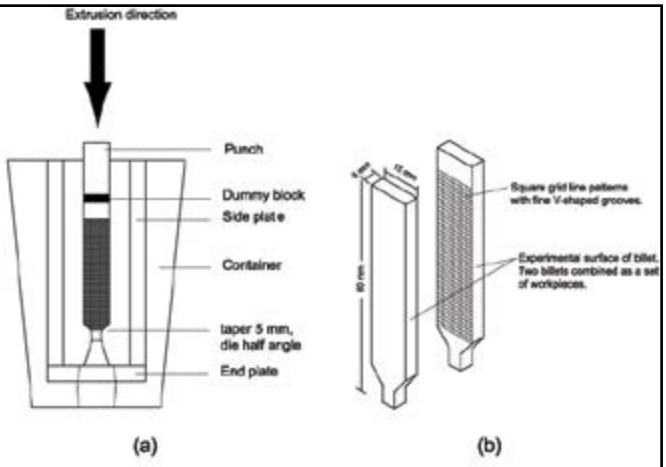

Fig. 2(a) Schematic of plane strain extrusion (b) Schematic for billet used in the experimental works.

Experimental apparatus. Cold work, vertical, forward extrusion process used in the experiment. The main components are a container, tapers die and billets. The die half angle of the tapers die used is 45-degree, as shown in Fig. 2(a). The tapers die are made of tool steel (SKD11), and necessary heat treatments were performed before the experiment. The experimental surfaces of the tapers die (surface in contact with the billet) were polished with abrasive paper and an arithmetic surface roughness, Ra of approximately 0.15 µm was recorded.

This experiment was carried out with the laboratory press machine at room temperature. This

-plane extrusion apparatus was assembled and placed on the load cell to record the load extrusion (Y-axis) during each test. The displacement of ram stroke (X-axis) was also recorded by using the displacement sensor, which is attached to the holder of plain extrusion apparatus. Extrusion was stopped at a piston stroke of 35 mm, where the extrusion process was expected to reach a steady state. The ram speed was constant at 7.6 mm/s. Lubricant was applied onto the tapers die (surface which has contact with the billets) before the test. The billets were cleaned -with acetone. During the extrusion process, the two similar billets were stacked and used as one unit of billet was fixed on a container and extruded through a pair of tapers die. After the experiment, the partially extruded billets were taken out from the plane extrusion apparatus and surface roughness of the billet with the observation plane was measured. Then, the extrusion load was analyzed.

Fig. 2(b) shows a schematic sketch of the billets used in the experiment. The billets material are made of pure aluminum (A1100). The billets are shaped by an NC wire cut electric discharge machining device. Two similar billets were stacked and used as one unit of billet. One side of the contact surface of the combined billets was the observation plane of plastic flow in plane strain extrusion. The observation plane was not affected by the frictional constraint of the parallel side walls. A square grid pattern measuring the material flow in the extrusion process was scribed by the NC milling machine on the observation plane of the billet. The grid lines were V-shaped grooves with 0.5 mm depth, 0.2 mm width, and 1.0 mm interval length. The billets were annealed before the experiment. The annealed condition is the best for cold forming due to the ferrite, which is present in its microstructure [3].

Lubricants. Commercial extrusion oil will be used as the test lubricant. Mechanical properties of tested lubricants such as density, kinematic viscosity, and viscosity index are presented in Table 1. The kinematic viscosity is recommended when dealing with fluid motion and velocity field. It may notify to the propagation of the movement by friction. One drop of lubricant (approximately 15 mg) was applied on the experimental surface of a taper die before the experiment. The initial amount of the lubricant was predicted to create full film lubrication regime at the early stage of the extrusion process.

Table 1 Mechanical properties of tested lubricant

Mechanical Properties		Commercial extrusion oil
Relative density, ρ (g/cm^3)		0.90
Viscosity index		273
Kinematic viscosity, (mm^2/s)	27°C	107.70
	40°C	42.05
	100°C	11.20

Experimental procedure. A hydraulic press machine was used to provide pressing force to the punch. During the extrusion process, the extrusion load and displacement displayed by the punch per unit time were recorded. A load cell was used to record extrusion load during the process, where a linear displacement velocity transducer (LVDT) was used to record the displacement displaced.

Results and discussions

Extrusion load. The extrusion load-piston stroke curve is shown in Fig. 3. The figure shows that the extrusion load has reached a constant level during the process and a steady state was observed at the piston stroke of 15 mm onwards for textured taper die (TA). Untextured taper dies samples show an unstable condition from the beginning until the end of the process. Thus, all the curves show a reduction in extrusion load once the maximum load is reached. This trend may be due to the fact that the frictional force decreases linearly once the maximum load is reached, as proposed by [5].
Textured surface at taper die sliding contact was proved able to reduce extrusion load, rather than without textured [6,7]. The type of surface provides traps for lubricant flow during extrusion process, as it also can hold the lubricant slightly longer in order to maintain the surface roughness quality until the product area.

Surface roughness. The distribution of arithmetic mean surface roughness, Ra along the experimental surface billet (sliding plane) was measured with a surface profiler device. The experimental surface was defined as the surface of billet which was in contact with a taper die and a container during the extrusion process. The undeformed area is the region of the billet which is not deformed during the extrusion process. Deformed area is the region of the billet that started to deform according to the shape of the taper die during the extrusion process. Product area is the region of the billet which is extruded from the taper die bearing (just passed the taper die angle during extrusion process). The measured direction is perpendicular to the extrusion direction. The product areas (0 mm) for both types of taper die are tested for wear observation in billet which will be discussed in the next section.

Fig. 4 presents the roughness value along the process. For the untextured taper die (NA), extruded billet is rougher. Due to the thick layer from the very beginning of deformation process, the thin film tends to stay on the sliding surface. The thicker film layer separated the surface between the taper die and billet. It may prevent the asperities of the billet to be further flattened by a surface of the die [8,9,10]. With regard to the solid contact between sliding contact surfaces, a reduction in the solid contact area may decrease friction [11].

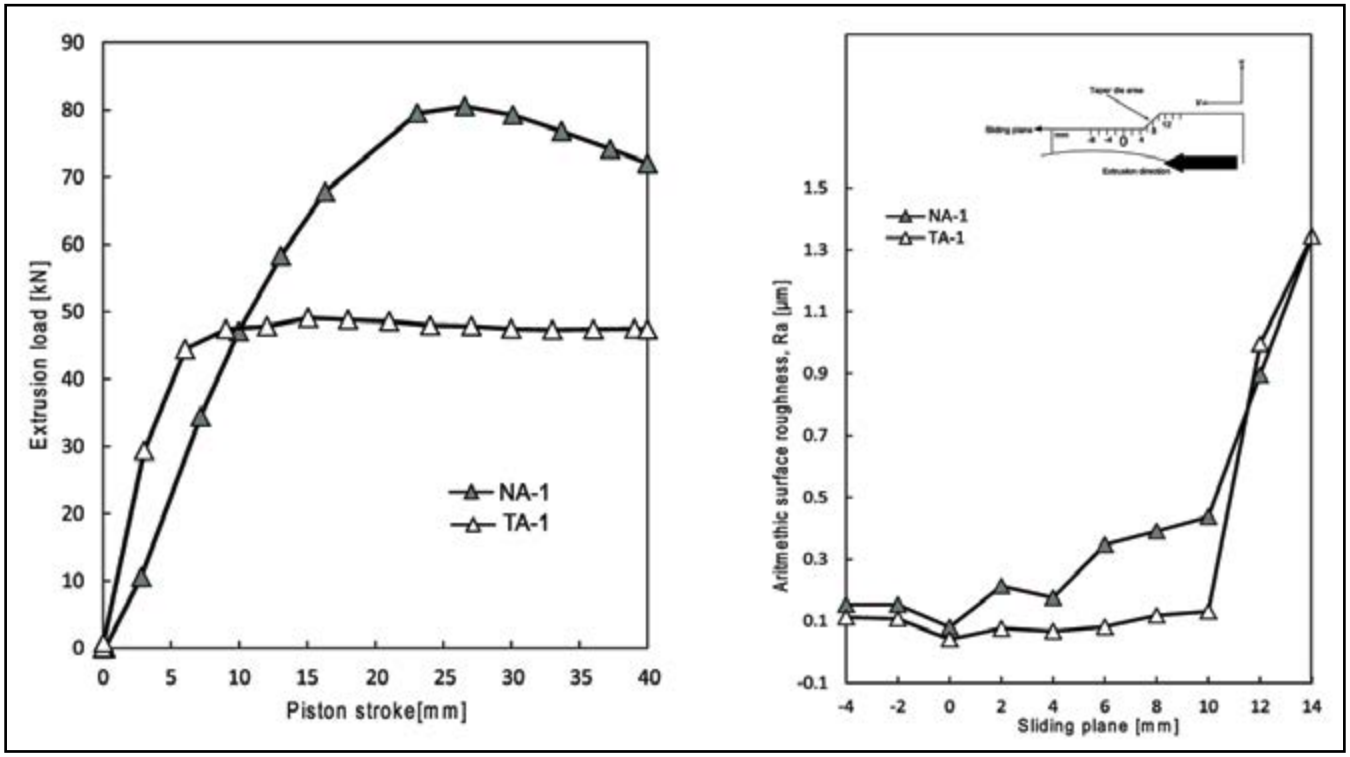

Fig. 3 Extrusion load-piston stroke curves

Fig. 4 The distribution of arithmetic mean surface roughness, Ra

The values are getting smoother with micro-pits existence on the taper die's surfaces (TA), which show a reduction of roughness value for each tested lubricant. As textured holes were embedded on the measurement area, it was proven that better surface roughness can be obtained. Some amount of lubricant might be entrapped during the process inside the holes, but it still gives a good impact for a smoother sliding surface, rather than without embedded holes. The decreasing roughness in this region is most probably due to the highest contact pressure in this region, as proposed by [12,13].

From the beginning of the extrusion process, it shows a stable value for each tested lubricant. As predicted, sliding contact surface by using textured taper die (TA) presents the finest surface roughness and yet, finer than at the deformation area. [10] verified that surface texturing is one of the effective keys to friction reduction. With an existence of textured surface at the taper die area, again, it is an advantage for a better surface roughness along the sliding contact area. Nevertheless, the difference between each lubricant is not significant, at a range of 0.1 to 0.25 micron.

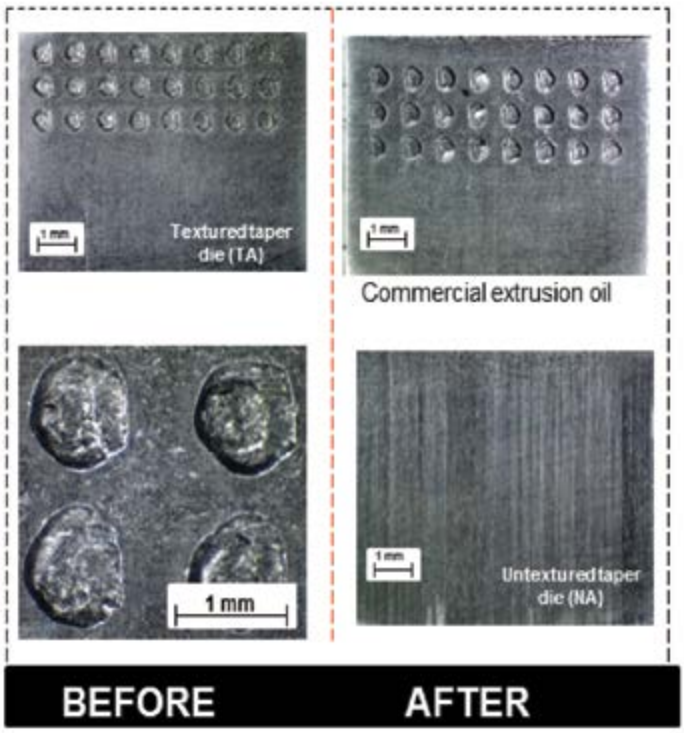

Fig. 5 Surface image of textured taper die (TA)

Observations for taper die. Fig. 5 presents the surface image of textured taper die (TA) captured by a CCD camera. Charge Couple Device (CCD) camera is used to capture the images with a magnification of 4.5 and from the observation, it was found that no severe wear has occurred. The taper dies surface condition before and after the extrusion process were clearly visualized. The shiny silver color inside the holes indicates the amount of entrapped debris which comes from the billet during the process. The findings confirmed that lubricant with thin thickness may lead to a higher friction and extrusion load, as well as causing the deformation process to be higher compared to lubricant with thick thickness.

Conclusions

Finding the alternatives approach to maintain lubricant flow along the extrusion process, as well as alternatives lubricant for metal forming process are the main purpose of this research. The surface textures in this experiment were in the form of micro-holes. Two experimental conditions were tested; untextured taper dies (NA) and textured taper die (TA). The tribological behavior of extruded billet and tapers die were compared and analyzed accordingly. The findings were concluded as follows:

1) Textured taper dies (TA) may decrease the extrusion load of cold extrusion process. Textured surface indentation on tapers die sliding contact surface would prevent metal to metal contact between billet and a taper die. It also produced lower friction and wear. Nevertheless, friction also has an advantage which it may lead to better surface roughness. It could be due to that lubricant with thin thickness tends to produce more contact between sliding surface, and yet resulting in finer

surface along the contact area.

2) Debris entrapped inside the textured holes does not give high influence towards the performance of metal forming product. No severe wear was observed which may lead to other material failures such as crack, fracture and fatigue.

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KEBERKESANAN FESTIVAL LAYANG-LAYANG SEDUNIA KALI-21 SEBAGAI PENGUKUHAN DOMAIN PEMBELAJARAN BAGI PROGRAM PENGURUAN ACARA DI POLITEKNIK IBRAHIM SULTAN

M.C. Nyi Imas [1], M. Nurulizati [2]

[123]Jabatan Pelancongan dan Hospitaliti, Politeknik Ibrahim Sultan, 81700 Johor, Malaysia

Abstrak: Kajian ini bertujuan untuk mengukur tahap penguasaan Domain Pembelajaran (Learning Domain) graduan Program Penguruan Acara Politeknik Ibrahim Sultan menerusi platfom penganjuran Majlis Taklimat Bersama Peserta Antarabangsa, Festival Layang-Layang Sedunia Pasir Gudang Kali Ke-2. Isu kemahiran insaniah (soft skill) di kalangan graduan pusat pengajian tinggi tempatan sering dibincangkan memandangkan 25% graduan yang menganggur kini adalah disebabkan kurangnya penguasaan dalam kemahiran insaniah. Penguasaan kemahiran insaniah yang baik selain daripada pencapaian akademik yang cemerlang akan membuka peluang pekerjaan yang lebih luas selain dapat menonjolkan diri mereka sebagai calon modal insan yang berkaliber dan fleksibel. Ia juga merupakan salah satu nilai tambah (value added) yang dicari oleh bakal majikan memandangkan persaingan yang sengit dalam pemburuan pekerjaan masa kini. Objektif kajian ini pula akan mengenalpasti tahap penguasaan graduan dalam (i) Kemahiran Komunikasi (LD3), (ii) Kemahiran Pemikiran Kritis & Penyelesaian Masalah (LD4), (iii) Kemahiran Kepimpinan Dan Kerja Berpasukan (LD9) yang dirasakan berupaya untuk menerapkan kemahiran insaniah dalam diri graduan. Objektif kajian adalah mengukur tahap pengukuhan Domain Pembelajaran graduan dan menganalisa tahap kemahiran graduan dari segi ketiga-tiga aspek tersebut dalam sistem pendidikan Politeknik Malaysia. Bagi mencapai objektif kajian, metodologi kajian yang digunakan adalah berbentuk kuantitatif menggunakan perisian SPSS dengan mengedarkan borang kaji selidik kepada responden. Responden kajian pula adalah terdiri daripada 24 orang graduan Diploma Pengurusan Acara semester 4 yang merupakan jawatankuasa pengendali Majlis Taklimat Bersama Peserta Antarabangsa, Festival Layang-Layang Sedunia Pasir Gudang Kali Ke-21. Majlis Taklimat Bersama Peserta Antarabangsa, Festival Layang-Layang Sedunia Pasir Gudang Kali Ke-21 ini dipilih dalam kajian ini disebabkan ia merupakan acara pertama yang dianjurkan oleh graduan semester 4 bersama pihak luar Politeknik Ibrahim Sultan. Hasil kajian mendapati tahap penguasaan ketiga-tiga dominan pembelajaran adalah berada ditahap yang tinggi dengan dengan majoriti pelajar mendapat skore Setuju (S) dan Sangat Setuju (SS) bagi setiap pernyataan yang diberi.

Kata kunci: Domain Pembelajaran, Kemahiran Komunikasi (LD3), Kemahiran Pemikiran Kritis Dan Penyelesaian Masalah (LD4), Kemahiran Kepimpinan Dan Kerja Berpasukan (LD9), kemahiran insaniah (soft skill), Program Diploma Pengurusan Acara, Majlis Taklimat Bersama Peserta Antarabangsa, Festival Layang-Layang Sedunia Pasir Gudang Kali Ke-21

Pengenalan

Kurangnya kajian yang berkaitan dengan pengukuhan dan penguasaan Domain Pembelajaran (LD) bagi program-program di bawah naungan sistem pendidikan Politeknik Malaysia merupakan salah satu faktor pencetus kepada kajian ini. Domain Pembelajaran adalah satu proses pembelajaran menyeluruh yang merangkumi tiga ciri-ciri utama iaitu kognitif, afektif dan psikomotor.

Domain Pembelajaran juga menjadi penanda aras untuk membolehkan seseorang pelajar itu bukan sahaja memperolehi ilmu pengetahuan malah juga berkemahiran insaniah (soft skill). Kajian ini memfokuskan kepada tiga Domain Pembelajaran Afektif sahaja iaitu Kemahiran berkomunikasi (LD3), Kemahiran Pemikiran Kritis Dan Penyelesaian Masalah (LD4) dan Kemahiran Kepimpinan Dan Kerja Berpasukan (LD9).

Majlis Taklimat Bersama Peserta Antarabangsa, Festival Layang-Layang Sedunia Pasir Gudang Kali Ke-21 merupakan satu acara yang dilaksanakan dengan kerjasama sekreteriat Festival Layang-Layang Sedunia Pasir Gudang dibawah naungan Majlis Perbandaran Pasir Gudang. Acara ini diadakan bertujuan untuk menyediakan satu platform taklimat kepada peserta antarabangsa berkaitan perjalanan Festival Layang-Layang Sedunia Pasir Gudang yang berlangsung selama lima hari. Hasil perbincangan diantara pihak Politeknik Ibrahim Sultan dan Majlis Perbandaran Pasir Gudang, sekreteriat Majlis Taklimat Bersama Peserta Antarabangsa, Festival Layang-Layang Sedunia Pasir Gudang Kali Ke-21 bersetuju untuk memberi peluang kepada graduan Pengurusan Acara untuk menguruskan dan mengendalikan majlis taklimat tersebut. Proses yang melibatkan perancangan, pembahagian tugas, merekabentuk konsep dan tema serta perlaksanaan majlis telah diangkat sebagai satu proses penilaian domain pembelajaran. Manakala domain pembelajaran yang dikaji adalah Kemahiran Komunikasi (LD3), Kemahiran Pemikiran Kritis Dan Penyelesaian Masalah (LD4), Kemahiran Kepimpinan Dan Kerja Berpasukan (LD9).

Tujuan kajian

Kajian ini adalah bertujuan untuk mengkaji pengukuhan domain pembelajaran graduan Program Diploma Pengurusan Acara, Politeknik Ibrahim Sultan menerusi penganjuran Majlis Taklimat Bersama Peserta Antarabangsa, Festival Layang-Layang Sedunia Pasir Gudang Kali Ke-21. Hanya 3 domain pembelajaran sahaja yang akan diukur dalam kajian ini iaitu Kemahiran berkomunikasi (LD3), Kemahiran Pemikiran Kritis Dan Penyelesaian Masalah (LD4) dan Kemahiran Kepimpinan Dan Kerja Berpasukan (LD9).

Objektif kajian

i. Mengkaji tahap pengukuhan Domain Pembelajaran graduan Program Pengurusan Acara, Politeknik Ibrahim Sultan menerusi penganjuran Majlis Taklimat Bersama Peserta Antarabangsa, Festival Layang-Layang Sedunia Pasir Gudang Kali Ke-21.

ii.Menganalisa tahap kemahiran graduan dari segi aspek Kemahiran Komunikasi (LD3), Kemahiran Pemikiran Kritis Dan Penyelesaian Masalah (LD4), Kemahiran Kepimpinan Dan Kerja Berpasukan (LD9).

Persoalan kajian

Untuk menyokong objektif yang telah digariskan, berikut adalah persoalan kajian bagi memberi

panduan terhadap pelaksanaan objektif-objektif tersebut:

i.Bagaimanakah tahap pengukuhan Domain Pembelajaran graduan menerusi platfom penganjuran Majlis Taklimat Bersama Peserta Antarabangsa, Festival Layang-Layang Sedunia Pasir Gudang Kali Ke-21?

ii.Apakah graduan Diploma Pengurusan Acara benar-benar menguasai Kemahiran Komunikasi (LD3), Kemahiran Pemikiran Kritis Dan Penyelesaian Masalah (LD4), Kemahiran Kepimpinan Dan Kerja Berpasukan (LD9) menerusi majlis tersebut.

Metodologi Kajian

Bagi mencapai objektif kajian, kaedah yang digunakan adalah berbentuk kuantitatif dengan mengedarkan borang kaji selidik kepada responden. Eisner (1979) menjelaskan kaedah kuantitatif menitikberatkan proses akibat dan keseluruhan yang tersusun dan bukannya pembolehubah bebas yang mementingkan maksud dan bukan juga statistik berkaitan tingkahlaku (behavioral). Kaedah kuantitatif lebih berminat pada kesimpulan yang berdasarkan konteks yang berpotensi mewujudkan polisi baru dan keputusan yang berbentuk kependidikan. Manakala responden dalam kajian ini adalah terdiri daripada graduan Diploma Pengurusan Acara semester 4 yang merupakan jawatankuasa pengendali Majlis Taklimat Bersama Peserta Antarabangsa, Festival Layang-Layang Sedunia Pasir Gudang Kali Ke-21. Saiz sampel yang diambil adalah berdasarkan jumlah keseluruhan pelajar semester 4 iaitu seramai 24 orang. Kajian ini menggunakan borang soal selidik sebagai instrumen kajian utama. Borang soal selidik yang digunakan terbahagi kepada dua bahagian iaitu, bahagian A yang merangkumi profil responden dan bahagian B yang merangkumi pernyataan domain pembelajaran Kemahiran berkomunikasi (LD3), Kemahiran Pemikiran Kritis Dan Penyelesaian Masalah (LD4) dan Kemahiran Kepimpinan Dan Kerja Berpasukan (LD9).

Dapatan Kajian

Seramai 26 responden yang terdiri daripada graduan Diploma Pengurusan Acara semester 4 yang mengendalikan Majlis Taklimat Bersama Peserta Antarabangsa, Festival Layang-Layang Sedunia Pasir Gudang Kali Ke-21 yang telah melengkapkan borang soal selidik yang diedarkan. Daripada jumlah tersebut 74 peratus adalah terdiri daripada perempuan manakala selebihnya 26 peratus lagi adalah lelaki. Kesemua responden adalah berumur 20 tahun. Ini disebabkan kesemua responden berada dalam kelas dan semester yang sama.

3.1 Kemahiran Komunikasi (LD3)

Jadual 1: Peratusan – Kemahiran Komunikasi (LD3)

Bil	Item/Penyataan	STS (%)	TS (%)	TP (%)	S (%)	SS (%)
1.	Saya boleh menyampaikan pendapat dan idea saya dengan yakin sama ada dalam bentuk percakapan atau penulisan.	0	0	7	42	51
2.	Saya boleh menjadi pendengar yang baik dan dapat memberi respon yang baik terhadap apa yang disampaikan.	0	0	0	43	57
3.	Saya boleh menyampaikan pembentangan (presentation) dengan jelas dan penuh yakin.	0	0	7	53	40
4.	Saya boleh berkomunikasi dengan mereka yang terdiri dari latarbelakang dan budaya yang berbeza.	0	0	0	38	62
5.	Saya boleh bertolak ansur dalam mencari keputusan terbaik utk program ini.	0	0	0	38	62

* ST = Sangat Tidak Setuju, TS = Tidak Setuju, TP = Tidak Pasti, S = Setuju, SS = Sangat Setuju

Daripada dapatan yang diperolehi memperlihatkan peratusan tahap Pengukuhan Untuk Kemahiran Komunikasi (LD3) adalah tercapai dimana secara keseluruhan responden bersetuju dengan setiap pernyataan yang berkaitan dengan kemahiran berkomunikasi. Dengan skor melebihi 50 peratus majoriti responden memilih Sangat Setuju (SS) dengan pernyataan nombor 1, 2, 4 dan 5. Manakala pernyataan nombor 3 yang berkaitan dengan kebolehan pelajar menyampaikan pembentangan dengan jelas dan penuh yakin, majoriti responden memilih Setuju (S) sahaja iaitu sebanyak 53 peratus manakala 38 peratus Sangat Setuju (SS) dan 7 peratus Tidak Pasti (TP).

3.2 Kemahiran Pemikiran Kritis Dan Penyelesaian Masalah (LD4)

Jadual 2: Peratusan – Kemahiran Pemikiran Kritis Dan Penyelesaian Masalah (LD4)

Bil	Item/Penyataan	STS (%)	TS (%)	TP (%)	S (%)	SS (%)
1	Melalui kerja kumpulan ini saya boleh meningkatkan kemahiran berfikir dalam menjelaskan, menganalisa dan menilai sebarang masalah yang timbul dan mencari jalan penyelesaian kepada permasalahan tersebut.	0	0	0	31	69
2	Saya boleh memberi idea dan alternatif dalam menyelesaikan tugas yang diberi.	0	0	0	47	53
3	Saya boleh berfikir diluar kotak *(think out of the box)*.	0	0	11	42	47
4	Saya boleh menumpukan sepenuh perhatian dan komitmen kepada tugas yang diberikan.	0	0	0	31	69
5.	Saya boleh memahami dan menyesuaikan diri terhadap jaringan kerja dan persekitaran kerja yang diberi.	0	0	0	35	65

* ST = Sangat Tidak Setuju, TS = Tidak Setuju, TP = Tidak Pasti, S = Setuju, SS = Sangat Setuju

Peratusan bagi Kemahiran Pemikiran Kritis Dan Penyelesaian Masalah (LD4), pernyataan nombor 1, 2, 4 dan 5 menunjukkan majoriti responden Sangat Setuju (SS) dengan pernyataan Kemahiran Pemikiran Kritis Dan Penyelesaian Masalah. Pernyataan nombor 1 dan 4 menunjukkan peratusan Sangat Setuju (SS) paling tinggi. Responden sangat bersetuju dengan pernyataan melalui kerja kumpulan boleh meningkatkan kemahiran berfikir dalam menjelaskan, menganalisa dan menilai sebarang masalah yang timbul dan mencari jalan penyelesaian kepada sebarang permasalahan yang timbul dan responden juga dapat menumpukan sepenuh perhatian dan komitmen kepada tugas yang diberikan. Manakala bagi pernyataan nombor 3 yang menyatakan tentang pefikiran diluar kotak pula, terdapat segelintir responden (11%) yang menyatakan tidak pasti (TP) berkenaan pernyataan ini.

3.3 Kemahiran Kepimpinan Dan Kerja Berpasukan (LD9).

Jadual 2: Peratusan – Kemahiran Kepimpinan Dan Kerja Berpasukan (LD9)

Bil	Item/Penyataan	STS (%)	TS (%)	TP (%)	S (%)	SS (%)
1.	Saya boleh mengetuai tugasan yang diberikan.	0	0	3	42	55
2.	Saya boleh menyelia tugas rakan-rakan saya.	0	0	3	46	51
3.	Peranan saya sebagai ketua atau ahli biasa dapat dilaksanakan dengan baik mengikut keperluan dan situasi semasa.	0	0	3	47	50
4.	Saya boleh memberikan bekerjasama yang baik dalam menyelesaikan kerja kumpulan yang diberikan.	0	0	4	43	53
5.	Saya boleh berinteraksi dan menjalin hubungan yang baik dengan rakan sekumpulan dalam mencapai matlamat program ini.	0	0	0	50	50
6.	Saya boleh menghormati perbezaan pendapat, pendirian dan sikap rakan sekumpulan saya.	0	0	0	24	76
7.	Saya boleh melibatkan diri dalam perancangan dan pengendalian kerja kumpulan	0	0	0	36	64

* ST = Sangat Tidak Setuju, TS = Tidak Setuju, TP = Tidak Pasti, S = Setuju, SS = Sangat Setuju

Bagi pernyataan yang berkaitan dengan Kemahiran Kepimpinan Dan Kerja Berpasukan (LD9), majoriti responden memilih Sangat Setuju (SS) bagi semua pernyataan yang diberikan. Peratusan tertinggi adalah pernyataan nombor 6 iaitu "Saya boleh menghormati perbezaan pendapat, pendirian dan sikap rakan sekumpulan saya" iaitu sebanyak 76 peratus dimana majoriti responden Sangat Setuju (SS) dengan pernyataan ini. Manakala pernyataan yang agak rendah peratusannya adalah bagi kenyataan nombor 3 iaitu "Peranan saya sebagai ketua atau ahli biasa dapat dilaksanakan dengan baik mengikut keperluan dan situasi semasa" dengan skor sebanyak 50 peratus Sangat Setuju (SS), 47 peratus Setuju (S) dan 3 peratus Tidak Pasti (TP).

Kesimpulan

Kesimpulan yang boleh dibuat dari kajian ini adalah graduan Program Pengurusan Acara dapat menguasai dengan baik ketiga-tiga Domain Pembelajaran yang diukur iaitu Kemahiran berkomunikasi (LD3), Kemahiran Pemikiran Kritis Dan Penyelesaian Masalah (LD4) dan Kemahiran Kepimpinan Dan Kerja Berpasukan (LD9). Bagi setiap pernyataan yang diberikan majoriti skore yang diperolehi bagi ketiga-tiga Domain Pembelajaran adalah Setuju (S) dan Sangat Setuju (SS). Walaubagaimanapun sekiranya ada pernyataan yang perlu dibincangkan semula adalah pernyataan "Saya boleh berfikir diluar kotak (think out of the box)" dibawah pernyataan Kemahiran Pemikiran Kritis Dan Penyelesaian Masalah (LD4). Peratusan Kurang Pasti (TP) agak tinggi (11%) bagi pernyataan ini berbanding pernyatan-pernyataan lain. Secara keseluruhannya adalah satu

permulaan yang baik bagi Program Pengurusan Acara yang boleh dikategorikan sebagai program baru (dilancarkan pada tahun 2014) dalam sistem pendidikan Politeknik Malaysia kerana hasilan dapatan yang menunjukkan para graduan dapat menguasai dengan baik ketiga-tiga domain pembelajaran tersebut. Memandangkan limitasi kajian ini hanya memfokuskan kepada tiga domain pembelajaran sahaja, diharapkan pada masa akan datang akan ada kajian yang lebih menyeluruh terhadap kesemua domain-domain pembelajaran yang lain dan akan melibatkan semua pelajar semester akhir Politeknik Ibrahim sultan.

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Title: To Study the Effect of the Cooling Media Process on Fatigue Surface Patterns

Muda Ibrahim1,
School of Mechanical Engineering, Polytechnic Ibrahim Sultan
Email: 1mudaking@yahoo.com

Mohd Norazizul Fadli2
School of Mechanical Engineering, Polytechnic Ibrahim Sultan
Email: 2m.norazizulfadli@gmail.com

Abstract: The high demands regarding service life of transmission components in many applications can be reached only by the application of a customized hardening process. Since the fatigue life is closely related to the condition of surface, so it is important to study the effect of cooling media in quenching process on fatigue life of a component. A comprehensive study is conducted to determine the effect of hardening process on fatigue life of medium carbon steel grade S45C (AISI 1045) which chemical compositions are 0.45 % carbon, 0.65% manganese and silicon 0.25%. The heat treatment process was done by using Electric furnaces which temperature can be varies between 30 to 1300 ºC with a capacity of 20 litres. The experiment was conducted with the used of five different cooling media which were ice water , water, brine 10%, palm oil, and SAE 40 engine oil. Surface patterns were determined by fracture patterns and failure modes. The fracture patterns of a fatigue failure at specimen B, W and A can be categories into the fast-fracture zone, as the fracture surface is flat. Therefore, a fatigue failure appearance of specimen S and P are similar to a brittle and ductile fracture arising from the three stages (fracture surfaces are flat and rough). The failures modes for fracture surfaces obtained from SEM showed the fracture surface of specimens B, W and A. It contains a flat morphology fracture, which can be categorized as brittle fractures. For specimens S and P that have been quenched into cooling media from oil-based family is found to suffer from ductile and brittle fracture.

Keywords: Surface patterns, Fracture patterns, Failure modes

Introduction

The high demands regarding service life of transmission components in many applications can be reached only by the application of a customized hardening process. This hardening process results in a wear resistant surface-layer in combination with a tough core of the component. It has been seen that from past experience fatigue life depends on heat treatment and surface finish. Fatigue failure occurs under conditions of repeated variable dynamic loading, because it is generally observed that these failures occur only after a considerable period of service. Since the fatigue life is closely related to the condition of the surface, so it is important to study the effect of cooling media in the quenching process on fatigue life of a component.

Literature Review

Introduction

Firstly, the literature review will start with the introduction of carbon steel and follow by information about medium carbon steel including some example of it. Then, followed by the explanation on the effect of heating temperature in producing the medium carbon steel. In addition the effect on the fatigue life, microstructure changes, the strength and also the hardness properties will be discussed.

Carbon Steel

Krauss (1980) found that, properties of carbon steels always are classified into two categories. Firstly, low carbon steels for this contain up to 0.29 wt. % C. It has low tensile strength but it is cheap and malleable. Secondly, the medium carbon steels for this contain about 0.3-0.6 wt. % C. It has a good wear resistance and balances ductility and strength. Lastly at high carbon steels for this approximately contain 0.61-1.4 wt. % C and considered as very strong steel.
Medium carbon steel for the carbon concentration between 0.3-0.6 wt. % C, it's called medium carbon steel. In improving their mechanical properties these steels can be treated by heating austenitic, quenching and tempering. Medium carbon steel has low hardenability known as plain medium carbon steel. These steels can successfully heat treated in very thin section and with very rapid quenching rates. In addition, others alloying elements like chromium, nickel and molybdenum, giving high property to a variety of strength ductility combinations. These heat-treated alloys are stronger than the low-carbon steels but low in ductility and toughness (Callister, 2003).
The transformation temperatures indicate the points at which the structure becomes an unstable form and begins to undergo a transformation to a different crystalline structure. It can be seen that carbon steels, with a typical maximum carbon content of less than 0.35% for pressure containing applications, will have a transformation temperature range that will vary with the carbon content and the rate of heating or cooling (Linnert, 1994).

Heat Treatment

Classic quench & temper heat treatments require that steels are fully austenitic and are subsequently quenched at a rapid enough rate to obtain fully martensitic structures. The critical cooling rate to avoid the "pearlite nose" of the austenite transformation diagram depends on the hardenability of the alloy being quenched. The hardenability of an alloy is based on its chemical composition and can be readily calculated. Fewer hardenability alloys require more rapid cooling to obtain martensitic (Totten et. al., 1993).

More recently American Society of Mechanical Engineers, (2004) has issued guidelines for quench hardening is often used prior to a tempering heat treatment. It is defined as "hardening a steel object by austenitic it and then cooling it rapidly enough that some or all the austenite transforms to martensitic". Quench hardening is normally the first step in a heat treatment that would then include a tempering heat treatment. The martensitic steel is excessively hard and strong with characteristic low toughness, so the tempering treatment is used to recover some of the more

desirable properties. The carbon steel material is typically heated to 1500–1600ºF (815–870ºC) and quenched in a medium selected to cause the desired cooling rate.

Quench Medium (Cooling Media)

A 10% solution of brine is usually an effective quench. The relationship of brine concentration of hardness is shown in (Figure 2.1) and the numbers of specimens are 1 to 10. Small variations in quench temperature will not greatly affect the cooling rate of the system. A temperature of 20oC (68oF) assures maximum effectiveness of cooling.

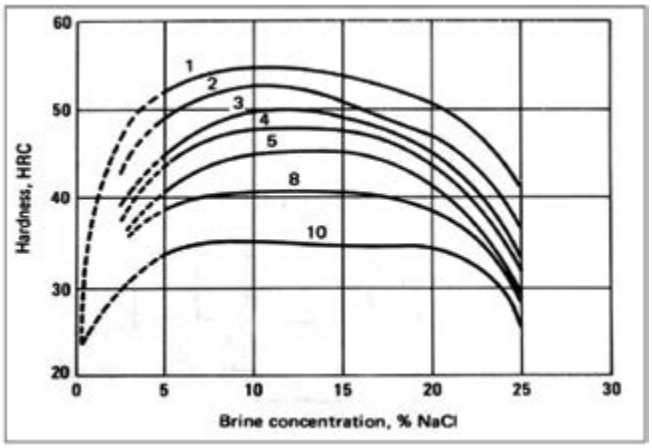

Figure 2.1 Relation of hardness to brine concentration when still quenching end quench specimens 90°C brine solution (Stanley, 2010).

Water quenching is the most common of induction quench. Cold water is one of the most severe of the quench and rapid agitation allows it to approach the maximum capabilities of the liquid quench. If the temperature of the water is allowed to increase, its capabilities for reducing the vapor phase drops and the cooling rate will also decrease at a rapid rate. Water quench temperatures should be in the range of 15-25 °C as shown in (Figure 2.2). To maintain adequate cooling provide agitation of the fluid to create a velocity in the order of 0.25 m/s.

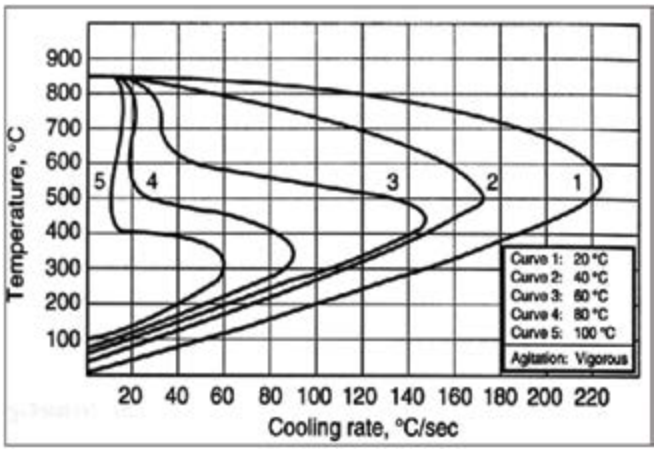

Figure 2.2 Effect of temperature on quenching properties of water (Stanley, 2010).

Oils are characterized by quenching speed and operating temperature among other factors. Oils range from normal speed for quenching high hardenability steels to high speed for steels with low hardenability (Figure 2.3). A major factor in selection of oils is the flash point or temperature at which the oil vapours will ignite if an ignition source is present. Ignition occurs if the part is not quenched rapidly or if the oil does not remove heat fast enough. Rapid agitation of the oil together with an adequate cooling means in the quench tank is necessary to reduce the possibility of fire. A major factor in selection of oils is the flash point or temperature at which the oil vapours will ignite if an ignition source is present. Ignition occurs if the part is not quenched rapidly or if the oil does not remove heat fast enough. Rapid agitation of the oil together with an adequate cooling means in the quench tank is necessary to reduce the possibility of fire.

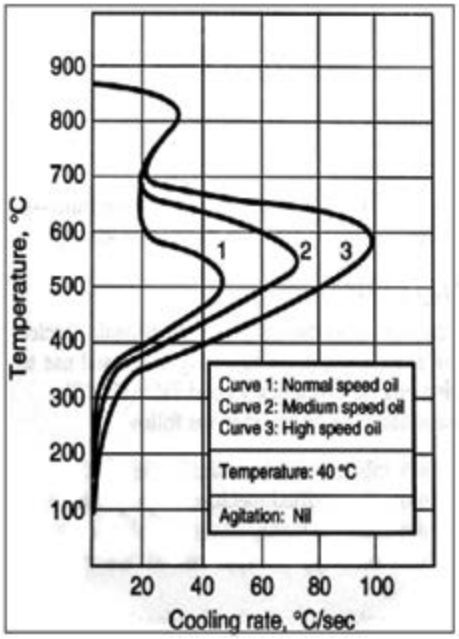

Figure 2.3 Cooling rate curves for quenching oils (Stanley, 2010).

Fatigue Life

Nasr et al. (2010) states that, the defect induces a significant degradation of the fatigue strength near the high cycle fatigue number between 106 and 107 cycles. A significant decrease of the defective material fatigue limit is observed for both loadings. However for a limited number of cycles between 105 and 106 cycles, it is observed that the material is less influenced by the defect. Marin (1962) claims that the endurance limit modifying factors has seen that the rotating-beam specimen used in the laboratory to determine endurance limits is prepared very carefully and tested under closely controlled conditions. It is unrealistic to expect the endurance limit of a mechanical or structural member to match the values obtained in the laboratory. Some differences include:

- Material: composition, basis of failure, variability.
- Manufacturing: method, heat treatment, fretting corrosion, surface condition, stress Concentration.
- Environment: corrosion, temperature, stresses state, relaxation times.

• Design: size, shape, life, stress state, stress concentration, speed, fretting, galling.

Shigley and Mitchell (1983) claim that the three major fatigue life methods used in design and analysis are the stress-life method, the strain-life method, and the linear-elastic fracture mechanics method. These methods attempt to predict the life in the number of cycles to failure, N, for a specific level of loading. Life of 1 ≤ N ≤ 103 cycles are generally classified as low-cycle fatigue, whereas high-cycle fatigue is considered to be N > 103 cycles (Figure 2.4). The stress-life method, based on stress levels only, is the least accurate approach, especially for low-cycle applications. However, it is the most traditional method, since it is the easiest to implement for a wide range of design applications, has ample supporting data, and represents high-cycle applications adequately.

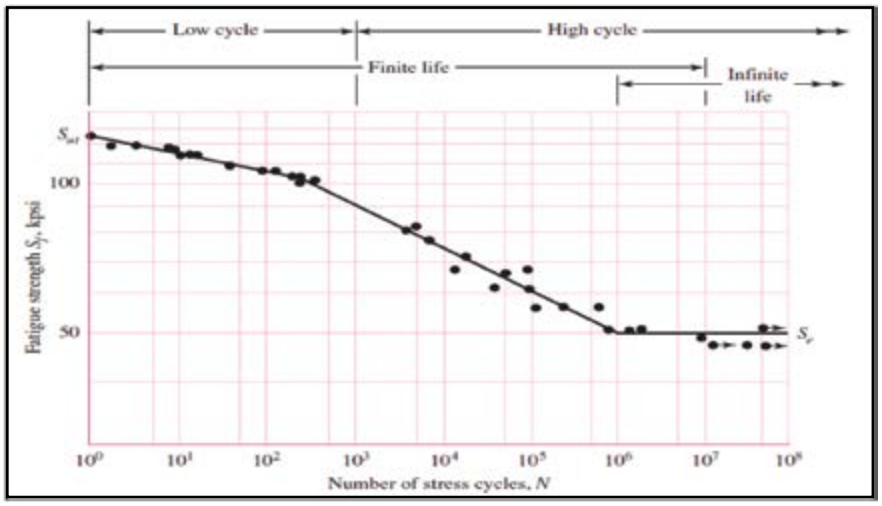

Figure 2.4 An S-N diagram plotted from the results of completely reversed axial fatigue tests.

Failure Modes

Calvo et. al. (2010) has written and demonstrates at fracture mechanisms and ductility at high temperatures of carbon steel and for picture of fracture modes on ductile surface are shown at Figure 2.5 below:

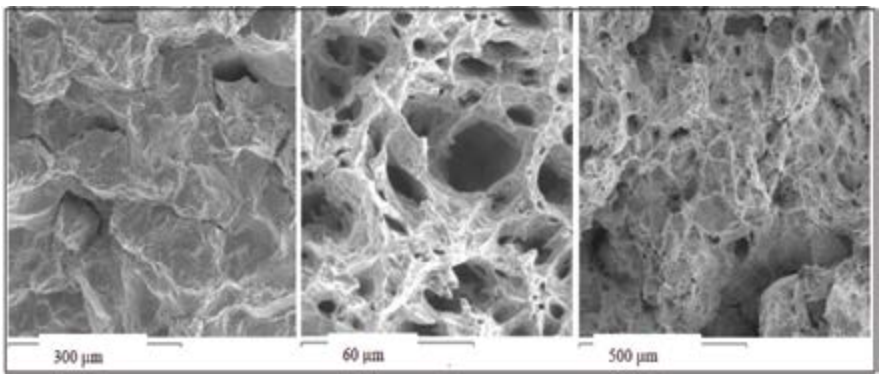

Figure 2.5 Ductile Fractures at high temperatures of carbon steel (Calvo et. al., 2010)

Analysis of the fracture surface of the hook was carried out in detail by scanning electron microscopy (SEM). Figure 2.6 presents images of the fracture surface, where clear and characteristic features of the brittle fracture can be observed – cleave, trans granular fracture, and secondary cracks.

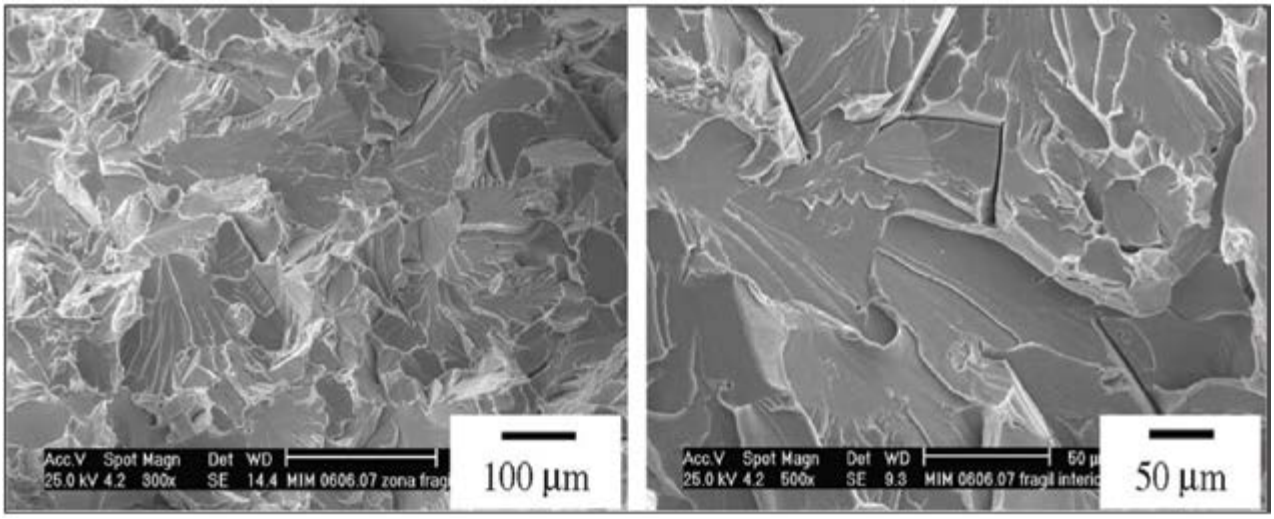

Figure 2.6 Brittle fracture: presence of cleavage, transgranular fracture, and secondary cracks (Torres et. al., 2010)

The investigation at high cycle fatigue and failure modes of carburized steel to analysis of the fracture surface shows a combination of fracture mechanisms, i.e. Brittle fracture is observed in the hard layer (Figure 2.7) and ductile fracture is observed in specimen core (Figure 2.8) (Farfa'n et. al.,2004).

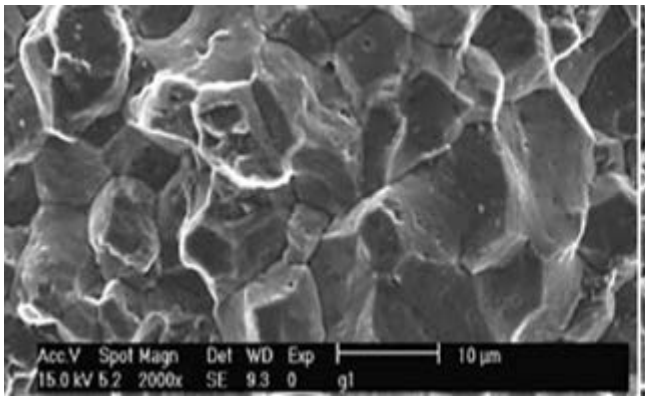

Figure 2.7 Brittle fracture surfaces

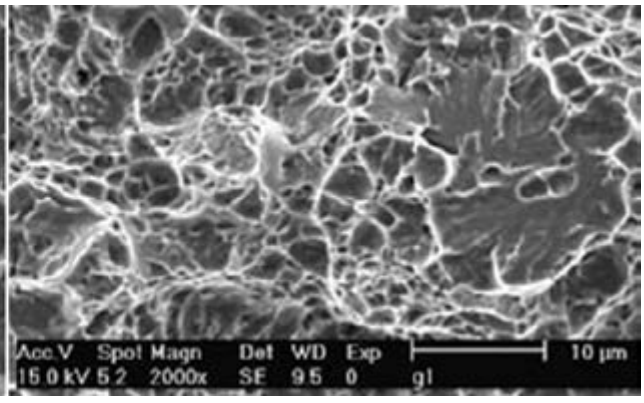

Figure 2.8 Ductile fracture surfaces

Fracture Patterns

There is a good deal to be learned from the fracture patterns of a fatigue failure at (Figure 2.9) shows representations of failure surfaces of various part geometries under differing load conditions

and levels of stress concentration. Note that, in the case of rotational bending, even the direction of rotation influences the failure pattern.

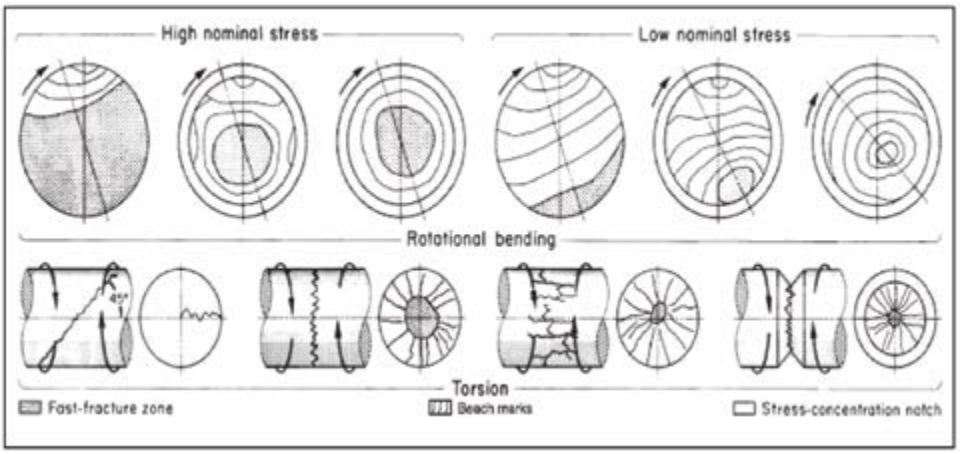

Figure 2.9 Schematics of fatigue fracture surfaces (Shigley and Mitchell, 1983).

A fatigue failure has an appearance similar to a brittle fracture, as the fracture surfaces are flat and perpendicular to the stress axis with the absence of necking. The fracture features of a fatigue failure, however, are quite different from a static brittle fracture arising from three stages of development. Stage I is the initiation of one or more micro cracks due to cyclic plastic deformation followed by crystallographic propagation extending from two to five grains about the origin. Stage I cracks are not normally discernible to the naked eye. Stage II progresses from micro cracks to macro cracks forming parallel plateau-like fracture surfaces separated by longitudinal ridges. The plateaus are generally smooth and normal to the direction of maximum tensile stress. These surfaces can be wavy dark and light bands referred to as beach marks or clamshell marks, as seen in (Figure 2.10). During cyclic loading, these cracked surfaces open and close, rubbing together, and the beach mark appearance depends on the changes in the level or frequency of loading and the corrosive nature of the environment. Stage III occurs during the final stress cycle when the remaining material cannot support the loads, resulting in a sudden and fast fracture. A stage III fracture can be brittle, ductile, or a combination of both. Quite often the beach marks, if they exist, and possible patterns in the stage III fracture called chevron lines, point toward the origins of the initial cracks.

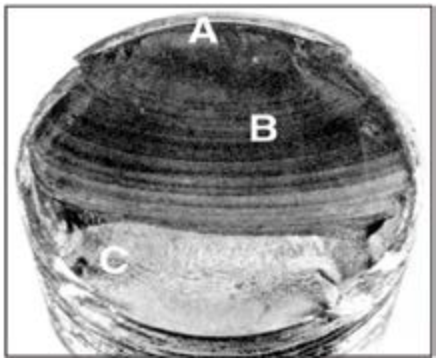

Figure 2.10 Fatigue failure of a bolt due to repeated unidirectional bending. The failure started at the thread root at A, propagated across most of the cross section shown by the beach marks at B,

before final fast fracture at C. (ASM Handbook, 1987)

Research Methodology

Introduction

A comprehensive study is conducted to determine the effect of hardening process on fatigue life of medium carbon steel.

Overview of the Methodology

The achievement of the objectives set forth requires the adherence to a well thought out methodology as outlined in the following:

a. Experimental design and planning.
b. Samples preparation.
c. Heat treatment process.
d. An experimental test which includes.
    i. Tensile test using Universal Testing Machine.
    ii. Fatigue tests.
    iii. Observation using the SEM.
e. Data analysis.
    i. Evaluation of the influence of various hardening media in terms of fatigue surface patterns.

Work Piece

Medium carbon steel grade S45C (AISI 1045) was used in this study. Chemical compositions are 0.45 % carbon, 0.65% manganese and 0.25% silicon. The mechanical properties of hardness are between 167 – 229 HB.

Research Approach

The experiment was conducted with the used of five different cooling media such as ice , water, brine 10%, palm oil, and SAE 40 engine oil. The heat treatment process was done by using Electric furnaces (Nabertherm furnaces) which temperature can be varied between 30 to 1300 ºC with a capacity of 20 litres.

Specimens Machination Process

The preparation of the test specimen for tensile and fatigue tests was conducted using the CNC machine. The cutting speed employed is 2500 rpm, with the feeding rate of 0.08 mm/min. The dimension measurement and the layout of the test specimens for the tensile test follow the ASTM A370 standard as described in **(Figure 3.1).** On the other hand, the test specimens for the fatigue test is in accordance with the dimension measurement **(Figure 3.2)** supplied by the instruments manual BRAND TERCO MODEL-MT3012-E.

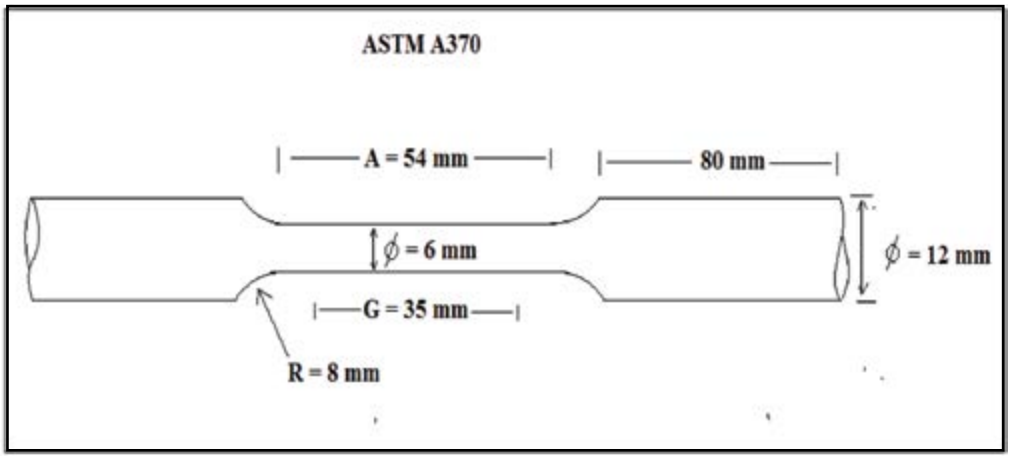

Figure 3.1 The dimension measurement of test specimen for tensile test.

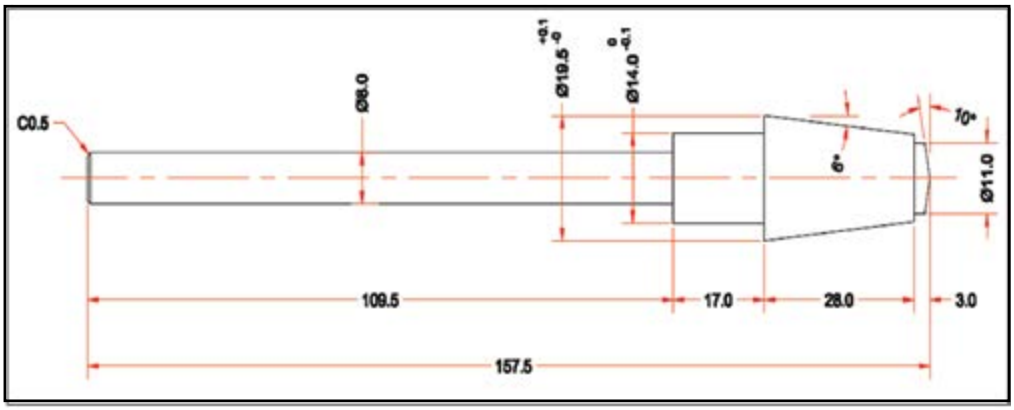

Figure 3.2 The dimension measurement of test specimen for fatigue test.

The Heat Treatment Process

The specimens that have been machined were individually subjected to the quenching process in five different cooling media. The process was carried out in the Metallurgy Laboratory A in Polytechnic Ibrahim Sultan. The cooling media were coded to ensure that the specimens can be differentiated after the quenching process (Table 3.1). The process was carried out at a temperature of 850 ºC and 30 minutes of soaking time. Electric furnaces (Nabertherm furnaces) are used to heat the specimens at the temperature of the furnaces varies between 30 to 1300 ºC with a capacity of 20 litres.

Table 3.1 Cooling media code and cooling temperature.

Code	Type of Cooling Media	Temperature Cooling Media	Capacity Media
A	Ice	0 °C	4 litres
W	Water	25 °C	4 litres
B	Brine 10%	25 °C	4 litres
P	Palm Oil	25 °C	4 litres
S	SAE 40 Oil	25 °C	4 litres

Fatigue Test

Fatigue test (rotating specimen) is conducted to analyse the fatigue behaviour of steel that has been subjected to cyclic loading. The values of the cycle load, N and the form of fatigue fracture (fracture surface) after specimens are fractured will be noted and analysed. The types of fracture will be classified to the fracture modes of the steel. The test is carried out using the BRAND-TERCO, MODEL-MT3012-E (Figure 3.3).

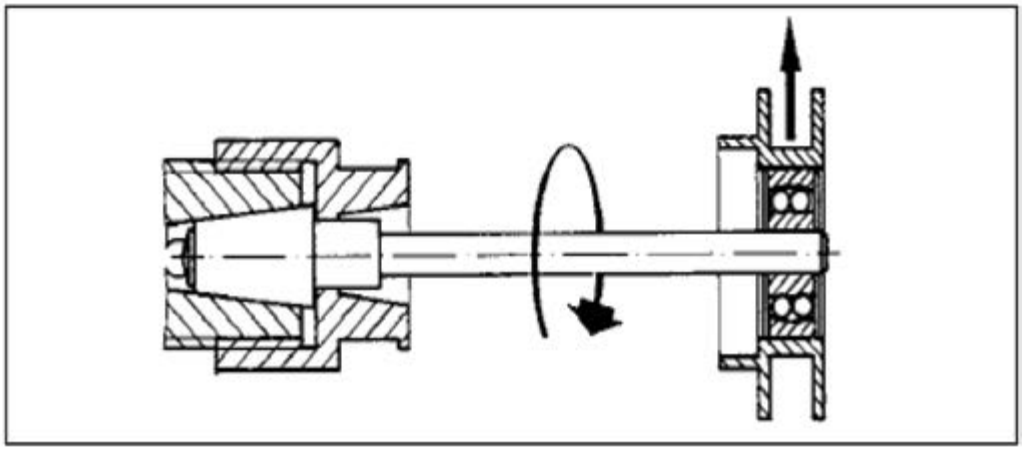

Figure 3.3 Working Principle

Results and Discussion

Introduction

This chapter explains the data obtained from the tensile test and the fatigue test. Data analysis is carried out to acquire results relevant to the tests, followed by a thorough description on how the test results are attained.

Tensile Test Result

The tensile test result is carried out to obtain the mechanical traits of the material, which are the Tensile Strength and the Young's Modulus (Table 4.1). The result is based on the grafts attained from the tensile tests that were carried out on five specimens using the Universal Testing Machine (INSTRON 600X). These grafts are available in the Appendix C2- C6.

Table 4.1 Tensile test result

Specimen	Tensile Strength (σ_u) ,(MPa)	Young's Modulus (*E*),(GPa)
Brine 10 % (B)	1245	209
SAE 40 engine oil (S)	1080	138
Water (W)	920	199
Palm Oil (P)	919	178
Ice 0°C (A)	199	-

From the tests that are carried out, it was found that the highest value which is 1245 MPa, for the tensile test was obtained from the specimen that has been quenched in brine 10%. This amount of strength is caused by the diffusion of the brine content into the specimen during the quenching process from 850 °C into a cooling medium that contains 10% at the temperature 25 °C.

On the other hand, the strength value of the specimen that has been quenched in ice has a value of 199 MPa, which is the lowest when compared to the strength values obtained from specimens that are quenched in brine 10%, water, SAE 40 engine oil and palm oil. The percentage of the different strength value between specimen A and specimen B is 84%, while with specimen W is 78%.

The reason behind the significant decline of strength values can be attributed to the heat treatment at the temperature of 850 °C and the quenching process in the ice at the temperature of 0°C. Tendency to brittle fracture is increased with decreasing temperature and specimen A becomes very brittle fracture because the movement of crack involves very little plastic deformation of the metal adjacent to the crack. Brittle fracture in crystalline materials usually occurs along characteristic crystallographic planes called cleavage planes. According to Khanna (2000), brittle fracture should be avoided at all costs, because it occurs without giving any prior warning and usually produces disastrous consequences. The phenomenon of brittle fracture is important, because it may occur at low temperatures, for examples in pressure vessels, bridges, ships, hulls end pipe lines.

Fatigue Test Result

Endurance of fatigue is very important to materials, especially to engineering components that are exposed to repetitive forces. Fatigue strength is calculated by carrying out tests on specimens using the BRAND-TERCO, MODEL-MT3012-E machine. It utilizes the maximum to minimum loads between 300 - 80 N (Table 4.2) that have been adjusted to the machine to determine the cycle values (failure).

Table 4.2 Fatigue test results.

BRINE 10% (B)			SAE 40 (S)			WATER (W)			PALM OIL (P)			ICE 0°C (A)		
LOAD (NEWTON)	STRESS AMPLITUDE (σa) (Mpa)	CYCLES (N)	LOAD (NEWTON)	STRESS AMPLITUDE (σa) (Mpa)	CYCLES (N)	LOAD (NEWTON)	STRESS AMPLITUDE (σa) (Mpa)	CYCLES (N)	LOAD (NEWTON)	STRESS AMPLITUDE (σa) (Mpa)	CYCLES (N)	LOAD (NEWTON)	STRESS AMPLITUDE (σa) (Mpa)	CYCLES (N)
300	600	663	300	600	985	300	600	552	300	600	758	300	600	468
250	500	20033	250	500	12234	250	500	6554	250	500	5834	250	500	2544
200	400	592213	225	450	37342	200	400	106581	200	400	66038	200	400	17545
175	350	1220012	175	350	503745	190	380	170034	190	380	100322	150	300	131302
165	330	3204405	160	320	965554	175	350	200354	175	350	190344	130	260	240026
			150	300	1178150	160	320	600456	160	320	538867	120	240	440023
			140	280	3002376	145	290	1234265	150	300	914993	110	220	651023
						135	270	3254432	140	280	1230056	100	200	850234
									130	260	3256448	90	180	1203761
												80	160	3022303

Microstructures

After the etching process with nital 2%, the specimen B (brine 10%), W (water) and A (ice) indicates a shiny surface, while the surface of the specimen S (SAE 40) and P (palm oil) are dim view (Figure 4.1).

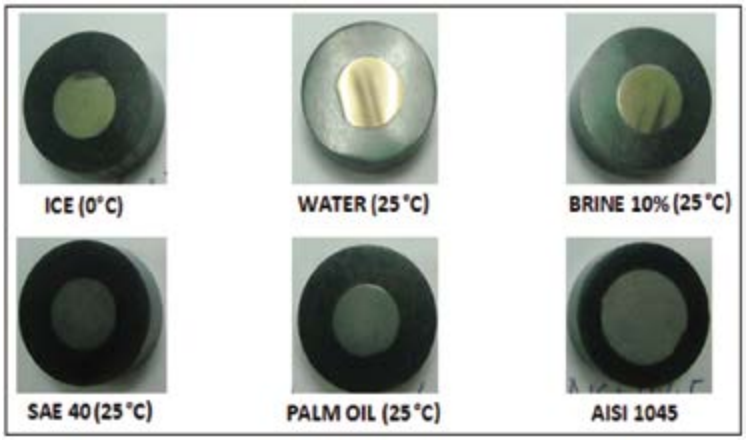

Figure 4.1 Mounting specimen

Microstructures that are formed for specimens B, W and A that have been quenched in cooling media from water-based family (brine 10 %, water and ice 0°C) turned into martensitic transformation microstructure (strong and brittle) and can be viewed in **(Figure 4.2).**

On the other hand, in specimens S and P, there is a miniscule amount of microstructure ferrite and perlite in the martensitic transformation microstructure. This can be seen in **(Figure 4.3).**

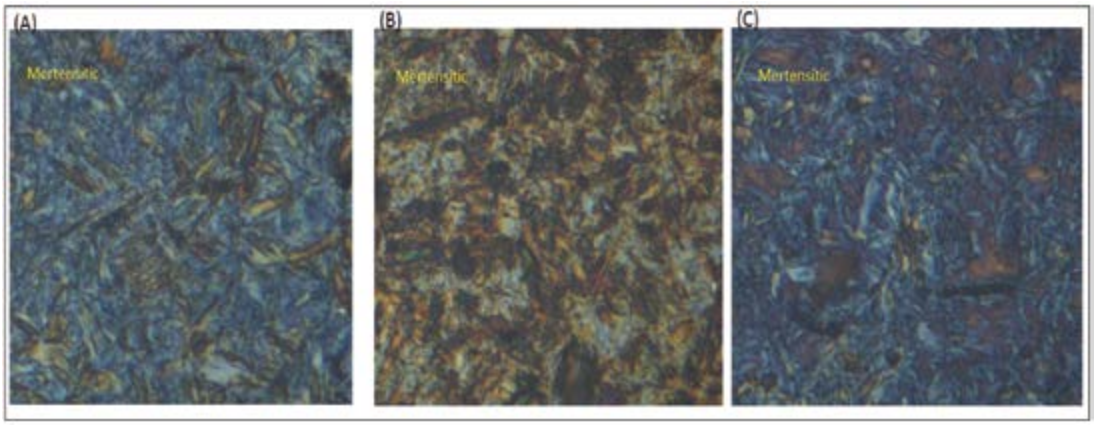

Figure 4.2 Optical micrograph (100X) of the specimens: (A) Specimen W shows a martensitic matrix; (B) Specimen B shows a martensitic matrix and (C) Specimen A showing martensitic matrix

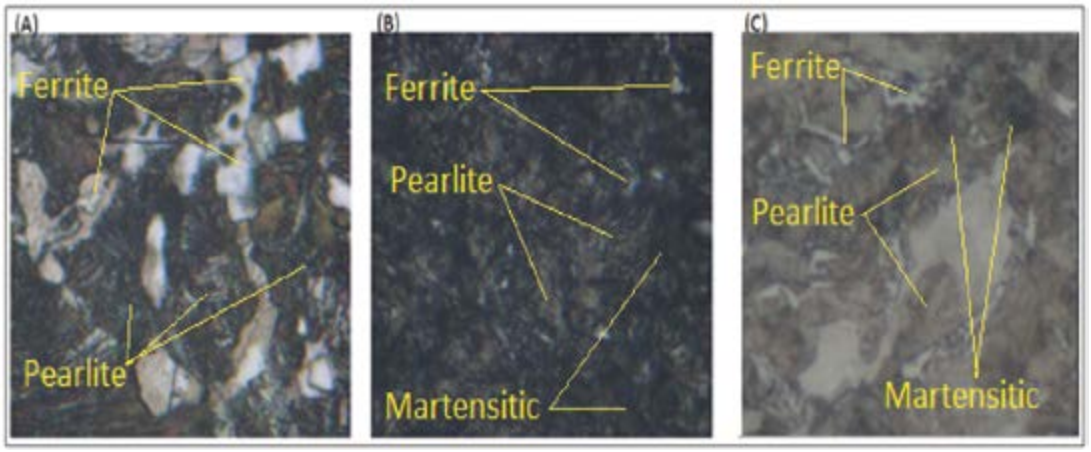

Figure 4.3 Optical micrograph (100X) of the specimens: (A) AISI 1045 ferrite (light) formed first at prior austenite grain boundaries and pearlite (lamellar) formed later in the remaining material; (B) Specimen P and (C) Specimen S.

Fracture Patterns (Fatigue Failure)

The fracture patterns of a fatigue failure at specimen B, W and A can be categories into the fast-fracture zone, as the fracture surface is flat (brittle failure) (Figure 4.4). Fracture failure can be categorized into three stages. Stage I is the initiation of one or more microcracks due to cyclic plastic deformation followed by crystallographic propagation extending from two to five grains about the origin. Stage I cracks are not normally discernible to the naked eye. Stage II progresses from microcracks to macrocracks forming parallel plateau-like fracture surfaces separated by longitudinal ridges. Stage III occurs during the final stress cycle when the remaining material cannot supported the loads, resulted in a sudden and fast fracture and this stage fracture can be brittle, ductile or a combination of both (ASM Handbook, 1987). Therefore, a fatigue failure appearance of specimen S and P are similar to a brittle and ductile fracture arising from the three stages (fracture surfaces are flat and rough) **(Figure 4.5).** Quite often the beach marks that exist and possible patterns in the stage III fracture is called chevron lines, point toward the origins of the initial cracks.

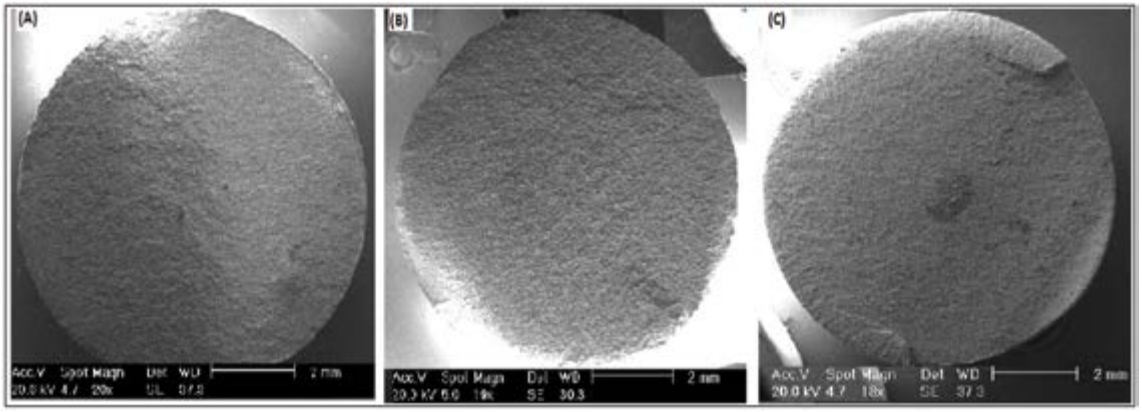

Figure 4.4 Fracture patterns at high cycle fatigue; (A) Specimen B; (B) Specimen W; (C) Specimen A

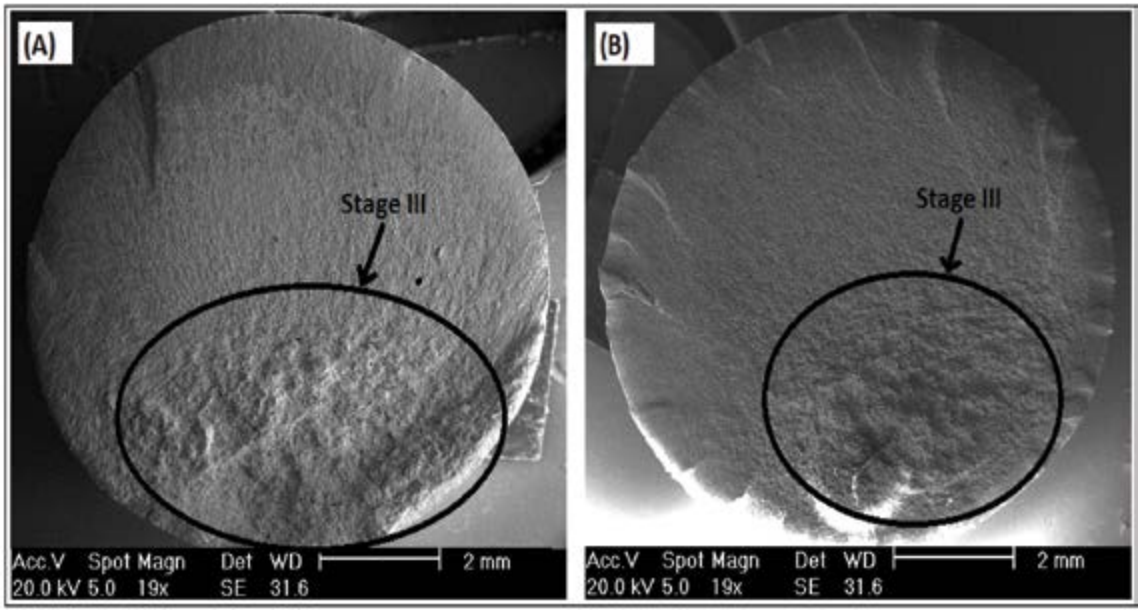

Figure 4.5 Fracture patterns at high cycle fatigue; (A) Specimen S; (B) Specimen P

Failure Modes

Anderson (1995), stated that fractured mechanism on metals usually occurs in three conditions, which are ductile fractures on alloys, cleavage and intergranular fracture. Cleavage fracture involves separation along the crystallographic planes, which leads to intergranular fracture. Intergranular fractures are cracks that take place along the grain boundary of a material. There are multiple processes that can lead to intergranular fracture:

i) Precipitation of a brittle phase on the grain boundary.
ii) Hydrogen embrittlement and liquid metal embrittlement.
iii) Environmental factors that accelerate the fracture process.
iv) Intergranular corrosion.
v) Grain boundary crack and cavity formation associated with elevated temperature.

From the scanning electron microscope (SEM) on the fractographs of fracture surfaces on high fatigue cycle test, intergranular fracture on brittle material and ductile fracture for ductile material are discovered. Intergranular fracture is caused by brittle cemented found on grain boundaries. On the other hand, ductile fracture is caused by nucleation, growth and microscopic cracks.

The fractographs for the fracture surfaces obtained from SEM showed the fracture surface of specimens B, W and A. It contains a flat morphology fracture, which can be categorized as brittle fractures. This has been stated by Sohar (2008), crack initiation revealed very flat morphology similar to brittle failure.

Therefore, this test discovers that intergranular fracture (brittle material) happens to specimen B, W and A, which have been quenched in cooling media from water-based family (brine 10%, water and ice 0°C). Specimen A is observed to contain the most significant intergranular fractures **(Figure 4.6)** and almost 50% of the fracture surface exhibits intergranular cracking (cleavage). Additionally, intergranular fracture is also present in specimens W and A and can be observed in **(Figure 4.7 and Figure 4.8)**

For specimens S and P that have been quenched into cooling media from oil-based family is found to suffer from ductile and brittle fracture. The fracture surface can be viewed at low cycle fatigue **(Figure 4.9)** and fracture surface at high cycle fatigue **(Figure 4.10 and 4.11).**

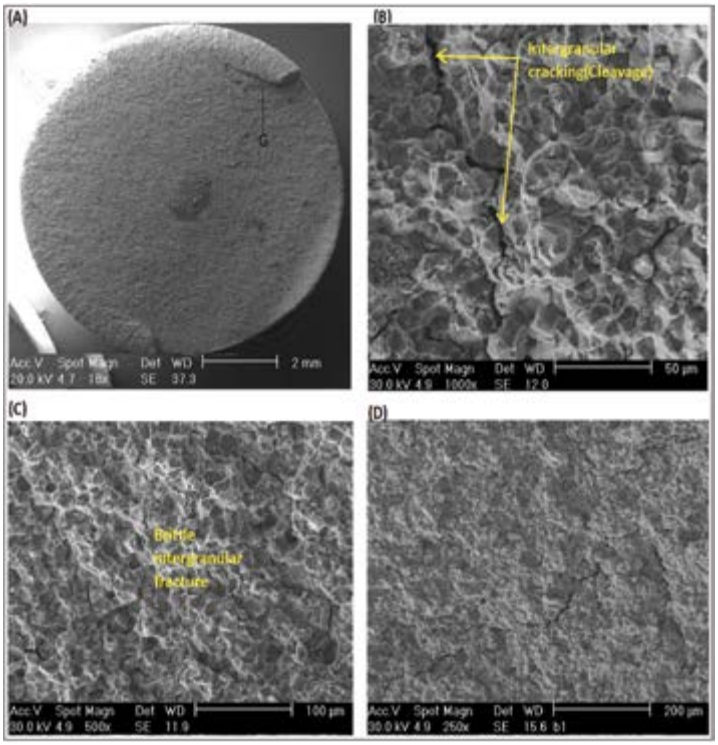

Figure 4.6 (A) SEM micrographs of group specimen A (σa = 200 MPa, Cycle = 850234 N). Fracture surface (brittle) of high cycle fatigue specimens; (B) part G-detail at 50 μm; (C) part G-detail at 100 μm; (D) part G-detail at 200 μm.

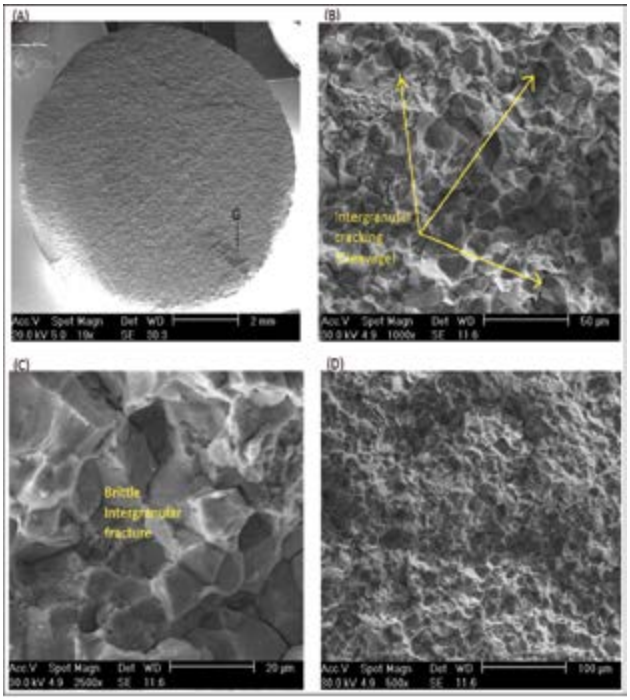

Figure 4.7 (A) SEM micrographs of group specimen W (σa = 320 MPa, Cycle = 600456 N). Fracture surface (brittle) of high cycle fatigue specimens; (B) part G-detail at 50 μm; (C) part G-detail at 20 μm; (D) part G-detail at 100 μm.

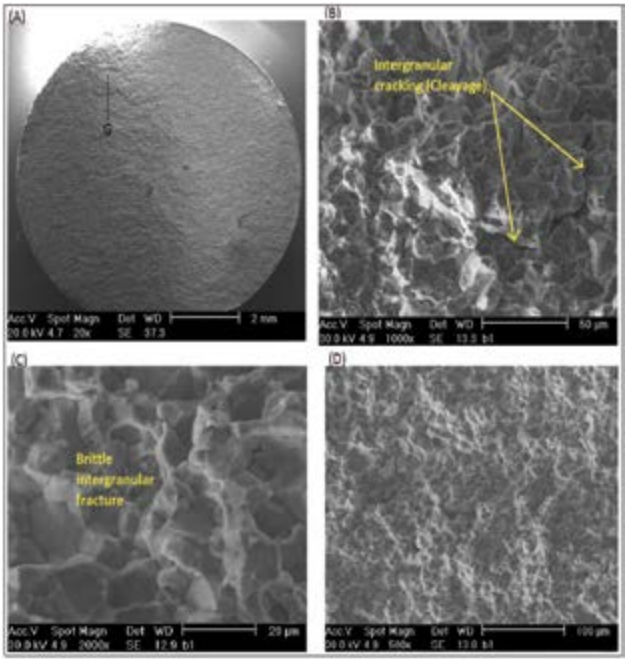

Figure 4.8 (A) SEM micrographs of group specimen B (σa = 400 MPa, Cycle = 592213 N). Fracture surface (brittle) of high cycle fatigue specimens; (B) part G-detail at 50 μm; (C) part G-detail at 20 μm; (D) part G-detail at 100 μm.

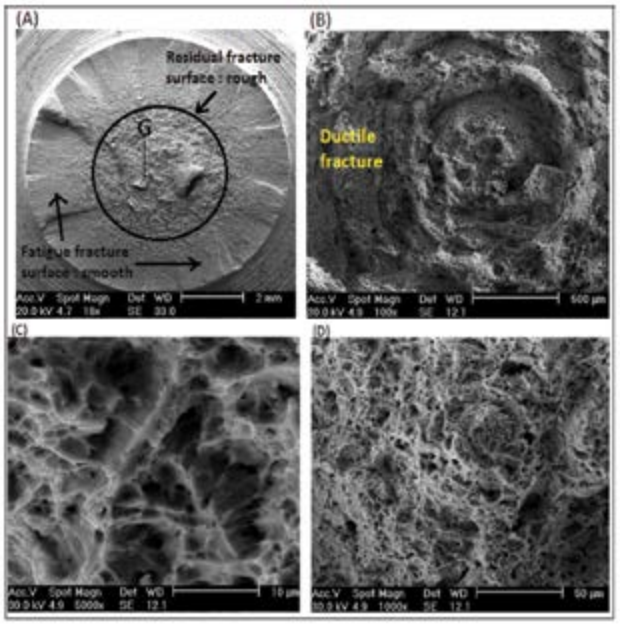

Figure 4.9 (A) SEM micrographs of group specimen P (σa = 600 MPa, Cycle = 758 N). The fracture surface of low cycle fatigue specimens; (B) part G-detail at 500 µm; (C) part G-detail at 10 µm; (D) part G-detail at 50 µm.

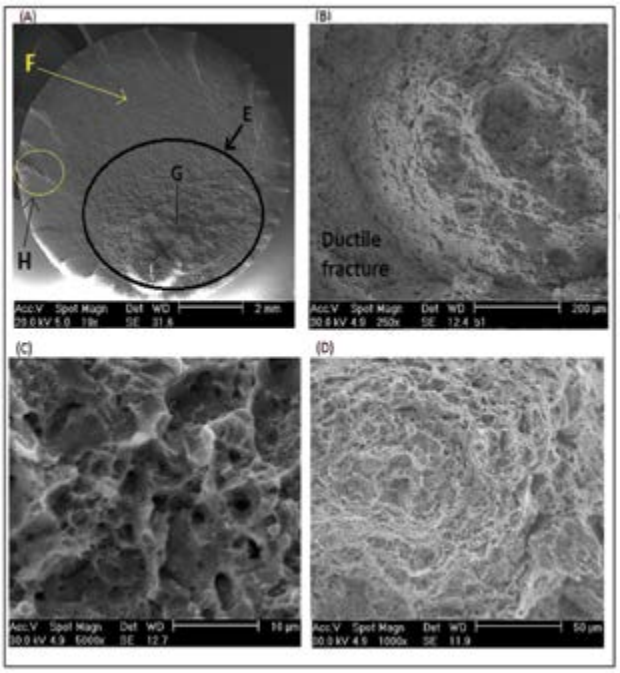

Figure 4.10 (A) SEM micrographs of group specimen P (σa = 300 MPa, Cycle = 914993 N). The fracture surface of high cycle fatigue specimens; (B) part G-detail at 200 µm; (C) part G-detail at 10 µm; (D) part G-detail at 50 µm; part E- residual fracture surface (rough); part F- fatigue fracture surface (smooth with lines of the rest) and part H- morphology fracture.

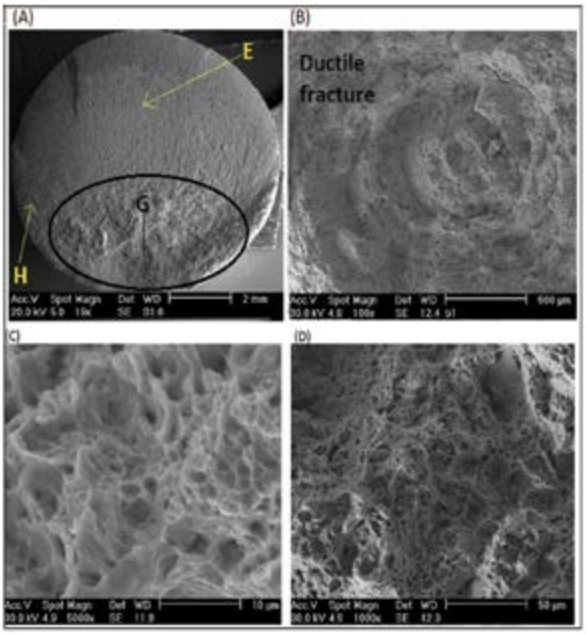

Figure 4.11 (A) SEM micrographs of group specimen S (σa = 320 MPa, Cycle = 965554 N). Fracture surface of high cycle fatigue specimens; (B) part G-detail at 500 μm; (C) part G-detail at 10 μm; (D) part G-detail at 50 μm; part E- fatigue fracture surface (smooth with lines of rest); part F- residual fracture surface (rough) and
part H- morphology fracture (beach marks)

Conclusion

Based on the results obtained from the five specimens, which are specimen B, specimen S, specimen W, specimen P and specimen A, the highest tensile strength and hardness was found in specimen B that has been quenched in brine 10%. On the other hand, specimen A displays the low tensile strength compared to specimens B, W, S and P. The temperature of 0°C in ice-based cooling media during the quenching process affects the tensile strength, where the material becomes too brittle and shows the flat fracture surface when subjected to axial tension. Therefore, fatigue strength is directly proportional to tensile strength, where the higher the value of the tensile strength, the higher fatigue endurance limit. The following conclusions can be drawn:

i) From the S-N Curve graft, at low cycle fatigue, fractures on the axis of rotation are recorded at high values of bending load. Most of the specimens experience failures between the cycle span of 1 to 1000 cycles. From this observation, specimens that are quenched in brine 10%, water and ice experience failure during a cycle span of 400 to 700 cycles. This is caused by the specimens inability to endure high curve of load to the axis of rotation because all the specimens are brittle and easy to break (fast fracture). These specimens become brittle because their microstructure undergoes 100% transformation from the austenite phase to the martensitic phase, as the cooling processes are too rapid, especially with the ice-based cooling media.

ii) On the other hand, specimens that are quenched in engine oil (SAE 40) and Palm Oil are fractured between 600 to 1000 cycles at low fatigue cycle. Both specimens are formed in the combination

phase between the phase perlite, ferrite and martensitic. When combination phase occurs, the specimens turned out strong and slightly ductile. Therefore, in low fatigue cycle, these specimens are fractured during higher cycles when compared to specimens that are quenched in brine 10%, water and ice.

iii)The values of the fatigue strength of this study have been determined through the plotting of S-N Curves. Specimen B, which is quenched in brine 10%, recorded fatigue endurance limit at 330 MPa with cycles span over one million and this, is considered to be the best fatigue endurance limit value. Therefore, engineering component structures that utilize specimen B are safe to be used under the load 330 MPa.

iv) From the observations of the fracture patterns during high fatigue cycle, the fatigue fracture surface of specimens B, W and A display a flat fracture surface and are categorized as brittle fracture. After examining the specimen's fracture surface using SEM, a significant amount of intergranular fracture is found on specimen A, which have been quenched in ice at the temperature of 0°C.

v)Fracture patterns for specimens S and P that have been quenched in engine oil (SAE 40) and Palm Oil respectively, 'Cup and Cone', and flat fracture are found on their fracture surface after high fatigue cycle.

vi) After close observation using the SEM, specimens S and P fractures are categorized as ductile and brittle into two different surfaces. The first one is a smooth surface that is caused by material's fatigue and the second is a rough (stage III) surface of material that fails to hold the load and snaps (fast fracture).

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PG EASY MAP SEBAGAI INOVASI BARU PETA PELANCONGAN DI PASIR GUDANG

S. Zaiton1, a, W. M. Rosnani2, b, and N. Nadzlin3, c,
1Politeknik Ibrahim Sultan, Pasir Gudang, Johor Darul Takzim
2 Politeknik Ibrahim Sultan, Pasir Gudang, Johor Darul Takzim
2 Politeknik Ibrahim Sultan, Pasir Gudang, Johor Darul Takzim
azaitonsarman@gmail.com, b mek8982@gmail.com, clynn1506@gmail.com

Kata Kunci: Peta, Kod QR, Telefon Pintar, Destinasi Pelancongan,

Abstrak. Penggunaan peta sebagai alat petunjuk arah ke destinasi pelancongan merupakan elemen penting dalam memastikan aktiviti pelancongan seiring dengan revolusi industri 4.0 mendorong inovasi PG Easy Map. Oleh itu, inovasi peta PG Easy Map direka untuk memudahkan pelancong untuk mengakses maklumat destinasi yang terdapat di Pasir Gudang dengan mudah dan pantas secara atas talian. Isu peta sedia ada adalah terlalu ringkas dan tidak memberikan informasi terkini tentang tarikan yang terdapat di Pasir Gudang. PG Easy Map ini adalah gabungan penggunaan peta dan teknologi Kod QR sebagai alat menyebarluaskan maklumat pelancongan secara berkesan dalam menarik kunjungan lebih ramai pelancong ke Pasir Gudang. Dapatan kajian konseptual ini menunjukkan PG Easy Map, lebih banyak maklumat-maklumat berkenaan tarikan pelancongan dan kemudahan untuk membantu pelancong mengorientasikan diri sebelum mereka sampai ke Pasir Gudang. Ciri-ciri PG Easy Map yang mesra pengguna, mudah untuk diakses dan di bawa ke mana-mana sahaja dapat memberikan manafaat kepada semua golongan pengguna. Maklumbalas kajian rintis terhadap PG Easy Map daripada 100 orang responden telah diperolehi mendapati secara keseluruhannya, responden memberikan maklumbalas yang positif terhadap penciptaan PG Easy Map. Sebanyak 56% responden menyatakan bahawa 'PG Easy Map' dapat memberikan manafaat kepada pelancong khususnya yang pertama kali menjejakkan kaki ke Pasir Gudang pelancongan di samping mampu mempromosikan Pasir Gudang sebagai destinasi pelancongan utama di peringkat antarabangsa.

Pendahuluan

Pelancongan adalah industri yang mempunyai impak yang tinggi terhadap ekonomi dan sosial negara, kerana ia membantu dalam membangun sektor lain melalui kesan pengganda. Ia terdiri daripada aktiviti, kemudahan, perkhidmatan dan industri yang menyampaikan pengalaman perjalanan seperti pengangkutan, penginapan, makan dan minum pertubuhan, hiburan, rekreasi, pengalaman sejarah dan budaya, tarikan destinasi, membeli-belah dan perkhidmatan lain yang tersedia untuk pelancong jauh dari rumah. Fadahunsi (2011) pelancongan ditakrifkan sebagai jumlah fenomena dan hubungan yang timbul daripada interaksi komuniti pelancong dan tuan rumah dalam proses menarik dan menganjurkan para pelancong ini. Ini adalah aktiviti yang kompleks yang memerlukan ketersediaan parameter tertentu seperti rangkaian jalan yang boleh diakses, kemudahan penginapan standard, tarikan dan maklumat mengenai potensi dan tapak tarikan sedia

ada.

Pelancong, biasanya, mempunyai pengetahuan yang agak terhad tentang persekitaran yang dikunjungi, dan peta melaksanakan fungsi penting dalam pengambilalihan maklumat mengenai destinasi perjalanan. Menarik bahagian perniagaan perjalanan adalah bergantung kepada tahap strategi pemasaran yang komprehensif dan dalam pameran dan penglihatan maklumat berkaitan pelancongan memainkan peranan utama. Untuk menonjolkan daya tarikan destinasi pelancongan,. Peta adalah medium yang sangat diperlukan untuk menyampaikan maklumat dan mewujudkan imej ruang dan tempat. Ia telah diketahui memainkan peranan penting dalam mengenalpasti dan mencari tarikan pelancongan dan mempunyai peranan penting dalam memainkan sumber pengurusan pelancongan yang berkesan dan cekap adalah fakta yang tidak dapat dikendalikan.

Oleh itu, peta pelancongan adalah medium terbaik untuk menyediakan perkhidmatan yang baik dalam industri pelancongan. Peta pelancongan melaksanakan pelbagai fungsi yang paling penting ialah memberikan maklumat kepada pengguna (pelancong) tentang lokasi-lokasi pelancongan, memudahkan orientasi dalam ruang geografi dan bergerak di sekitar kawasan, membantu dalam membuat pilihan kawasan pelancong yang dikunjungi dan dalam merancang perjalanan. Peta berperanan memberikan maklumat umum kepada pelancong dengan pantas (Olomo, 1993). Peta yang dibincangkan melakukan banyak fungsi lain yang biasanya dikaitkan dengan peta yang salah satunya adalah fungsi dokumentari.

Peta pelancongan bercirikan maklumat visual sesuai untuk sesiapa sahaja untuk mengetahui tempat pelancongan di kawasan tersebut dengan lebih mudah. Selain itu, kajian sebelum ini menyatakan ciri-ciri peta yang baik adalah peta yang menyediakan maklumat tentang kewujudan, lokasi, dan jarak antara ciri-ciri tanah, seperti tempat-tempat penduduk dan laluan perjalanan dan perhubungan (Shamim Ahmad Shah &Muzafar Ahmad Wani., 2015). Berdasarkan kajian lain pula, ciri-ciri kandungan peta yang efektif termasuk: kawasan geografi bandar, sistem komunikasi umum, fungsi pelbagai bahagian bandar, lokasi monumen yang menarik dan perkhidmatan pelancongan (Olomo & Enaruvbe, 2005).

Bagi meningkatkan lagi manafaat fungsi sebuah peta, penggunaan peta telah diinovasikan dengan penghasilan teknologi GPS (Global Positioning System). Teknologi GPS (Global Positioning System) adalah suatu sistem radio navigasi dan penentuan posisi yang berasaskan satelit yang dapat digunakan oleh ramai orang sekaligus dalam segala cuaca, serta direka untuk memberikan posisi dan kecepatan tiga dimensi yang teliti, dan juga informasi mengenai waktu, secara kontinal di seluruh dunia (Abidin, 1995).

Kebiasaannya, pelancong akan bergantung pada penggunaan maklumat statik seperti panduan buku, peta bercetak, dan risalah informatif untuk mencari destinasi yang akan dilawati. Cara untuk mengenali tarikan baru ini dianggap bermanfaat walaupun sumber maklumat mungkin tidak lengkap dengan maklumat yang terkini. Memandangkan pertumbuhan sektor pelancongan dan penggunaan telefon pintar yang semakin meningkat pada masa kini, industri teknologi maklumat dan komunikasi (ICT) telah mula mewujudkan alat untuk membantu pengembara mahupun penduduk tempatan untuk mengetahui dan mengembara di persekitaran kawasan perlancongan yang terbaru.

Kod Pantas (QR) adalah kod bar dua dimensi (kod matriks) yang membolehkan kandungannya dikodkan pada kelajuan tinggi. Dicipta oleh syarikat Jepun Denso-Wave pada tahun 1994, ianya telah digunakan terutamanya untuk tujuan pengesanan dan kegunaannya semakin berkembang luas dengan ciptaan aplikasi yang membolehkan mereka dibaca oleh kamera telefon pintar. Alat yang digunakan untuk membaca Kod QR disebut QR Code Scanner. Secara umumnya, alat ini telah tersedia dalam bentuk aplikasi di smartphone seperti Android atau iPhone. Tujuan utama Kod QR digunakan ialah untuk memudahkan pengguna Smartphone mengakses informasi dengan dua langkah mudah iaitu a) Mengimbas Kod QR, dan b) melakukan Aksi iaitu berupa membuka browser, menyimpan informasi, atau mendail nombor yang ada di Kod QR tersebut. Penggunaan teknologi Kod QR telah lama diamalkan di negara-negara lain khususnya Jepun khususnya bagi perniagaan automotif. Fungsi kegunaan Kod QR telah berkembang luas dimanafaatkan bagi dunia perniagaan masa kini termasuklah sektor pelancongan (Denso, 2011).

Justeru itu, PG Easy Map direka hasil daripada gabungan peta yang dilengkapi Kod QR dan dihubungkan dengan sistem teknologi GPS melalui penggunaan telefon pintar diharapkan dapat meningkatkan lagi penggunaan peta di dalam pelancongan.

Objektif Kajian

1) Menghasilkan sebuah peta daerah Pasir Gudang yang dilengkapi dengan sistem kod QR yang mesra pengguna.
2) Memperkenalkan “PG Easy Map” sebagai medium promosi pelancongan Pasir Gudang.

Pembangunan Produk

1.Penggunaan kod QR pada “PG Easy Map”

Pengimbas Kod QR dengan peranti mudah alih yang digunakan pada peta tersebut berperanan sebagai medium memaparkan informasi tambahan dan juga sebagai alat interpretasi untuk pengguna dalam merancang perjalanan di Pasir Gudang. Aplikasi pembangunan laman web dan peranti mudah alih atas talian yang digunakan dalam pembikinan ‘PG Easy Map’ iaitu Adobe Spark, sebuah platform untuk membina laman ringkas atau blog ringkas dimana pengguna tidak perlu untuk membina platform atau blog sendiri. Manakala QR pula dilengkapkan bersama dengan peta dan dicetak bersama brosur.



Rajah 1: Gambaran Peta Sedia Ada dan Selepas diinovasi



Rajah 2: Gambaran depan dan belakang PG Easy Map yang Berbentuk Phamplet

2.Proses Pembangunan PG Easy Map

Langkah 1: Platform tentang informasi peta direka di platform pembangunan blog ringkas "Adobe Spark".	
Langkah 2: Platform yang telah siap di sunting kemudian akan di sebarkan di atas talian untuk mendapatkan alamat perkongsian (url web address).	
Langkah 3: Alamat laman tadi akan disalin dan dilekap pada laman penciptaan kod QR untuk mendapatkan kod QR dalam bentuk PNG atau JPEG.	
Langkah 4: Gambar kod QR akan ditampal pada peta yang telah direka dengan Pasir Gudang sebagai kawasan pilihan.	
Langkah 5: Peta yang telah lengkap dengan kod QR akan dilekapkan bersama rekaan brochure dan siap untuk dicetak.	

Pandangan Responden terhadap PG Easy Map

Kajian dijalankan dalam kalangan penduduk Bukit Dahlia yang mengandungi bilangan 145 rumah. Soal selidik dijalankan pada setiap rumah yang berada di Taman ini. Soal selidik diedarkan kepada mana-mana ahli isi rumah yang berminat menjawab soal selidik dalam isu yang dibawa.

Dapatan kajian ini mendapati demografi responden 55% adalah responden lelaki dan 45% adalah responden perempuan. Berumur antara 18 hingga 30 tahun dan 1 % adalah terdiri daripada responden berumur 51-60 tahun.

Berdasarkan Rajah 3, skor min bagi penyataan pertama ialah 4.55, di hampir 56% responden berpendapat sangat setuju bahawa 'PG Easy Map'ini, membantu pelancong untuk mendapat maklumat destinasi pelancongan yang terdapat di Pasir Gudang. Seterusnya, skor min bagi penyataan kedua iaitu 4.45, merupakan maklum balas responden sangat setuju terhadap 'PG Easy Map'mudah digunakan dengan memasang applikasi pengimpas QR kod di telefon pintar mereka. Selain itu, skor min bagi kenyataan ketiga ialah 4.20, di mana 59% responden berpendapat setuju mengenai 'PG Easy Map'sesuai digunakan untuk semua peringkat umur. Di samping itu, skor min bagi kenyataan keempat pula ialah 4.38, di mana responden bersetuju mengenai maklumat destinasi lengkap dan terkini serta memenuhi keperluan pelancong ini disebabkan "PG EasyMap" menggunakan platform yang mudah untuk mengemaskini maklumat destinasi terutamanya tarikan baru. Manakala skor min yang kelima adalah 4.42, dimana 48% responden berpendapat pengunaan 'PG Easy Map'ini menjimatkan masa dan kos.

Seterusnya, skor min bagi kenyataan ke enam ialah 4.39, merupakan maklum balas responden mengenai peta 'PG Easy Map'sesuai untuk didapati di pusat atau kaunter informasi pelancongan terutama bagi mereka yang pertama kalinya berkunjung ke Pasir Gudang. Sehubungan itu, skor min yang ketujuh adalah 4.18, ia merupakan maklum balas reponden sebanyak 84% setuju bahawa kertas peta 'PG Easy Map'berkualiti tinggi dan kalis air. Skor min bagi kenyataan kelapan ialah 4.66, di mana responden berpendapat bahawa reka bentuk dan corak 'PG Easy Map'menarik, mudah difahami dan fleksibal. Diikuti dengan skor min yang kesembilan iaitu 4.45, ia merupakan maklum balas responden menyatakan bahwa peta 'PG Easy Map'mudah di bawa ke mana-mana sahaja dengan saiznya yang kecil. Seterusnya, skor min yang kesepuluh ialah 4.41, di mana 94% responden berpendapat setuju dengan kenyataan pelancong berminat mendapatkan maklumat melalui aplikasi "PG Easy Map". Ini disebabkan, 'PG Easy Map'tidak mengenakan apa-apa bayaran ketika mereka mengakses ke laman sesawang adobe spark page untuk mendapatkan maklumat destinasi tertentu. Akhir sekali, skor min yang kesebelas ialah 4.46, ia merupakan maklum balas responden mengenai 'PG Easy Map' sesuai sebagai rujukan untuk penduduk Pasir Gudang.

Keterangan	Min
1. *"PG Easy Map"* membantu saya untuk mendapat maklumat destinasi pelancongan.	4.55
2. *"PG Easy Map"* mudah digunakan dengan hanya perlu memuat turun applikasi pengimpas QR kod di telefon pintar.	4.45
3. PG Easy map sesuai digunakan oleh semua peringkat umur.	4.20
4. Maklumat yang terdapat di dalam Easy Map dan laman web yang berkaitan lengkap dan terkini serta memenuhi keperluan saya.	4.38
5. Pengunaan *"PG Easy Map"* menjimatkan masa dan kos.	4.42
6. Peta *"PG Easy Map"* sesuai untuk didapati di pusat atau kaunter informasi pelancongan.	4.39
7. Kertas peta *"PG Easy Map"* berkualiti tinggi dan kalis air.	4.18
8. Reka bentuk dan corak *"PG Easy Map"* menarik, mudah difahami dan fleksibal.	4.66
9. *"PG Easy Map"* mudah di bawa ke mana-mana sahaja.	4.45
10. Pelancong berminat mendapatkan maklumat melalui aplikasi *"PG Easy Map"*	4.41
11. *"PG Easy Map"* sesuai sebagai rujukan untuk penduduk Pasir Gudang.	4.46

Sumber, Kajian Lapangan 2018, N = 100 responden

Rajah 3: Pandangan Responden Terhadap 'PG Easy Map"

Perbincangan dan Cadangan

Pasir Gudang, salah satu kawasan yang berada di dalam Iskandar Malaysia, juga sedang membangun sebagai sebuah bandar industri di Malaysia. Secara umumnya, para pengunjung yang berkunjung di Pasir Gudang hanya tertumpu di kawasan-kawasan pelancongan yang telah menempa nama sahaja seperti di Bukit Layang-layang yang menjadi lokasi Festival Layang-layang Sedunia setiap tahun. Walaupun sebenarnya terdapat banyak destinasi-destinasi menarik yang boleh dikunjungi dan mampu menawarkan pengalaman yang menarik seperti Sarang Buaya Tanjung Langsat, Rumah Rakit di Kong Kong Laut dan Kedai Makan Rahmat di Pasir Putih yang sentiasa menjadi tumpuan khususnya di hujung minggu oleh pelancong-pelancong Singapura. Pelancongan juga dapat memajukan bidang perniagaan di Pasir Gudang. Ini adalah kerana pelancong asing yang datang ke Pasir Gudang memerlukan tempat penginapan, makanan dan minuman, perkhidmatan pengangkutan, juru pandu pelancong dan perkhidmatan yang lain-lain. Pelancong asing amat menggemari makanan sama ada makanan tradisonal mahu pun makanan barat di Malaysia.

Penciptaan 'PG Easy Map ini sememangnya belum pernah diciptakan sebagai salah satu alat interpretasi pelancongan di Pasir Gudang. Oleh itu produk ini dihasilkan dan boleh digunakan oleh pelbagai lapisan masyarakat terutama kepada pengunjung luar yang berkunjung ke Johor Bahru dan Pasir Gudang secara khasnya.

'PG Easy Map' dihasilkan dengan tujuan untuk membantu orang ramai khasnya pengunjung luar untuk meneroka dan lebih mengenali Pasir Gudang dan tarikan pelancongan di kawasan Pasir Gudang. Produk ini sebagai alat interpretasi berpotensi membantu meningkatkan imej Pasir Gudang sebagai salah satu destinasi pelancongan dalam Iskandar Malaysia dan negeri Johor khususnya.

Secara keseluruhannya, hasil kajian juga mendapati kebanyakan responden menerima baik dengan memberikan maklumbalas positif. PG Easy Map yang merupakan satu inovasi untuk pelancong dan masyarakat di Pasir Gudang ini akan memudahkan lagi pengguna untuk mengetahui destinasi menarik di Pasir Gudang dengan hanya mengimbas QR kod yang terdapat di peta " Peta Easy Map" yang boleh diakses melalui telefon pintar. Ciri-ciri PG Easy Map yang mesra pelanggan iaitu ringan, kecil, mudah dibawa, reka bentuk dan corak menarik, mudah difahami dan fleksibel menarik minat pengguna untuk mendapatkan maklumat. Hasil kajian menunjukkan bahawa 'PG Easy Map' diyakini dapat membantu pengguna untuk mengakses kawasan Pasir Gudang lebih mudah dan efisien dengan bantuan teknologi yang sistematik. "PG Easy Map" ini mempunyai pelbagai maklumat yang berguna yang memenuhi keperluan pelancong ketika mengembara. Produk ini juga selari dengan kemajuan teknologi terkini terutamanya penggunaan telefon pintar.

Namun begitu, beberapa penambahan perlu dilakukan untuk mengatasi kelemahan produk tersebut:

i. Rekaan peta Pasir Gudang yang lebih mesra pelancong
ii. Sistem informasi diimbas dalam situasi offline yang dapat membantu pengunjung mengimbas kod QR walaupun di luar jaringan internet.
iii. Teknologi Augmented Reality (AR) di mana imbasan berbentuk 3-Dimensi terdapat pada peta untuk menambah keseronokan pengguna.
iv. Di cetak dalam reka bentuk poskad dan kertas yang lebih berkualiti tinggi.

Kesimpulan

PG Easy Map" ini ialah gabungan penggunaan peta dan teknologi Kod QR sebagai alat menyebarluaskan maklumat pelancongan secara berkesan dalam menarik kunjungan lebih ramai pelancong ke Pasir Gudang. Pengguna hanya perlu mengimbas mana- mana Kod QR yang terdapat di peta dengan menggunakan telefon pintar untuk mendapatkan maklumat dengan mudah dan pantas. PG Easy Map dibangunkan hasil daripada kesukaran mencari tarikan pelancongan yang terdapat di Pasir Gudang. Kajian mendapati kebanyakan tarikan pelancongan di Pasir Gudang tidak mendapat sambutan kerana penyebarluasan maklumat yang agak terhad menyebabkan Pasir Gudang yang lebih dikenali sebagai tempat perindustrian. Dengan adanya 'PG Easy Map', promosi pelancongan di Pasir Gudang dapat ditingkatkan dan kemajuan bandar dapat diperbaiki agar selaras dengan perubahan pelancongan yang berlaku. 'PG Easy Map' diyakini dapat membantu pengguna untuk mengakses kawasan Pasir Gudang lebih mudah dan efisien dengan bantuan teknologi yang sistematik.

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FESTIVAL LAYANG-LAYANG SEDUNIA: FAKTOR MOTIVASI PENGLIBATAN PELAJAR JABATAN PELANCONGAN & HOSPITALITI SEBAGAI SUKARELAWAN

Sarman. Z1,a, Kassim N. A.2,b and Zulkifli N. H.3,c

1Politeknik Ibrahim Sultan, Johor, Malaysia

2Politeknik Metro Kuantan, Pahang, Malaysia

3Politeknik Ibrahim Sultan, Johor, Malaysia

azaitonsarman@gmail.com, bakashahkassim@gmail.com, cnurhidayahzulkifli@gmail.com

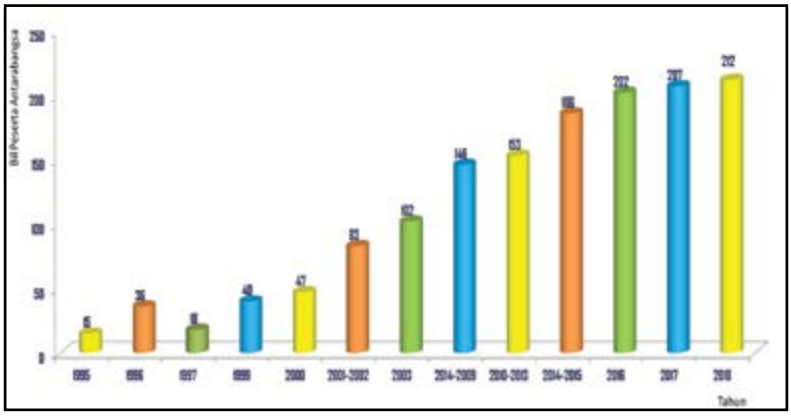
Kata Kunci: Sukarelawan, TVET, Motivasi Penglibatan Sukarelawan

Abstrak. Penglibatan pelajar dalam aktiviti bertaraf antarabangsa merupakan satu platform terbaik dalam membentuk dan membina graduan TVET berkualiti. Proses pembelajaran dalam aktiviti berbentuk sukarelawan ini merupakan aspek penting yang dapat membantu meningkatkan keberkesanan dapat mencungkil potensi dan bakat pelajar. Faktor-faktor pendorong ke arah penglibatan aktiviti sukarelawan ini dikenalpasti dalam kajian ini iaitu (1) Keperluan Psikologi dan (2) satu pengiktirafan atau ganjaran kepada graduan. Tahap penglibatan pelajar TVET dengan aktiviti kesukarelawanan dilihat berpotensi ke arah pembentukan pemikiran yang positif dan pembangunan personaliti yang mantap di kalangan pelajar. Kajian ini diharap dapat menjadi panduan dalam penganjuran aktiviti kesukarelawanan agar penglibatan aktif pelajar berterusan sehingga selepas bergraduan nanti.

Pendahuluan

Penganjuran Festival Layang-layang Sedunia Pasir Gudang telah bermula pada tahun 1995 dengan dinamakan Festival Layang-layang Antarabangsa Pasir Gudang, Johor Darul merupakan usaha Majlis Perbandaran Pasir Gudang (MPPG) dengan kerjasama Kerajaan Negeri Johor, Kementerian Kebudayaan Kesenian dan Pelancongan, Majlis Tindakan Pelancongan Negeri Johor, Persatuan Pelayang Johor serta Majlis Pelayang Malaysia. Acara tahunan ini berlangsung selama lima hari, terbuka kepada peserta tempatan dan antarabangsa. Ketika awal penganjurannya iaitu pada tahun 1995, hanya seramai 15 orang peserta antarabangsa terlibat. Walaubagaimanapun bilangan peserta antarabangsa ini semakin bertambah dari tahun ke tahun seperti ditunjukkan dalam Jadual 1.

Jadual 1 : Bilangan Peserta Antarabangsa Daripada Tahun 1995 hingga 2018



Melihat kepada pertambahan peserta antarabangsa ini, pihak penganjur Festival Layang-layang Sedunia Pasir Gudang, telah mengambil inisiatif untuk membuka peluang kepada para pelajar TVET di Politeknik Ibrahim Sultan (PIS), khususnya program Diploma Pengurusan Pelancongan, Jabatan Pelancongan dan Hospitaliti (JPH) untuk dilantik sebagai sukarelawan bertugas sebagai Pegawai Perhubungan Peserta Antarabangsa bagi memastikan bahawa proses pengurusan peserta antarabangsa bagi Festival Layang-layang Sedunia ini berjalan lancar. Sehubungan itu, setiap tahun pihak Politeknik Ibrahim Sultan akan menghantar sejumlah sukarelawan untuk bertugas dan jumlah tersebut adalah seperti ditunjukkan dalam Jadual 2. Berdasarkan Jadual 2, didapati berlaku peningkatan dalam bilangan sukrelawan yang bertugas. Selain itu juga, peluang menjadi sukarelawan bukan hanya tertumpu kepada Sekretariat Pengurusan Peserta Antarabangsa, malahan peluang-peluang lain seperti pembantu padang, pegawai perhubungan sekolah Asean juga turut dibuka kepada pelajar JPH, PIS. Oleh itu, mulai tahun 2011, bilangan sukarelawan daripada PIS telah meningkat sehingga 100 peratus sejajar dengan peluang sebagai sukarelawan yang dibuka kepada para pelajar PIS seperti ditunjukkan dalam Jadual 2:

Jadual 2 : Bidang Tugas Sukarelawan Serta Bilangannya Mulai Tahun 2004 hingga 2018



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
A	10	10	15	15	20	20	30	30	30	28	40	45	45	45	45
B	0	0	0	0	0	0	0	30	30	30	30	30	30	30	30
C	0	0	0	0	0	0	0	0	0	2	10	10	10	10	10
D	0	0	0	0	0	0	0	0	0	15	20	20	20	20	20

Apa itu Sukarelawan?

Khidmat pelajar TVET perlu diperluaskan di mana khidmat pelajar-pelajar JPH sebagai sukarelawan adalah satu sumber utama bagi memastikan kelancaran fungsi dan tugasan dalam sesebuah acara atau program yang telah dirancang dilaksanakan di Festival Layang-layang Sedunia Pasir Gudang. Sukarelawan adalah seseorang yang memberikan khidmat dan sumbangan secara sukarela serta niat yang ikhlas tanpa mengharapkan ganjaran material (Azizan Bahari, 2003). Dalam menjalankan sesuatu program atau aktiviti bantuan sukarelawan amatlah penting bagi memastikan kelancaran program. Astin & Sax (1998) pula menyatakan bahawa penglibatan pelajar dengan aktiviti sukarelawan bukan sahaja mampu meningkatkan tahap pencapaian mereka daripada aspek kurikulum dan ko-kurikulam, malahan mereka mempunyai rasa tanggungjawab yang tinggi untuk membantu komuniti sekeliling yang berada dalam keadaan yang memerlukan. Manakala kajian yang dijalankan oleh Haski-Leventhal et al., (2008) pula menunjukkan bahawa pelajar universiti yang melibatkan diri dengan aktiviti berbentuk kesukarelawanan mempunyai gaya kehidupan yang lebih berdisiplin dan kebanyakan mereka dilihat lebih mempunyai keyakinan diri dan mampu mengurus masa dengan lebih sistematik. Menurut Musick & Wilson, (2008), kerja kesukarelawan merujuk kepada aktiviti yang dilakukan untuk membantu orang lain tanpa menjangkakan atau mengharapkan balasan dan bebas sepenuhnya). Menurut Khoo dan Engelhorn (2011), sukarelawan sangat penting kerana mereka menyumbangkan kepakaran, kemahiran, pengetahuan dan tenaga. Salah satu tugas dan tanggungjawab sebagai liason officer adalah untuk sentiasa memastikan pelayang menyerahkan dokumen-dokumen yang berkaitan seperti salinan passport dan juga tiket perjalanan kapal terbang kepunyaan pelayang-pelayang yang dipertanggungjawabkan. Pelajar juga turut membantu dalam hal-hal kebajikan pelayang sewaktu di padang seperti menjaga barangan milik pelayang seperti layang-layang berada di dalam keadaan selamat, membawa pelayang untuk mendapatkan rawatan sekiranya perlu.

Apakah Faktor Motivasi Pelajar Jabatan Pelancongan dan Hospitaliti Kekal Menjadi Sukarelawan Di Festival Layang-Layang Sedunia Pasir Gudang?

Terdapat banyak pengaruh dan faktor yang boleh mempengaruhi sukarelawan untuk terlibat dengan kegiatan sukarelawan

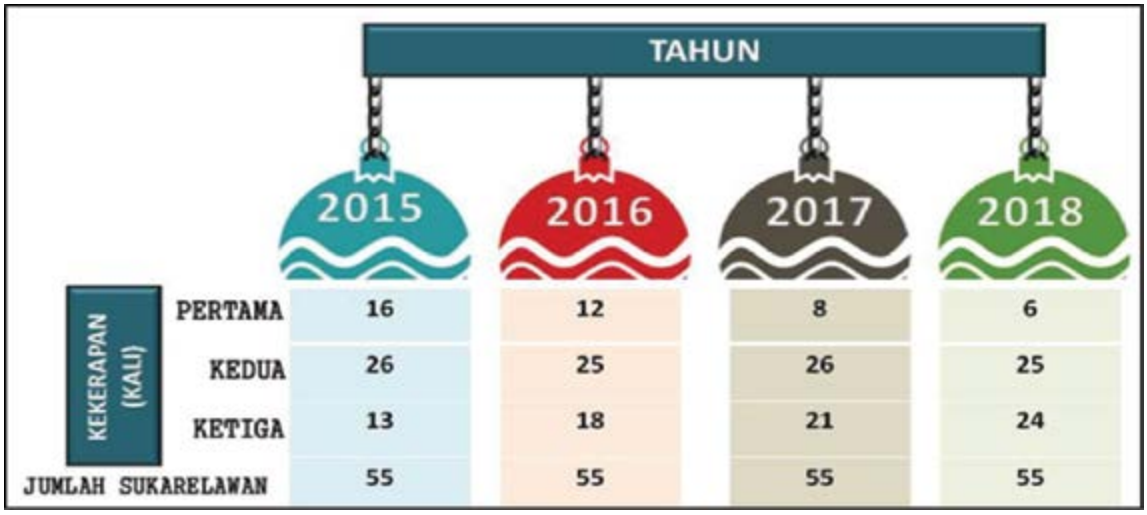


Sebahagian pelajar-pelajar sukarelawan sebagai liaison officer Festival Layang-Layang Sedunia Pasir Gudang Kali Ke 23 2018.

Menurut Chacon, Perez, Florez & Vecina, (2011), terdapat beberapa teori yang dapat membantu kita memahami apakah yang memotivasi individu dapat terus kekal melibatkan diri dalam aktiviti kesukarelawan. Kefahaman tentang faktor motivasi individu yang mendorong menyertai dan terus setia bersama dalam aktiviti kesukarelawanan dapat memberi penerangan tentang tingkah laku penglibatan para pelajar JPH PIS dalam kesukarelawanan.

Jadual 3 menunjukkan Peratusan Kekerapan bagi seorang Pelajar Jabatan Pelancongan Terlibat Sebagai Sukarelawan yang bertugas sebagai Liaison Officer Pelayang Antarabangsa dan Asean) di Festival Layang-layang Sedunia Pasir Gudang. Berdasarkan statistik di Jadual 3, menunjukkan bahawa kekerapan pelajar yang kekal melibatkan diri sebagai sukarelawan di Festival Pasir Gudang setiap tahun semakin meningkat. Mereka mula melibatkan diri bermula dari Tahun pertama pengajian lagi. Gaya ini menggambarkan bahawa terdapat faktor-faktor tertentu yang mendorong mereka untuk terus kekal berkhidmat di festival yang setiap tahun diadakan.

Jadual 3 : Kekerapan Bagi Seorang Pelajar Jabatan Pelancongan Terlibat Sebagai Sukarelawan (Liaison Officer Pelayang Antarabangsa Dan Asean) Di Festival Layang-Layang Sedunia Pasir Gudang



Sumber : Kajian Lapangan 2018

Antara persoalan yang pernah diutarakan kepada pelajar-pelajar yang terlibat, siapakah yang mendorong mereka untuk melibatkan diri di dalam kerja-kerja sukarelawan? Respon yang diberikan oleh pelajar-pelajar tersebut antaranya ialah keadaan sekeliling, ibubapa, rakan, diri sendiri, organisasi, masyarakat dan media sosial, dorongan dari pensyarah, badan-badan NGO yang mempromosikan aktiviti kesukarelawan dan melihat kesusahan orang lain melalui media sosial atau secara berhadapan (Rajah 1).



Rajah 1 : Pendorong Individu Terlibat sebagai Sukarelawan

Pearce, J. L., (1982), terdapat dua pandangan tentang perkara ini iaitu sebagai memenuhi keperluan dalaman atau keperluan psikologi dan menyertai aktivtiti kesukarelawanan untuk mendapat pengiktirafan atau faedah.

1. Keperluan Psikologi

Keperluan psikologi boleh mempengaruhi penglibatan sukarelawan/wati. Seperti yang diterangkan oleh Maslow (1970) bahawa motivasi adalah tindakbalas kepada keperluan dalaman mengikut hiraki keperluan psikology, keperluan mendapat keselesaan, keperluan sosial, keperluan kepuasan diri (self esteem) dan keperluan merealisasikan kehendak diri (self actualization). Mengikut Maslow (1970) juga, individu bertindakbalas kerana kerana untuk menenuhi keperluan yang ada. Jika keperluan ini dicapai maka ia tidak lagi dapat memberi perangsang. Individu akan dirangsang dengan keperluan yang baru bagi memotivasi. Teori ini mencadangkan bagi pertubuhan yang ingin menarik peserta sukarela dan meningkatkan kesetiaan sukarelaan hendaklah peka kepada keperluan ahli yang dominan dalam organisasi berkenaan.

Mengikut Gray (2000), pekerja sukarela dapat mengekalkan kepuasan bergantung kepada dua katogori iaitu faktor kepuasan (satisfier) seperti pencapaian (achievement), pengiktirafan, kepercayaan kepada tugas yang diamanahkan dengan memberi lebih tanggungjawab dan faktor ketidakpuasan (faktor Hygiene) seperti perhubungan interpersonal yang lemah, kurangnya penyeliaan dan keadaan tempatkerja yang kurang memuaskan akan meningkatkan ketidakpuasan kerja. Jadi pihak pertubuhan akan mengenalpasti sumber yang menjadi faktor kepuasan dan faktor ketidakpuasan sebagai landasan untuk mengekalkan kesetiaan pekerja sukarela. McClelland (1985) pula mengenalpasti keperluan untuk pencapaian, bersekutu (affiliation) dan kuasa sebagai penggerak. Individu yang bertindakbalas kepada kehendak untuk mencapai sesuatu adalah digerakkan kepada penyempurnaan tugas, individu yang respon kepada keperluan ingin bersekutu

(affiliation) disebabkan ingin menambahkan perhubungan interpersonal. Ada individu yang ingin memenuhi keperluan kuasa untuk mengambil peluang menyerlahkan ciri-ciri kepimpinan yang sedia ada dan bagaimana semangat bekerjasama dibentuk oleh seorang ketua terhadap kesemua ahlinya. Penglibatan pelajar JPH di dalam Festival layang-layang juga dapat membantu membentuk bakat kepimpinan mereka dengan lantikan seorang ketua iaitu 'penghulu' dan 'penghuluwati' yang bertanggungjawab sebagai penyelaras dan mengkoordonat ahli-ahli di bawahannya, serta sebagai agen perantaraan di antara liason officer dengan urusetia dari MPPG. Pelajar-pelajar juga diterapkan dengan semangat bekerjasama dalam melaksanakan tugas dan tanggungjawab sebagai liason officer bagi memastikan perjalanan festival berkeadaan lancar. Perkara yang dilakukan oleh mereka termasuklah menyediakan goodies bag bagi pelayang-pelayang antarabangsa, menjaga keselamatan barangan pelayang-pelayang, dan membantu pelayang-pelayang antarabangsa yang terlibat untuk menaikkan layang-layang sewaktu aktiviti pertunjukkan layang-layang dijalankan.

2. Keperluan mendapat pengiktirafan dan ganjaran

Menurut Mabry (1998), pelajar yang terlibat dengan aktiviti yang berkaitan dengan kesukarelawanan dikenalpasti mempunyai perubahan yang ketara daripada aspek nilai sosial yang dimiliki oleh mereka. Keadaan ini wujud memandangkan mereka mempunyai pengalaman pelbagai kemahiran termasuk kemahiran berkomunikasi, bersosial dan kebertanggungjawaban dengan pelbagai lapisan masyarakat berbanding dengan mereka yang tiada pengalaman langsung dalam aktiviti berbentuk kemasyarakatan. Sebagai sukaralewan Festival Layang-layang Pasir Gudang, pelajar –pelajar dapat melatih diri dalam kemahiran berkomunikasi bukan sahaja Bahasa Inggeris malah pelbagai bahasa lain kerana pelayang berasal dari serata dunia. Contohnya, pada Tahun 2017, sebanyak lebih kurang 207 orang pelayang antarabangsa dari 40 buah Negara yang telah terlibat dalam festival kali ini. Mereka adalah terdiri dari pelayang-pelayang antarabangsa yang berasal dari pelbagai negara termasuklah dari China, Taiwan, Vietnam, Laos, Rusia, England, Zambia, Ukraine, Syria, Curacao, South Korea, Mongolia, Nepal, New Zealand, Philippines, Poland, Romania, Scortland, Macau, Slovenia, Sweden, South Africa, Thailand, USA, Wales, Myanmar, Morocco, Italy, Japan, Jerman,. Bagi pelajar yang mahir berkomunikasi di dalam bahasa-bahasa lain seperti Bahasa Jepun dan Bahasa Korea, mereka dapat menyampaikan maklumat dengan lebih mudah kepada pelayang. Selain itu, mereka lebih berkeyakinan untuk berkomunikasi apabila saling berhubung semasa berada di padang. Pelajar turut berpeluang untuk mempelajari bahasa-bahasa lain apabila berkomunikasi dengan pelayang-pelayang antarabangsa tersebut. Pelajar berpeluang untuk menunjukkan kemahiran mereka melalui cara dan langkah yg perlu dibuat apabila terdapat pelayang-pelayang yang menghadapi sebarang masalah seperti masalah kesihatan, layang-layang tersangkut dipokok, ingin membuat pertukaran mata wang, membeli sim kad dan lain-lain. Justeru itu, pelajar perlu bijak untuk mencari penyelesaian segera dengan berfikiran secara kritis dalam menyelesaikan sesuatu isu yang berbangkit.

Mengikut Brown dan Zahry (1989), terdapat tiga jenis penghargaan yang diperolehi oleh pekerja sukarela iaitu (a) peluang untuk bersosialkan secara positif, (b) peluang untuk meningkatkan dibidang karier dengan menambah kemahiran yang diperolehi dan (c) kepuasan diri setelah selesai membantu menjalankan tugas. Gidron (1983) mengkelaskan bentuk-bentuk penghargaan yang diterima oleh pekerja sukarela. Antaranya ialah pembentukkan perhubungan dengan pelanggan

semasa menjalankan tugas, dan begitu juga perhubungan dangan pekerja sukarela yang lain dan juga dengan golongan profesional dalam pertubuhan kesukarelaan. Crouter, A., (1984), menyatakan bahawa walaupun pekerja biasa mendapat imbuhan dalam bentuk gaji, tetapi pekerja sukarela mendapat imbuhan yang setimpal tetapi bukan dalam bentuk imbuhan material seperti status, penghargaaan dan faedah-faedah yang lain. Dan imbuhan seperti ini dapat menguatkan motivasi dalaman yang akan menjanakan "imbuhan psikologi" yang dapat menjamin kesetiaan dalam pertubuhan tersebut. Sebagai menghargai kerjasama pelajar JPH sebagai sukarelawan, pihak MPPG akan memberikan penghargaan kepada setiap pelajar yang terlibat dengan sijil penghargaan dan sejumlah imbuhan sebagai menghargai mereka.

Penutup

Keterlibatan pelajar TVET dengan aktiviti kesukarelawanan dilihat sebagai petanda yang baik ke arah pembentukan pemikiran yang positif dan pembangunan personaliti yang mantap di kalangan pelajar . Justeru itu, budaya kesukarelawanan di politeknik perlu disemai dan disemarakkan lagi. Dicadangkan agar satu kajian yang lebih menyeluruh dilakukan oleh pihak politeknik bagi mengetahui faktor-faktor yang mendorong pelajar-pelajar Politeknik khususnya di Jabatan Pelancongan dan Hospitaliti untuk melibatkan diri di dalam program kesukarelawanan yang diadakan oleh Politeknik mahupun oleh organisasi luar. Ini kerana, faktor yang menyebabkan seseorang itu terlibat dalam kerja kesukarelawanan adalah berbeza-beza. Hasil kajian diyakini mampu menyediakan maklumat asas yang berguna ke arah keperluan perancangan program sukarelawan dan khidmat masyarakat yang lebih strategik oleh pihak pentadbir politeknik bagi memupuk semangat kesukarelawanan yang tinggi di kalangan pelajar.

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Appraisal on Different Road Stabilization Techniques for Different Road Condition

H. Halina1,a, Masirin, M.I.M2,b
1Politeknik Sultan Azlan Shah, Perak, Malaysia
2RECESS, FKAAS, Universiti Tun Hussein Onn Malaysia
ahalina1278@hotmail.com
bidrusmas@gmail.com

Keywords: Road Condition; Road Surface Condition; Stabilization Techniques; Soil properties

Abstract. Road condition in term of road surface condition depends on the subgrade soil strength. Therefore, a weak subgrade condition requires improvements in stabilization. Soil stabilization is the alteration of one or more geotechnical properties to create an improved soil material possessing the desired engineering properties. The main purpose of the soil stabilization is to increase the shear strength of an existing ground condition to enhance its load-bearing capacity, achieve a desired improved permeability and enhance the durability of the soil to resistance to the process of weathering, and traffic usage among others. Three method in soil stabilization considered in this study are chemical admixture, mechanical and geosynthetics methods. The difference in soil stabilization methods depends on the different road surface conditions. Road condition with weakness subgrade is more appropriate and economical in used stabilization chemical method. In this paper, discussing the road condition requires the ground improvement through soil stabilization.

Introduction

Road condition are categorized into various conditions including road surfaces. Road conditions that are in good condition provide the convenience of road users and reduce the risk of accidents. A road surface condition in pavement layer is supposed to be a continuous stretch of asphalt lay for a smooth ride or drive. Visible cracks, pothole, bulges and depressions may punctuate such smooth ride. The punctuation in smooth ride is generally regarded as road failure. Poor road surface condition in road failure could be defined as a discontinuity in a road pavement resulting in cracks, potholes, bulges and depressions [15]. According to Kumar [5], failed roads are characterized by cracking, rutting, shoving, depression, corrugation and edge. Typical road surface condition problems on roads are poorly performing drainage, road structures that are too thin, poor quality base course materials, frost susceptible subgrades, and peat under the road structure [2]. Field observation and laboratory experiments carried out by D.C Onuoha [15] and Zumrawi [4], showed that road failure can arise from inadequate knowledge of the geotechnical characteristics and behavior of residual soils on which the road are built and non-recognition of the influence of geology and geomorphology during the design and construction phases. Thus the treatment of troublesome materials like clays must considered by the soil stabilization.

Soil stabilization can be explained as the alteration of the soil properties by chemical or physical means in order to enhance the engineering quality of the soil [1]. A number of stabilization methods are being used to improve soil properties since ancient times. This is important especially

when comfortability of train passengers or road users are concerned [17, 18]. Stabilized soil will give better foundation for structures constructed on it especially in the transportation industries. Thus, in present studies, with the improvement of the soil, it is expected that bearing capacity will be increased. A variety of ground improvement innovations and techniques including vertical drains, complete soil replacement, grouting, geosynthetic reinforcement, new materials as reinforcements and chemical stabilization are used in construction of road to improve the performance of soil [19].

Objectives

The objectives of this paper are to conduct the followings;
a. An overview the road condition requires the ground improvement through soil stabilization
b. An appraisal on the use of the stabilization methods that are appropriate to the road conditions.

Road Conditions

Road condition can vary much along road stretches and that can cause tricky driving circumstances for drivers. Road condition are divided into road restrictions and road surface condition. The performance of road surface condition in pavement is very responsive to the characteristics of the soil subgrade. For that reason, weak subgrade is enhanced by adopting the most efficient stabilization technique. A road surface condition or pavement is the durable surface material laid down on an area intended to sustain traffic. Poor pavement is defined in terms of decreasing serviceability pavement caused by the development of surface distresses such as cracks, potholes and ruts [4]. In addition, poor road surface condition such as rutting, shoving, depression, edge drop and edge break as summarized in table 1 are due to weak soil conditions requiring improvements in soil stabilization.

Table 1. Poor road surface condition in pavement failure and their possible causes.[5]

Poor Road Surface Condition in Pavement Failure	Possible Causes
Alligator Cracking	Fatigue failure due to flexible base Inadequate pavement thickness.
Block Cracking	Reflection of joints cracking in underlying base
Longitudinal Cracking	Reflection cracking Poor paving lane joint Pavement widening Cut/fill differential settlement
Transverse Cracking	Fatigue failure of asphalt concrete Reflection of shrinkage cracking Construction joints
Rutting	Inadequate pavement thickness Post construction compaction Instability of base surfacing
Shoving	Poor bond between layers Lack of edge containment
Depression	Inadequate pavement thickness Settlement of service trench or embankment Isolated consolidation Volume change of subgrade
Corrugation	Instability of asphalt concrete or base course
Edge Drop	Inadequate pavement width Erodible shoulder material (lack of plasticity)
Edge Break	Inadequate pavement width Inadequate edge support Traffic travelling on shoulder edge drop Weak seal coat/loss of adhesion

A number of studies researchers have found a road surface condition in pavement deformation is the result of weakness in one or more layers of the pavement that has experienced movement after construction. The deformation may be accompanied by cracking. The basic type of road surface deformation are rutting, corrugations, shoving, surface-depression and swell [4]. Rutting is an undesired distress in a pavement for several reasons. Rutting is caused by several factors such as low density of the layer, stress condition, and number of load application among others and occurs in different layers of the pavement [14]. A rule of thumb is that the wider the ruts are, the deeper in the pavement the permanent deformation has occurred. Surface distortions can be a traffic hazard. Therefore, improvements to soil layers are important to avoid the occurrence of deformations.

Soil Stabilization Technique

Soil stabilization technique that are currently been used for improvement of road subgrade and subbase can be grouped into three broad categories such as mechanical stabilization, geosynthetics stabilization and chemical admixture stabilization [3]. The difference in soil stabilization methods depends on the different soil type as described in figure 1. Fine soil particles such as clay are suitable in stabilization techniques using admixture chemical. Numerous kinds of stabilizer were used as soil stabilizer were used as soil additives to improve its engineering properties. A number of stabilizers, such as lime, cement, fly ash, clay additives, chloride, Terrayme, depend on their chemical reactions with the soil elements in the presence of water [12, 3, 1, 13]. Other additives in mechanical stabilization technique, such as using new materials such as polyethylene and clay fillers or geofiber and geogrid are dependent on their physical effect to improve soil for subgrade properties [18, 19].

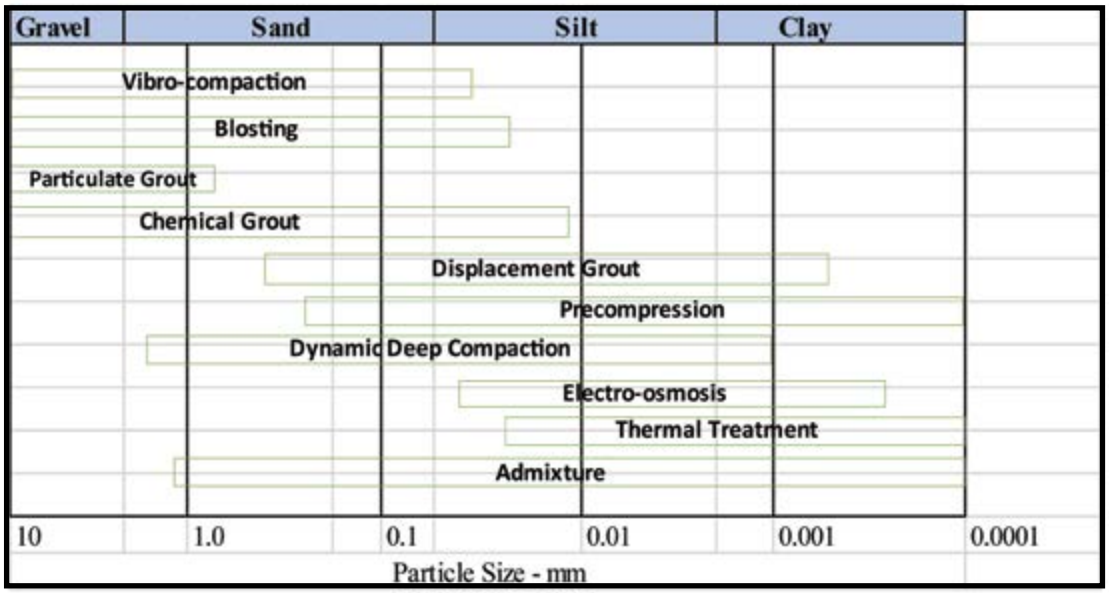

Fig. 1. Soil stabilization technique with different soil types

Mechanical stabilization is a process of mixing two or more soils with different particle size gradations to produce a new soil with desired engineering characteristics and then compacting

the mixture to the required density using conventional method [3]. The soil may be mixed at the construction site, or at a central plant, or in a burrow area. The soils are mixed and compacted at the construction site. Compaction provides a significant effect on soil properties, such as strength, permeability and swelling for improvement of road surface quality.

In addition, soil stabilization techniques are using geosynthetics. Geosynthetics can provide a reinforcement function in paved and unpaved roads to improve the subgrade bearing capacity or reduce the subbase thickness of the pavement. [6,7]. To improve the subgrade bearing capacity, the geosynthetics reinforcement is placed at the interface between the subbase and subgrade layer of the paved road and the subgrade interface for unpaved roads. The stresses imposed on the subgrade are higher in unreinforced pavement than in geosynthetics reinforced pavement. Previous research has found that interfacing soil with a geosynthetics increases the penetration resistance and hence the CBR strength is increased by 73% [8, 9]. Therefore, using of geosynthetics in soil stabilization have been found very effective solution in various geotechnical problem also for pavement subgrade stabilization.

However, previous studies have reported that the selection of soil stabilization techniques depends on the purpose and type of soil as summarized in table 2. For example for the purpose of improving the load-bearing for high plasticity clay is suitable for chemical stabilization with using lime modified soil. In addition to soil type, coarse granular to use mechanical methods of soil stabilization.

Table 2. Subgrade stabilization method most suitable for specific applications [16]

	Purpose	Soil Type	Method / Additive
A.	Improves load-carrying and stress-distribution characteristics	Coarse granular	Mechanical, asphalt, compaction and cement
		Fine granular	Mechanical, asphalt, compaction and cement
		Clays of low PI	Compaction, cement modified soil, lime modified soil, soil cement, soil lime
			Soil lime, Lime modified soil
		Clay of high PI	Cement modified soil, asphalt, cement, lime fly ash
B.	Reduce frost susceptibility	Fine granular	Cement modified soil, cement, Lime, Chemical Water proofers, Lime Modified soil.
		Clays of low PI	Cement modified soil, asphalt, Chemical Water proofers, Lime modified soil, Lime
C.	Waterproofing and improved runoff	Clay of low PI	Cement Modified soil, Cement, Chemical Water proofers, Compaction, Lime Modified Soil, Lime
D.	Control of shrinkage and swell	Clays of low PI	Lime
		Clays of high PI	Lime, Lime Modified Soil
E.	Reduce resiliency	Clays of high PI	Cement, Lime Modified Soil
		Elastic silts and clays	

Conclusion

From this appraisal, it was found that different soil stabilization techniques are dependent on different road surface conditions. Poor road surface condition caused by rutting, pumping and

shoving will require admixture chemical or new innovative materials as stabilization techniques in its subgrade layer. This situation happened due to soil failure to carry the imposed loads while at the same time having a low water permeability properties. In conclusion, this study has also found that the causes of road failure has resulted in poor road surface conditions and in order to conduct remedy or repair works, it is not enough to just resurface the roads but, the types of soil should be investigated appropriately prior to the selection of any soil stabilization method.

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Keberkesanan Proses Pengajaran dan Pembelajaran Selepas Penggunaan Buku Termodinamik

Che Azlina binti Che Norohoseni 1, a, Sharifah Enne Suhaini binti Syed Mohd Zahari2,b
1Politeknik Port Dickson, Si Rusa, Malaysia
2 Politeknik Port Dickson, Si Rusa, Malaysia
acheazlina@polipd.edu.my, bsharifah_enne@polipd.edu.my

Keywords: Buku termodinamik; Persediaan pensyarah; kefahaman pelajar.

Abstrak. Kajian ini bertujuan untuk mendapat keberkesanan proses pengajaran dan pembelajaran terhadap penggunaan buku “Thermodynamics : Polytechnic Approach, 1st Edition”. Buku ini telah digunapakai oleh pelajar yang mengambil jurusan Mekanikal di peringkat Politeknik Malaysia mulai sesi Dis 2016 sehingga kini. Kajian ini merupakan kajian tinjauan dan data dikumpulkan melalui soal selidik secara talian yang mengandungi 23 item yang diiedarkan pensyarah politeknik Malaysia untuk mengukur keberkesanan pensyarah selepas menggunakan buku dan kebolehgunaan buku. Sebanyak 13 item soal selidik diedarkan kepada pelajar untuk mengukur keberkesanan buku dari persepsi pelajar. Manakala keputusan peperiksaan akhir sebelum dan selepas penggunaan buku digunakan untuk mengukur pencapaian pelajar dalam keberkesanan buku ini. Seramai 20 orang reponden pensyarah politeknik Malaysia yang menggunakan buku termodinamik ini dan 63 orang pelajar terlibat dalam kajian ini. Data yang dikumpul dan dianalisis secara deskriptif menggunakan perisisan SPSS. Statistik destriktif melibatkan pengukuran skor min untuk dapatan data kajian. Dapatan kajian ini, menunjukkan para pensyarah merasakan penggunaan buku ini membantu mereka meningkatkan keyakinan dan persediaan mereka dalam proses pengajaran dan pembelajaran.

Pengenalan

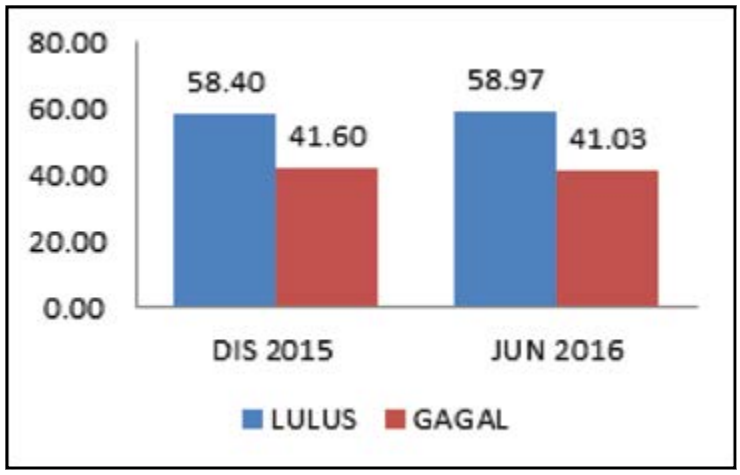
Buku merupakan bahan bacaan utama yang digunakan dalam bidang pembelajaran. Peranan buku adalah untuk menentukan pencapaian pelajar dalam satu subjek mata pelajaran yang diajar dilakukan tanpa melibatkan faktor-faktor lain [1]. Oleh itu, pemilihan buku atau bahan bacaan yang tidak sesuai dengan tahap kefahaman para pelajar berkemungkinan besar menyebabkan para pelajar gagal menguasai maklumat yang ingin disampaikan . Ramai pensyarah sering menghadapi masalah dalam pemilihan dan menyediakan bahan bacaan untuk pelajar kerana kurangnya pendedahan yang baik [12].

Kursus DJJ2073 Termodinamik merupakan salah satu kursus yang wajib diambil oleh semua pelajar yang jurusan Mekanikal di Politeknik KPM. Para pelajar perlu mengambil kursus ini, pada semester dua atau tiga bergantung kepada struktur bagi program Kejuruteraan Mekanikal yang berbeza. Di kalangan pelajar, kursus Termodinamik ini dianggap sebagai killer subject kerana peratusan kegagalan pelajar terhadap kursus ini adalah tinggi dalam setiap semester.
Sebagai langkah memupuk minat pelajar dan meningkatkan pencapaian akademik bagi kursus Termodinamik ini, maka salah satu inisiatif adalah menghasilkan buku hasil gabungan dari lima politeknik. Buku ini merupakan satu sumber pembelajaran dan bahan yang digunakan dalam

pembelajaran. Tujuan buku ini dihasilkan adalah sebagai bahan rujukan untuk pensyarah dan pelajar, membantu pensyarah dalam melaksanakan pengajaran dan pembelajaran dengan berkesan kerana terdapat nota, soalan contoh, aktiviti dan latihan. Dengan isi kandungan buku ini, pelajar yang lemah atau tercicir di dalam kuliah boleh mengulang kaji sendiri. Buku modul ini dibahagikan kepada empat tajuk utama kursus DJJ2073-Termodinamik selaras dengan kurikulum politeknik Malaysia.

Pernyataan Masalah

Permasalahan yang dihadapi, ramai pelajar gagal lepas megambil kursus ini. Ini dapat dibuktikan melalui keputusan peperiksaan sesi Disember 2015 (41.60) dan Jun 2015 (41.03) peratus pelajar gagal selepas mengambil kursus ini. Ini dijelaskan seperti dalam Rajah 1. Ia merupakan satu cabaran yang besar kepada pensyarah yang mengajar kursus ini untuk menarik minat pelajar dan memahami konsep asas termodinamik [15].



Rajah 1. Peratusan Kelulusan Pelajar yang Mengambil Kursus DJJ 2073 Termodinamik. [Data Unit Peperiksaan, Politeknik Port Dickson].

Kursus Termodinamik merupakan kursus yang lebih memerlukan pembelajaran yang berunsur imaginasi di mana para pensyarah mengalami kesukaran untuk menerangkan konsep termodinamik kepada para pelajar. Ini kerana tiada buku rujukan utama peringkat politeknik yang selari dengan silibus kurikulum yang dibangunkan oleh politeknik. Sehubungan dengan itu, timbul kesedaran kami sebagai pendidik politeknik dengan gabungan lima politeknik iaitu Politeknik Nilai, Politeknik Port Dickson, Politeknik Seberang Prai, Politeknik Ibrahim Sultan dan Politeknik Mukah. Hasil gabungan dari lima politeknik ini maka terhasil buku “Thermodynamics : Polytechnic Approach, 1st Edition” dan mula digunapakai mulai sesi Disember 2016. Sebagai bahan sumber pengajaran dan pembelajaran, peranannya adalah untuk membantu pelajar memahami dan menguasai konsep, aspek atau komponen dalam pembelajaran dengan lebih jelas dan mendalam.

Objektif Kajian

Kajian ini bertujuan untuk :

i.Dapat menentukan tahap keberkesanan pensyarah selepas menggunakan buku Termodinamik.
ii.Dapat menilai tahap kebolehgunaan buku Termodinamik dari persepsi pensyarah.
iii.Dapat menentukan keberkesanan penggunaan buku menurut persepsi pelajar.

Skop Kajian

Skop kajian ini melibatkan pensyarah yang mengajar kursus DJJ 2073-Termodinamik dan pelajar Jabatan Kejuruteraan Mekanikal, Politeknik Port Dickson yang telah mengambil kursus DJJ 2073-Termodinamik. Pensyarah ini terdiri daripada pensyarah yang telah menggunakan buku Termodinamik yang telah dibangunkan oleh penyelidik dan rakan-rakan. Responden merupakan pensyarah yang berpengalaman mengajar kursus Termodinamik lebih dari 3 tahun iaitu proses pengajaran sebelum penggunaan buku Termodinamik ini. Oleh itu, kumpulan sasaran ini, dapat membezakan pengalaman proses pengajaran dan pembelajaran sebelum dan selepas penggunaan buku kursus Termodinamik ini.

Kajian literatur

Proses pengajaran dan pembelajaran merupakan perkara yang utama dalam sistem pendidikan. Buku teks atau buku memainkan peranan penting sebagai bahan rujukan pengajar dalam menyediakan bahan pembelajaran yang mengikut silibus kurikulum [1]. Faktor pemilihan bahan pengajaran juga penting dalam memberi impak kepada proses pengajaran dan pembelajaran di dalam kelas yang lebih berkesan. Kandungan isi buku dibahagikan kepada tiga tahap iaitu senang atau mudah, selesa dan terlalu sukar atau susah [1]. Sekiranya pemilihan buku atau bahan yang tidak sesuai dengan tahap kefahaman pelajar, ia akan menyumbang kepada kekangan pengetahuan dan emosi pelajar dalam memahami maklumat yang ingin disampaikan sekaligus untuk mendatangkan kurang minat dalam konteks pembelajaran yang disampaikan. Seterusnya, faktor inilah merupakan antara faktor penyebab pelajar gagal dalam kursus ini. Buku memain peranan yang penting bagi menyampaikan maklumat, panduan kepada pelajar supaya mudah difahami. Justeru, bahan pembelajaran yang lebih menarik, efektif dan menyeronokkan melalui bahan bacaan yang bermutu dan berkualiti serta berkesan untuk pembaca [1].

Terdapat empat faktor cabaran bagi pensyarah yang mengajar kursus termodinamik ini [15]. Faktor yang pertama, pelajar gagal untuk faham konsep dalam asas termodinamik. Faktor yang kedua, pelajar tidak menguasai kemahiran membaca ‘Buku Jadual Stim’. Faktor yang ketiga, secara majoriti mennyatakan terlalu banyak rumus yang perlu diingatkan. Faktor yang terakhir, pelajar kejuruteraan elektrik dan awam menyatakan bahawa kursus termodinamik tidak penting. Mereka membuat anggapan kursus termodinamik ini hanya untuk pelajar mekanikal dan kimia sahaja [15]. Oleh itu, persediaan pengajaran seseorang pengajar sebelum masuk ke kelas amat penting bagi mencapai objektif pembelajaran. Maka, pemilihan bahan pembelajaran tersebut mestilah sesuai supaya dapat meningkatkan motivasi para pelajar khususnya boleh menarik perhatian dan minat mereka untuk belajar [2]. Persediaan ini membantu persiapan awal sebelum masuk ke dalam kelas seterusnya memberi lebih keyakinan kepada pengajar. Di samping itu juga, penggunaan buku termodinamik ini menjadi garis panduan dalam memastikan pengajar mengikuti silibus kurikulum yang telah dirancang oleh Jabatan Pengajian Politeknik.

Gaya pembelajaran merupakan cara belajar seseorang individu yang bertindak dengan

persekitarannya supaya dapat memproses, mentafsir dan memperoleh maklumat, ilmu pengetahuan atau kemahiran yang diingini. Gaya pembelajaran setiap pelajar adalah penting. Ini kerana gaya pembelajaran akan mempengaruhi pencapaian mereka dalam bidang akademik [13]. Terdapat beberapa implikasi gaya pembelajaran di dalam proses pembelajaran [3]. Sekiranya seseorang pelajar secara individu tidak dapat belajar dengan berkesan, maka seseorang guru perlu lebih prihatin dan berusaha untuk memajukan diri pelajar tersebut dalam memenuhi kehendak pembelajaran mereka. Kesimpulannya, semakin baik tahap pelajar pemprosesan dan pentafsiran seseorang pelajar itu, semakin berkesan proses pengajaran dan pembelajaran yang dilaluinya.
Berdasarkan sorotan kajian diatas, satu tinjauan dijalankan oleh peyelidik untuk mendapatkan maklum balas hasil dari penggunaan buku "Thermodynamics : Polytechnic Approach, 1st Edition" yang telah dibangunkan. Kajian ini tertujuan mendapat impak keberkesanan proses pengajaran dan pembelajaran bagi kursus Termodinamik selepas penggunaannya.

Metodologi Kajian

Kajian ini adalah merupakan satu kajian deskriptif dengan pendekatan kuantitatif. Kajian deskriptif menerangkan fenomena dengan menganalisis data deskriptif yang diproses daripada soal selidik atau media-media lain [4]. Kaedah kajian yang digunakan adalah kaedah kajian kes kerana kaedah in dapat merangkumi skop kajian yang luas.

Kajian ini berfokuskan kepada keberkesanan dan sumbangan penggunaan buku termodinamik terhadap persediaan pensyarah yang mengajar kursus DJJ2073-Termodinamik di politeknik. Sampel kajian ini terdiri daripada 20 orang pensyarah Jabatan Kejuruteraan Mekanikal, Politeknik Malaysia. Manakala seramai 63 orang pelajar Jabatan Kejuruteraan Mekanikal, Politeknik Port Dickson yang telah mengambil kursus DJJ 2073-Termodinamik. Pengumpulan maklumat bagi kajian ini melalui borang soal selidik secara talian. Soal selidik lebih pratikal dan berkesan digunakan kerana penggunaannya dapat meningkatkan ketepatan dan kebenaran maklumat yang diberikan oleh responden [4,7]. Kajian ini menggunakan soal selidik yang telah dibangunkan dan pengubahsuaian telah dilakukan terhadap soalan soal selidik supaya lebih berkesan [9].

Borang soal selidik diedarkan kepada dua kategori iaitu yang pertama kepada pensyarah manakala yang kedua kepada pelajar. Borang soal selidik yang diedarkan kepada pensyarah mengandungi 23 soalan yang dipecahankan kepada tiga bahagian. Bahagian A berkaitan dengan demografi (4 soalan), memerlukan maklumat latar belakang responden. Bahagian B adalah untuk menilai tahap persediaan pensyarah dalam penggunaan buku (8 soalan). Bahagian C pula, untuk menilai persepsi pensyarah terhadap isi kandungan buku(11 soalan).

Manakala untuk edaran pada pelajar, penyelidik bahagikan kepada dua bahagian. Bahagian A berkaitan dengan demografi (3 soalan) dan bahagian B berkaitan dengan keberkesanan penggunaan buku menurut persepsi pelajar (10 soalan).

Data yang dikumpulkan adalah data yang berbentuk kuantitatif. Data yang diperolehi akan diproses menggunakan perisian SPSS (Statistical Package for Social Sciencs version 22.0) [5]. Kaedah skor min digunakan untuk menganalisa data bagi setiap item. Oleh itu, Skala Likert digunakan untuk mengukur maklum balas para pensyarah bagi setiap soalan item yang dikemukan. Soalan-soalan dalam bahagian B dan C (persepsi pensyarah) dan bahagian B(persepsi pelajar) ini, diukur mengikut skala berikut; Sangat Setuju; Setuju; Tidak Pasti; Tidak Setuju; Sangat Tidak

Setuju. Skor min diterjemahkan dalam julat tertentu untuk menentukan tahap rendah, sederhana dan tinggi [6].

Min Skor	Intepretasi	Tahap Kecenderungan
1.0 hingga 2.39	Tidak Setuju	Rendah
2.40 hingga 3.79	Kurang Setuju	Sederhana
3.80 hingga 5.00	Setuju	Tinggi

Jadual 1 : Intepretasi Nilai skor bagi kajian
Sumber : (Landell, 1997) [6].

Analisis Kebolehpercayaan

Kebolehpercayaan data dinilai dari segi konsistensinya. Soal selidik boleh dipercayai jika jawapan responden terhadap soal selidik adalah konsisten dan boleh dilihat dengan merujuk kepada nilai cronbach alpha. Adalah didapati nilai cronbach alpha keberkesanan pensyarah sebanyak 0.928, kebolehgunaan buku 0.931 dan keberkesanan buku sebanyak 0.966. Dengan ini menunjukkan bahawa semua pembolehubah boleh dipercayai dan konsisten kerana nilai cronbach alpha melebihi 0.6. Sekiranya nilai alpha yang ditunjukkan melebihi 0.6, maka skala yang digunakan untuk mengukur pembolehubah tersebut mempunyai tahap kebolehpercayaan yang tinggi [14]. Jadual 3 menunjukkan nilai cronbach alpha bagi semua pemboleh ubah.

Pembolehubah	Nilai Cronbach Alpha
Keberkesanan pensyarah (persepsi pensyarah)	0.928
Kebolehgunaan buku (persepsi pensyarah)	0.931
Keberkesanan buku (persepsi pelajar)	0.966

Jadual 3: Analisis Kebolehpercayaan

Analisa Dapatan Kajian

Kajian ini adalah untuk mengenal pasti keberkesanan proses pengajaran dan pembelajaran selepas menggunakan buku Termodinamik. Hasil dari 20 responden pensyarah yang diperolehi, adalah seperti yang ditunjukkan di dalam Jadual 3.

Ciri-ciri	Kekerapan	Peratus
Jantina		
Lelaki	7	35
Perempuan	13	65
Umur		
31 hingga 35 tahun	4	20
36 hingga 40 tahun	12	60
41 hingga 45 tahun	4	20
Tahun Pengalaman Mengajar		
<kurang 3 tahun	3	15
4 ≤ 6 tahun	4	20
7 ≤ 9 tahun	3	15
lebih dari 9 tahun	10	50
Politeknik		
Politeknik Port Dickson	3	15
Politeknik Nilai	1	5
Politeknik Mukah	1	5
Politeknik Seberang Prai	2	10
Politeknik Ibrahim Sultan	1	5
Politeknik Tuanku Sultanah Bahiyah	2	10
Politeknik Banting Selangor	1	5
Politeknik Tuanku Syed Sirajuddin	2	10
Politeknik Sultan Abdul Halim Mu'adzam Shah	1	5
Tidak nyata nama politeknik	6	30

Jadual 3 : Data responden pensyarah.

Maklumat daripada Jadual 3 menunjukkan majoriti responden pensyarah terdiri daripada perempuan (65%) yang berumur 36 hingga 40 tahun (60%) dan berpengalaman mengajar melebihi dari 9 tahun (50%). Secara majoriti juga, didapati responden tidak menyatakan nama politeknik yang mengajar (30%).

Ciri-ciri	Kekerapan	Peratus
Jantina		
Lelaki	52	82.5
Perempuan	11	17.5
Umur		
18 hingga 19 tahun	35	55.6
20 hingga 21 tahun	26	41.3
22 hingga 23 tahun	2	3.2
Program		
DAD	22	34.9
DKM	15	23.8
DTP	26	41.3

Jadual 4 : Data responden pelajar.

Merujuk daripada Jadual 4 didapati majoriti responden pelajar adalah lelaki (52%) dan berumur 18 hingga 19 tahun (35%). Pelajar juga terdiri dari 3 program iaitu Diploma Kejuruteraan Mekanikal (Automotif) (DAD 34.9%), Diploma Kejuruteraan Mekanikal (DKM 23.8%) dan Diploma Kejuruteraan Mekanikal (Pembuatan) (DTP 41.3%).

No Item	Item	Skor Min	Tahap
5	Dapat menjimatkan masa persediaan PdP.	4.55	Tinggi
6	Proses PdP menjadi lebih teratur.	4.60	Tinggi
7	Proses PdP dalam bilik kuliah menjadi lebih teratur.	4.45	Tinggi
8	Nota dan soalan latihan sama dengan semua kelas.	4.50	Tinggi
9	Saya lebih yakin semasa mengajar.	4.50	Tinggi
10	Dapat merangsang minat pelajar dalam kursus ini.	4.30	Tinggi
11	Dapat meningkatkan interaksi antara pelajar dan pensyarah.	4.45	Tinggi
	Keseluruhan	**4.48**	**Tinggi**

Jadual 5. Analisis Skor Min bagi Item Tahap Keberkesanan Buku Persepsi Pensyarah.

Berdasarkan Jadual 5 di atas, secara keseluruhannya, purata skor min yang diperolehi adalah 4.48 dan ia berada pada tahap tinggi dan sangat baik. Item yang mendapat skor min tertinggi 4.60 iaitu item yang ke 6. Manakala skor min yang terendah untuk analisis ini adalah item yang ke 10 (4.30). Ini membuktikan bahawa buku ini membantu persediaan pensyarah sebelum dan semasa dalam proses pengajaran dan pembelajaran [1,8].

Jadual dibawah menunjukkan hasil taburan skor min bagi kandungan buku dari 20 responden dari pensyarah yang diperolehi. Pada bahagian ini, terdapat sepuluh item dinilai dan membuktikan kebolehgunaan buku ini dapat membantu meningkatkan tahap keberkesanan pensyarah di dalam

kelas.

No Item	Item	Skor Min	Tahap
12	Nota mengikut silibus kurikulum.	4.55	Tinggi
13	Nota yang mudah difahami oleh pelajar.	4.50	Tinggi
14	Nota yang sesuai dengan setiap topik.	4.60	Tinggi
15	Pembahagian sub topik sesuai.	4.55	Tinggi
16	Contoh soalan mudah difahami oleh pelajar.	4.60	Tinggi
17	Contoh soalan yang sesuai setiap topik.	4.60	Tinggi
18	Soalan tutorial yang pelbagai bentuk.	4.45	Tinggi
19	Struktur ayat yang digunakan adalah jelas.	4.35	Tinggi
20	Struktur ayat yang digunakan adalah mudah difahami.	4.35	Tinggi
21	Saiz tulisan yang digunakan sesuai.	4.50	Tinggi
	Keseluruhan	**4.51**	**Tinggi**

Jadual 6. Analisis Skor Min bagi Item Kebolehgunaan Buku.

Merujuk Jadual 6 di atas, item 14, 16 dan 17 mendapat nilai skor min yang tertinggi iaitu sebanyak 4.60. Terdapat dua item yang mendapat nilai skor min yang rendah iaitu item 19 dan 20. Secara keseluruhannya, purata skor mendapat nilai 4.51 berada pada tahap tinggi. Ini menunjukkan bahawa kebolehgunaan buku ini sangat membantu dalam keberkesanan pensyarah dalam proses pengajaran dan pembelajaran disamping dapat menarik perhatian pelajar semasa dalam kelas [6].

No Item	Item	Skor Min	Tahap
4	Saya mengunakan buku termodinamik ini sebagai nota utama semasa kuliah.	4.51	Tinggi
5	Saya sentiasa merujuk buku termodinamik ini untuk mendapatkan maklumat yang tepat.	4.41	Tinggi
6	Bahan-bahan di dalam buku termodinamik ini membantu meningkatkan kesediaan saya di dalam kelas.	4.38	Tinggi
7	Buku termodinamik ini membantu saya sebagai persediaan saya menghadapi ujian.	4.40	Tinggi
8	Buku termodinamik ini memudahkan saya dalam mengulangkaji pelajaran.	4.41	Tinggi
9	Buku termodinamik ini membantu saya dalam membuat latihan.	4.37	Tinggi
10	Saya mudah faham dengan ringkasan nota dalam buku ini.	4.28	Tinggi
11	Saya rasa lebih mudah faham selepas membuat ulangkaji menggunakan buku termodinamik ini.	4.32	Tinggi
12	Saya rasa lebih bersemangat setelah faham konsep termodinamik ini dengan menggunakan buku ini.	4.32	Tinggi
13	Saya setuju dengan buku ini dapat tingkatkan minat saya lebih mendalam dalam termodinamik ini.	4.19	Tinggi
	Keseluruhan	**4.34**	**Tinggi**

Jadual 7. Analisis Skor Min bagi Item Keberkesanan Buku Persepsi Pelajar.

Berdasarkan Jadual 7, menunjukkan hasil taburan skor min bagi keberkesanan buku dari persepsi 63 orang pelajar. Pada bahagian ini, Hasil dapatan kajian pada bahagian ini, 10 item telah dinilai. Secara keseluruhannya, purata skor min yang diperolehi adalah 4.34 dan ia berada pada tahap yang tinggi. Item 4 mendapat nilai skor yang tinggi dengan nilai skor min bernilai 4.51. Manakala item 13 mendapat skor min yang rendah dengan nilai 4.19. Oleh itu, kesan penggunaan buku ini, di dapati meningkatkan tahap kefahaman pelajar dalam tempoh yang singkat [11]. Tahap keberkesanan buku dan penguasaan buku ini dapat membantu pelajar dalam pengajaran dan pembelajaran. [7,8]. Secara keseluruhan, para pensyarah dan pelajar amat berpuas hati dengan kesan pengajaran dan pembelajaran dalam kelas selepas menggunakannya buku ini. Ini dapat dibuktikan hasil keputusan peperiksaan pelajar selepas menggunakan buku ini.

PENGGUNAAN BUKU		LULUS	GAGAL
SEBELUM	DIS 2015	58.40	41.60
	JUN 2016	58.97	41.03
SELEPAS	DIS 2016	84.36	15.64
	JUN 2017	81.05	18.95

Jadual 8. Peratus kelulusan pelajar sebelum dan selepas penggunaan buku di Politeknik Port Dickson.

[Sumber: Unit Peperiksaan, Politeknik Port Dickson]

Kesimpulan

Dapatan kajian menunjukkan secara umumnya pensyarah dan pelajar merasakan penggunaan buku ini membantu mereka dalam keberkesanan proses pengajaran dan pembelajaran semasa kuliah. Ini dapat dibuktikan daripada data yang diperolehi jelas menunjukkan bahawa proses pengajaran dan pembelajaran menjadi lebih teratur dengan nilai skor min yang tinggi 4.60. Oleh itu, penggunaan buku ini juga berkesan mengoptimumkan tahap persediaan pensyarah semasa proses pengajaran dan pembelajaran. Di samping itu, para pensyarah dapat merasakan movitasi mereka meningkat selepas menggunakan buku ini semasa proses pengajaran dan pembelajaran. Tambahan pula para pelajar, telah menggunakan buku ini sebagai nota utama mereka semasa kuliah dengan nilai skor 4.51. Dengan mengunakan buku ini, mereka menggunakan sumber rujukan bagaimana menyelasaikan soalan berdasarkan soalan contoh didalam buku. Sebagai rumusan, pengkaji memdapati kajian ini membuktikan bahawa peranan buku Termodinamik ini memberi impak yang mendalam kepada pensyarah dan juga pelajar. Ini dapat dibuktikan melalui hasil keputusan Peperiksan Akhir kursus DJJ2073-Termodinamik ini ada peningkatan selepas menggunakan buku ini khusus pelajar ambil subjek ini di Politeknik Port Dickson.

Penghargaan

Di sini, saya ingin mengambil kesempatan untuk merakamkan ucapan terima kasih kepada rakan-rakan pensyarah yang sudi menjawab soal selidik kajian ini. Di samping itu, juga saya ingin

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Developing an Advertorial Video for Increasing the Sale of Traditional Food Home Industry (A Case Study at Rakik Ayah Home Industry)

Sumira1, Nini Wahyuni2, Annisa Rahma Fianti3
1 State Polytechnic of Padang, Padang, Indonesia
2 State Polytechnic of Padang, Padang, Indonesia
3 State Polytechnic of Padang,, Padang, Indonesia
sumiradoano@gmail.com, ni2wa@yahoo.com, annisa.rahfian@gmail.com

Keywords: Advertorial Video; Home Industry; Traditional Food.

Abstract. This research discuss about the process of developing an advertorial video of Rakik Ayah, a traditional food from West Sumatera, especially Padang Panjang regency. The purpose of making this advertorial video are to promote and increase the sale of the traditional food product. There are some steps were done during conducting the process, namely; pre-production, production, and post production. In pre-production, the stages are set the topic, do some research and observation, make a framework, and prepare some tools to be used. Meanwhile, in production, shooting, selecting the video result, writing script, and recording the voice over were done. The last step is post production, in which the process are editing the video and voice, and mixing. The final video is assessed by experts; broadcasting and language expert. The result of this research is an appropriate advertorial video that is used as promotion media to increase the sale of the traditional food. In addition, the advertorial product can be shared and uploaded to online media.

Introduction

West Sumatera is one of provinces in Indonesia which has a good potential in both natural and human resources. In addition, it has a good agrarian commodity to improve the economic sector. The government support the economic growth of their society through several policies, such as attract the foreign tourist to come to this area, give an incentive support to small and middle business agent, and support the investment rapid.

According to the data of Pemerintah Kabupaten Tanah Datar (2017), there are more than 900.000 unit Small and Middle Micro Business (UMKM) in West Sumatera. One of the business is home industry in which all of the business activities such as the production and trade are done at home. The agent of this home industry is professional and businessman in which the number of them are usually increase time by time.

Rakik Ayah is one of the example of UMKM in West Sumatera, especially in Padang Panjang Regency. It is a traditional food product that has been produced since 1990 or almost 40 years ago. The advantages of this product are free MSG, preservative, and artificial dyes. This product is quite familiar and become one of the favourite food for Padang Panjang society and people in surrounding area such as Riau, Jambi, Medan, Bengkulu, Lampung, even Malaysia. However, during this time, the product promotion is done conventionally from word of mouth. Meanwhile,

promotion is important part in business, especially for Small and Middle Micro Business agent. They can increase the marketing and selling product through promote it both in electronic media; radio or television. However, due to the cost of promotion in the electronics media are expensive, the business agent just use information from person to person to promote their product.

Realizing this facts, this research focus in making an advertorial video as the media promotion to increase the sales of this product. Promotion is an essential part in marketing and selling product to wider society. The result of this research is an advertorial video that can be used as the promotion media to promote Rakik Ayah product. In addition, the result of this research can be uploaded into online media such as You Tube, Face Book, etc and it can be an alternatives way to increase the sale of the traditional food home industry in West Sumatera.

Material and Method.

A. Advertorial Video. Advertorial is a kind of media promotion that has longer duration. It is a combination of advertisement and editorial, as Arens (1992) explains that advertorial is a combination between advertisement and editorial. Whereas advertisement is presentation of material persuasively to the public through mass media in order to promote the product or services. Meanwhile, editorial is a statement about the opinion or argumentation that discuss about the current issues. In different way, Durianto (2003) said that advertorial is an advertisement to persuade the people to take action, and it will give the profit to the advertiser. Meanwhile, according to Marriem Webster (2009), definition of advertorial is concerning the one showed television (TV). Advertorials on television are longer than typical television advertisements. They are usually played on cable and satellite channels, which are less expensive than broadcast television. They may include a plot or story line to increase the entertainment value for viewers, and thus hold their attention longer.

Advertorial video is a part of feature video that fuctioned to promote the produce, service or the activities of organization (Lesmana, F, 2017) . Hence producing advertorial is quite the same with producing feature. There are some opinion suggested by some expert on the procedures of producing the feature. Rosenthal. A (2002), Fachruddin (2014), Sumira and Wahyuni (2018) propose three standard procedure in the producing feature ; pre production, production and post production

Pre-production. The process in this part is on preparation and plan of the whole things needed in making advertorial. There are several stages that must be done in pre production, such as formulating the idea, doing observation, making plan in form of and preparing some tools needed. First, formulating the idea. It is an early stage in finding and selecting idea or ideas and choose one of them that is more interesting to be produce. The idea can be gotten from ways: based on the experience, having connecting with informan, analyzing others media. It also can be found suddenly, such as on the road, at school, at office, and other places.

Second is doing observation or research. It can be the primary research of personal experience, for example by visiting and meeting the people in the observation directly. Then write down everything they get from observation, such as attitude, behavior, and thought from the people who are being researched. Last one is secondary research, it is done based on some reading material like books, newspapers, online article, biography, thesis and another search.

Third is making plan. This is the time to make the content of the feature that will be produced,

doing a meeting with the staff and making some plan in order to produce good feature/ advertorial. In this stage , the team arrange a frame work or story board that consist of title, list of data, informan to be met, list of question, making shooting list (Shooting list contains of notes about the sequence of images that will be recorded with a camera, such as location, situation, interview result on main characters, and activity of informant), shooting schedule. The last one is preparing tools. such as camera, tripod, microphone, battery, cassette or memory card, and lighting.

Production. At this stage, focuses on the shooting process. The team will do some activities such as taking some pictures and videos that are needed in making this video. Then collecting data from the source person's informat, doing depth interview, and recording the environment in order to support in completing the video..

Post-Production. This is the last part of video . The team will select all of the data that have been collected, such as picture or video, and the record of the interview. Then based on the date collected , it is time to write a script. A script is something written in well structured which should apply touching words. Then the team should pay attention to sentence structures, contens, etc. The script then is produce to be voice in voice over. It is the process of recording narration with the clear intonation and voice. Next is editing process. This process is about compiling, manipulating, and arranging re-recording the video (master tape) to provide additional text, images, or voice that is easy to be understood, and can be enjoyed by viewers. The last one is mixing. This part is about making a feature by combining all of videos, pictures, records of the informant, voice over (VO), and back sound music for the feature. The purpose is to make the project into a good video so the viewers enjoy watching it.

B. Research Design . This research is Research and Development study (R&D). The purpose of this research is to develop an appropriate advertorial video of a traditional food home industry product to both domestic and international society. The video becomes an alternatives promotion media that can be shared or uploaded through online media. By having an online media promotion, it is hoped that the producer can increase their production and marketing. The development and procedures of this research were adopted from theory that is proposed by Gall, M.D, Gall, J.P., & Borg, W.R. (2003) and Lee and Owen (2004). The development procedure consists of finding the needs analysis, developing product, validating the product, and revising the product.

This research develop an advertorial video through three stages, namely; pre-production, production, and post production. The instrumentation of this research are tape recorder, camera, tripod, assessment form for expert judgement, and interview list. For the video, it used Cool Edit Pro (Version 2.1) and Adobe Premiere application .

The data were collected through field survey and list of question for interviews in order to find the needs analysis data to make the advertorial video. Moreover, the advertorial product were assessed by using assessment list that consist of questions. The video product would be assessed by experts. The assessing form used Likert Scale 1-5, in which 1 is for very poor, 2 is for poor, 3 is for enough, 4 is for good, and 5 is for very good. Beside, the assessment form used written assessment, so the experts can give their written comments and suggestions. The result of the assessment was used as the consideration to evaluate and revise the advertorial product.

Result.

A. Need Analysis. It is the step where the researchers analyse and identify the need of media for promoting a product of traditional food home industry. It was done by conducting some survey and interview with some owner of traditional food home industry in Padang Panjang. From the survey and interview known that the method of selling and promoting their product are direct selling at home and some souvenir and food stores. Thus the promotion is also the information from one to one. In addition it is known that if they do promotion through television or radio , it will be expensive.

The researchers also get the information that most of the owner have been get in touch with social media like Face book, Line, twitter, etc. Thus come an idea to produce the promotion video that can be uploaded to online media as an alternative way to promote their product. Meanwhile as the lecturers at English department of State Polytechnic of Padang which concern with broadcasting field, the researcher want to formulate the model for advertorial video as one of the product that can be produce by the students since there is no valid model for this product for the students as a reference.
Finally the researcher chose one of traditional food home industry named Rakik Ayah as the object of this research, located at Koto Tuo, Panyalaian, Tanah Datar Regency. It has been established in 1990s. The owner, Yelmi Yunus, continues this home industry since 2010 which has been pioneered by her parents before.

B. Product Development. After conducting need analysis , then the researchers collaborated with one of English department students who chose advertorial video as her final project. The researchers role as the advisor of her final project who guide her in producing the product. The student produced the advertorial video following some stages; pre production, production, and post production

Pre-production: This is the step to prepare all thing before production process. Hence the object of this project have been pointed out after need analysis, thus the researchers continued with making the planning. Here, the researchers arranged the story board or frame work of the advertorial which consists of the topic, the aims, the questions list , the informants to be interviewed, the time schedule, budget estimation due to make the shooting process became more easier. In addition, before going to shooting process, the researchers had to prepare all the tools which were Camera Canon 7000D, Camera Canon Mirrorless, mic, lighting, tripod, and laptop to copy the videos from camera.

.Production: There are four activities conducted here: shooting, editing or selecting, writing script and recording voice over (VO). First shooting was focused on taking pictures and interviewing for information to make this advetorial video. Second is selecting the video then arrange it to the folder. The researchers also listened the result of the interviewed and selected them to be inserted in a script. Third is writing the script. For making advertorial script there are a formula, to be fulfil: 5W + 1H; what, who, where, when, why, and how. It means what the subject, who is the informants and target, where it is, when it is, why the target should know or buy, how to buy or how to make it. The

script was made based on the result of observation, shooting and interview. The last is Recording Voice Over (VO). When the script done, then the researchers have to read it by using tape recorder and also smart phone.

Post-production: In this stage, there are some activities: editing , subtitling, and mixing. For editing, there are two type of editing: editing voice and editing video. Editing voice is functioned for cleaning the noise background of VO. Cool Edit Pro 2.1 was applied in this process.



Fig.1. Cool Edit Pro 2.1 Application

While for Editing video which come from video shooting, and video courtesy, the application used was Adobe Premiere Pro CS6. After all the videos, voice, back sounds of the videos were completed to combine in mixing process , also used Adobe Premiere Pro CS6 application. The final results of this advertorial video entitled "Advetorial Video : Rakik Ayah Home Industry, Koto Tuo, Tanah Datar, West Sumatera" were an English script and video in MP4 format.



Fig. 2. Adobe Premiere Pro CS6 Application

Product Validation

The validation of the product were done in two phases. First is in writing the script and the second is the advertorial video . The first script made was gave to the broadcaster expert to ask for suggestion. There some point that must be written in advertorial script: (1) Subject of the the advertorial, (2) Organization or the name of the institution, (3) Location of the object, (4) Advantages of the product, (5) Application or where the product can be used or get, (6) Detail of the product, (7) Source or where the product can be gotten. Based on the analysing done by the expert , the script made have to be revise since in the script there is no information about the prize, and the detail of the product do not complete yet.

The second validation is related to the advertorial video. There are two experts who asked to fulfil the questionnaire: broadcaster expert for validating the technical content, and language expert or editor for validating the language since it was made in English. The aspects measured by broadcaster expert are; (1) Content, such as The theme, materials, plot, and the deep of the analysis, references, narration, voice (2) Delivery, such as the back sound,, wild tracking, and visualisation. While the language aspect to be validated were: (1)Narration, such as intonation, pronunciation, expression, articulation and , sentence structures. (2) Communication such as expression, the naturalisation, delivering the massages.

Product Revision

Based on the judgment from experts, first the researchers revised the script in form of content and sentence structured. In form of content, the researchers have to put the prize of the product, the location of the product can be gotten without saying the name of the store since it is an advertorial of the product, not a store. Then the researchers also must add the information about the producing detail like the packaging, weight, etc. Furthermore in form of language, the researcher must to revise the sentence structure related to the diction and sentence structure/ grammar.

The last revision was on the advertorial video itself. Based on the questionnaire and suggestions of the two experts, then the researcher have to add some more video in order to make the video better due to some information did not complete yet. Then the VO must be reproduce since the voice was too low. Then pronunciation, intonation, expression were not appropriate. Finally, the researchers can produce the script and advertorial video which can be used for promoting the product and can be a model for English department student who want to produce an advertorial video as their final project.

Conclusion

Advertorial video is a way to promote a product, service, and organization. Producing advertorial video is challenging, thus one who want to produce it must be creative, have a sense of art, and update. To produce good and acceptable advertorial video, someone have to do deep research on the product, service, organization to be promoted. Then it need to follow some procedures pre-production, production and post- production.

Since this advertorial video have been launched yet, thus the product application can not be measured yet. It is hope that for next, the researchers or other researchers can continue this R and D project to see the effectiveness of the video for increasing the marketing of the traditional food home industry product.

ACKNOWLEDGMENT

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Tensile Strength of Cogon Grass (Imperata Cylindrica) Reinforced Polypropylene

Norlini Husshin1, a Nur Aziah Hamzah2, b and Dr Nor Fazli Adull Manan3, c
1, 2 Politeknik Ibrahim Sultan, Johor,Malaysia
3Universiti Teknologi Mara,Selangor,Malaysia
anorlini@pis.edu.my,bhaszmyah8283@gmail.com,cnorfazli@salam.uitm.edu.my

ABSTRACT: Natural fibers have recently become attractive to researchers and engineers as an alternative reinforcement for fiber reinforced polymer composites. It is not only environmentally friendly, but also a great potential with physical properties and excellent performance at low weight, high strength and low density. In the present year, natural fiber cogon grass botanically called Imperata Cylindrica is introduced and it belongs to vedic grass family. In relation to that, this project focused on the tensile strength of the cogon grass reinforced polypropylene. Therefore, this project is conducted to analyze the effect of fiber content of the natural fiber reinforced composite. Composites consisting of cogon grass fiber and polypropylene were prepared by varying fiber contents (0 wt%, 5wt%, 10wt%, 15wt%, and 20wt%). The composite was then placed in a premier planetary mixer and through a vertical injection moulding machine. Three specimens were made for each fiber contents and were tested by using tensile test standard (ASTM D638). Then, the experiment result will analyze the stress-strain, stress-stretch and Young's modulus value. The best tensile strength is 12.026MPa and has the higher value of strain which is of 1.963%. These will conclude that the 15% of weight fraction of cogon grass fiber indicate the best tensile strength.

Keywords: Cogon Grass, Imperata Cylindrica, Polypropylene, Injection Moulding

Introduction

One of the main issues and challenges faced by world nowadays is waste generation and treatment. This is a very important issue as it is one of the factors under sustainability, which is able to make the world fully developed [1]. Due to these environmental issues, there have been various studies and researches conducted to promote the management and recycling of waste materials. A recommended way to solve this problem is natural fiber used as a reinforcement in the development of partially biodegradable green and environmentally friendly composites.

Polypropylene (PP) is a thermoplastic polymer that is widely used in industry such as laboratory equipment, automotive components, electrical equipment, packaging and textiles [2]. Generally, polypropylene has demonstrated some certain advantages such as good process ability, good stiffness, food contact acceptable, high impact resistance and good chemical resistance. However, polypropylene have some disadvantages and limitations such as high flammable, susceptible to UV degradation, susceptible to oxidation, high thermal expansion and poor bonding properties [3]. The mechanical properties and behavior of the polypropylene is improvised by adding a natural fiber into it. It is because the natural fiber is very lightweight, low energy production and most suitable substances to develop a new technology of reinforced polypropylene [4]

Natural fiber is a fiber that are produced by plants, animals and geological process [5]. From previous researches, the banana fiber, pineapple leaf fiber, papyrus, kenaf, hemp, jute, sisal, wood, coconut and cotton have been used as reinforcement of fibers by thermoplastic polymer [6]. In this study, a new technology of reinforced fibers is used from a cogon grass and also known as Imperata Cylindrica [7].

A cogon grass fiber widely used in the manufacture of engineering materials such as natural fiber reinforced composites. A fiber reinforced polymer is a composite material consisting of a polymer matrix reinforced with the natural fibers. Generally, polymer can be classified into two classes, thermoplastics and thermosetting [8]. Thermoplastic material which is polypropylene is used as reinforcement to the cogon grass fiber.

This research was conducted to study the effect of cogon grass fiber in the reinforcement of polypropylene. The basic mechanical properties of this composites were tested after it is fabricated by using vertical injection moulding [9]. The analysis is made by plotting a graph of stress over strain to determine the best composition of polypropylene and cogon grass fiber for further study.

Materials and Method

Materials

Polypropylene was supplied in granulated form by Faculty of Mechanical Engineering, UiTM Shah Alam. It has melting temperature of 180 °C and melt flow index of 11 gm/10 min at 230 °C. Cogon grass fiber was purchased from Shaanxi Jintai Biological Engineering. This fiber was undergone the solvent extraction and formed into fine brownish-yellow powder.

Sample Preparation

Based on Fig. 1, initially the composites sample was prepared in proper proportion of fibers (5wt%, 10wt%, 15wt%, and 20wt%) by weight and polypropylene pellets. The composite was mixed into premier planetary mixer for one hour. After it left to solidify for 24 hours, the composite was placed in the crusher machine and form into pellets. Then, it was placed in a vertical injection moulding machine at a temperature of 210 °C to fabricated three specimens for each weight fraction.



Fig. 1: Process to prepare the cogon grass fiber reinforced polypropylene.

Tensile Test

All Tensile test was carried out by using Laryee UE34300 universal testing machine system at the Strength of Material Laboratory of Department of Mechanical. Firstly, the parameters were set to 6 mm for thickness, 12 mm for width and 90 mm for the length. Then, the dog bone shaped specimen is placed into the tensile test machine as shown in Fig. 2. Furthermore, the ASTM D638-Standard Test Method is used to measure the tensile properties such as the ultimate tensile stress, strain and Young's modulus[10]. The constant speed rate for this testing is 10 mm/min. After the specimen cracked, the process is done. Fig. 3 show the specimen after tensile test.



Fig. 2: Arrangement of specimen for tensile test preparation.

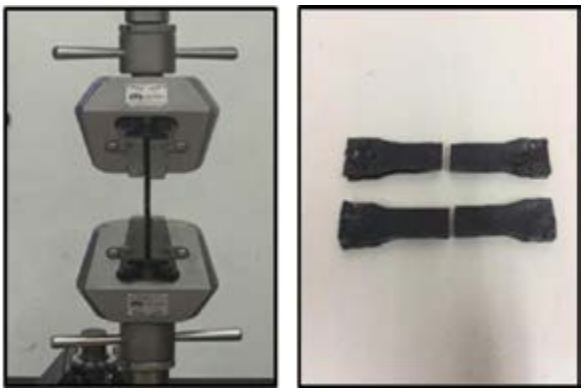

Fig. 3: The specimens after tensile test.

Result and Discussion

Stress-Strain Results

Table 1 shows the data of the total average stress-strain of the composition of cogon grass fiber reinforced polypropylene for each fiber content. The results of different fiber percentage are compared to conclude the best fiber percentage reinforced with polypropylene.

Table 1: The Stress-Strain Data of Difference Percentage of Fiber Reinforced Polypropylene

Stress (MPa)	Strain (%)			
	5 wt%	10 wt%	15 wt%	20 wt%
0	0.00	0.00	0.00	0.00
1	0.42	0.41	0.40	0.32
2	0.55	0.52	0.50	0.40
3	0.64	0.61	0.59	0.46
4	0.78	0.73	0.68	0.52

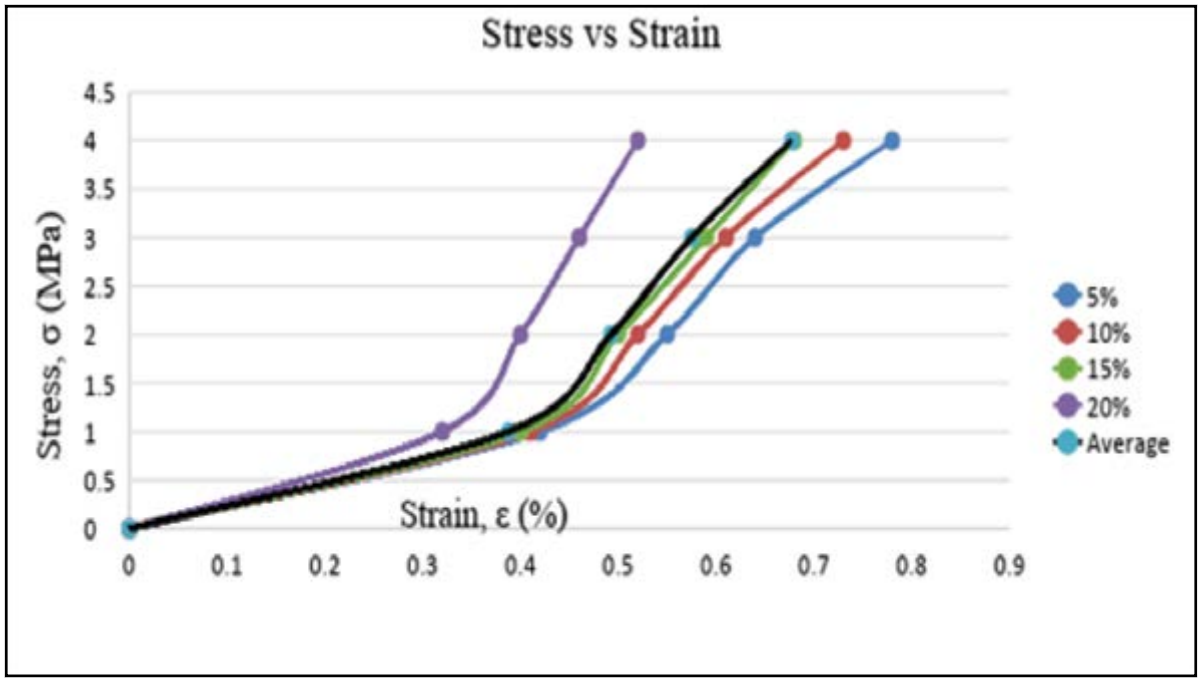

Fig. 4: The Graph of Stress against Strain for Different Percentage of Fiber Reinforced Polypropylene.

Fig. 4 shows the higher value of strain at 4 MPa is 5 wt% of fiber and followed by 10 wt%, 15 wt% and 20 wt%. The 5wt% of fiber is the highest value of strain and more ductile compared to other fiber percentage. The 20 wt% of fiber shows the lowest value of strain which means it is less ductile compared to other fiber percentage. The highest strain recorded in this experiment is 2.185% at 14.215 MPa for 15 wt% of fiber.

The average of tensile stress, tensile strength and young's modulus are found out for four different weight percentage of fiber as shown in Table 2. Based on the Fig. 5, the tensile stress is found to be increasing up to 15 wt% of fiber and the decrease at 20 wt%. The tensile stress of the composition is calculated as 12.026 MPa. The highest tensile strength for fiber reinforced polyester is 26.59 MPa because the composition of the previous is much linked to each other as compared to this experiment. This shows the large difference of tensile strength of these study. Fig. 6 shows the 15 wt% of fiber as the highest value of strain which is 1.963% and after that it decrease to 1.142% at 20 wt%. Lastly, Fig. 7 shows the Young's modulus is increase as the fiber weight percentage increase. As fiber is the stiffer component in the composite, resistance towards deformation increases with increase in fiber content, this consequently increases the stiffness of the composite. The highest Young's modulus is calculated as 1.384 GPa. The Young's modulus of the previous study state that the highest value is 674.95 MPa as compared to current study which is in the range of 579.84 MPa to 1138.44 MPa. These study shows that the fiber reinforced polypropylene could be more, less and medium range of ductile. Based on data analysis for this study, the best composition of fibers reinforced polypropylene is 15 wt.% of fibers because the higher value of tensile strength is 13.57 MPa which is close to previous data and the young modulus is 1100.38 % which is acceptable value as compared to previous data.

Table 2: The Average Value of Tensile Stress, Tensile Strain and Young's Modulus of different percentage weight of fiber.

Fiber Percentage	5 wt%	10 wt%	15 wt%	20 wt%
Tensile Stress, σ (MPa)	4.413	7.472	12.026	9.532
Tensile Strain, ε (%)	0.876	1.204	1.963	1.142
Young's Modulus, E (MPa)	579.840	983.274	1100.380	1384.441

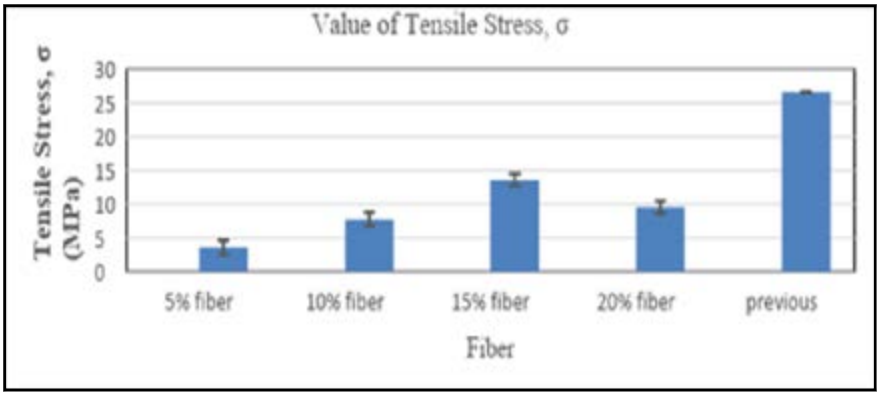

Fig. 5: The Value of Tensile Stress of the Fiber

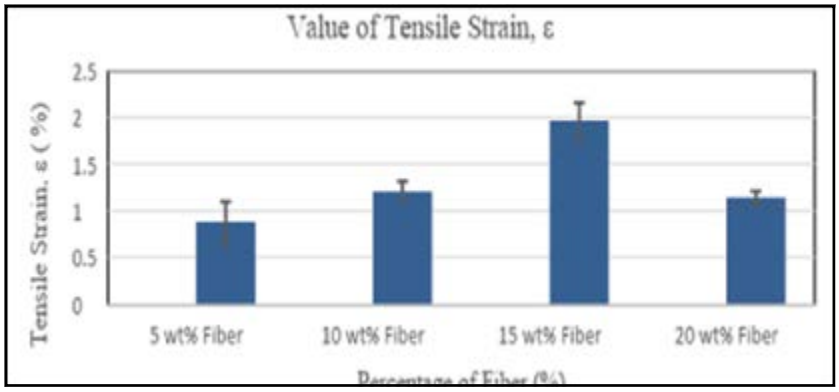

Fig. 6: The Value of Tensile Strain of the Fiber Reinforced Polypropylene

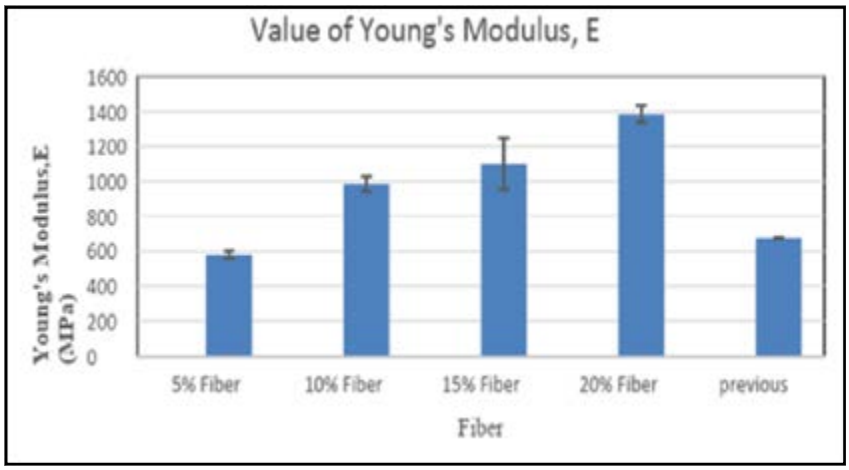

Fig. 7: The Value of Young's Modulus of the Fiber Reinforced Polypropylene

Conclusion

As a conclusion, the effect of adding cogon grass as reinforced fiber has been successfully investigated. The results of this study shows the 15wt% have the highest value of tensile strength compared to other fiber percentage. The finding shows, the increasing percentage of fiber will increase the value of tensile strength until 15wt% of fiber, then the tensile strength decrease at 20wt% of fiber. The Young's modulus in this experiment have the closer value to the theoretical value of polypropylene. As recommendation for further study, the other test like flexural test or fracture test should be done for this composite.

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Keberkesanan Penggunaan Borang Penilaian Keberkesanan Latihan Secara Atas Talian Di Unit Latihan Dan Pendidikan Lanjutan, PIS

S. Maisarawani1,a , S. Julaila2.b
1,2Politeknik Ibrahim Sultan, Pasir Gudang, Johor Darul Ta'zim
amaisarawani@yahoo.com.my, bjulailasapari@gmail.com

Kata Kunci: Borang secara atas talian; Borang penilaian keberkesanan latihan; SPSS

Abstrak. Sistem pemfailan yang banyak dengan penggunaan borang manual dan masalah pengumpulan data dan maklumbalas selepas kursus mendorong kami untuk menambah baik Sistem Borang Penilaian Keberkesanan Latihan secara atas talian. Selain daripada itu Unit Latihan dan Pendidikan Lanjutan, Politeknik Ibrahim Sultan (PIS) juga menghadapi masalah staf tidak mengisi borang secara manual dan pemantauan lambat dikesan. Oleh yang demikian kajian ini dibuat untuk melihat keberkesanan menggunakan Borang Penilaian Keberkesanan Latihan secara atas talian ini setelah tamat sesuatu kursus. Ia juga dapat membantu staf mengisi borang penilaian latihan ini di mana sahaja mereka berada dan pada bila-bila masa sahaja. Ini mendorong staf untuk menggunakan teknologi masa kini sekaligus berasa seronok dengan sistem yang digunakan. Bagi melaksanakannya, pengkaji telah menggunakan platform atas alamat www.jotform.com sebagai fokus kajian penggunaan borang penilaian secara atas talian dikalangan peserta kursus anjuran Unit Latihan Dan Pendidikan Lanjutan, di Politeknik Ibrahim Sultan. Instrumen kajian yang digunakan oleh pengkaji bagi menjalankan kajian adalah melalui soal selidik. Selain itu, perisian Statistical Package For Social Science (SPSS) menggunakan skor min dan nilai peratus. Ini merupakan tapak asas pada Politeknik Ibrahim Sultan sebagai peneraju kepada organisasi di Malaysia yang menuju kepada 'Go Green'.

Pengenalan

Perkembangan teknologi pada masa kini sedang pesat membangun. Perkara ini disebabkan oleh proses globalisasi yang sedang berlaku. Pada hari ini, seluruh negara telah merasakan perubahan di dalam bidang teknologi maklumat dan komunikasi. Persaingan masyarakat dunia yang hebat dalam abad ke-21 ini telah membawa kepada perubahan daripada era masyarakat industri kepada era masyarakat bermaklumat. Perkembangan dan penerokaan yang berterusan dalam bidang sains dan teknologi telah menyebabkan kehidupan manusia menjadi lebih maju dan sistematik. Telah banyak aplikasi kemajuan dalam bidang sains dan teknologi dapat digunakan untuk membantu manusia meringankan tugasan seharian mereka di samping membantu mereka untuk meneroka ilmu-ilmu dan pengetahuan yang lebih luas.

Perbincangan mengenai globalisasi dan corak pendidikan dunia tidak akan lengkap tanpa adanya penjelasan apakah yang dimaksudkan dengan apa yang dimaksudkan sebagai globalisasi. Menurut Messier dan Margaret (2002), "In today's world, distance is no longer a barrier to market entry, technologies are rapidly replicated by competitors, and information and communications technologies are shaping a new economic order" yang bermaksud globalisasi merupakan suatu

proses menjadikan dunia sebagai suatu perkampungan global di mana tiada sebarang sekatan ke atas seseorang individu ataupun organisasi untuk memasuki negara yang lain

Secara amnya, penggunaan borang penilaian keberkesanan latihan secara atas talian dalam pengurusan latihan merupakan alternatif kepada kaedah pengagihan borang secara tradisional. Memandangkan teknologi ICT dapat memastikan sumber maklumat diperolehi dengan mudah pada bila-bila masa dan dimana-mana sahaja, maka dengan itu penggunaan teknologi ICT dalam proses pengajaran dan pembelajaran serta pengurusan dan pentadbiran pendidikan Malaysia diperlukan (Chan, 2001).

Telefon bimbit memainkan peranan yang penting dalam kehidupan manusia sebagai alat untuk berkomunikasi dan telah berjaya menarik minat golongan muda(Hamdan, Din & Abdul Manaf, 2012). Berdasarkan Laporan Kaji Selidik Pengguna Telefon Bimbit 2007 yang dikeluarkan Suruhanjaya Komunikasi Multimedia Malaysia,lebih separuh daripada 21 juta pengguna telefon bimbit di negara ini gemar menggunakan khidmat SMS atau khidmat MMS sebagai medium berkomunikasi.Teknologi telekomunikasi juga terus mengalami perkembangan yang mendadak diseluruh dunia terutamanya dalam peralatan mudah alih seperti telefon bimbit dan PDA(Landell, 1997). Staf PIS hanya perlu menaipkan link yang telah dibangunkan iaitu www.jotform.me/pis/borang_penilaian_kursus dengan menggunakan telefon pintar mereka. Hasilnya borang penilaian kursus dapat dicapai serta dilengkapkan dengan cepat dan pantas.

Objektif Kajian

Mengetahui keberkesanan penggunaan borang secara atas talian kepada staf Politeknik Ibrahim Sultan.

Metodologi Kajian

Bahagian yang utama dalam menentukan metodologi kajian adalah mengenal pasti reka bentuk kajian. Reka bentuk kajian merupakan panduan tentang pendekatan kaedah yang sesuai digunakan bagi sesuatu kajian (Othman, 2001). Reka bentuk kajian dapat ditetapkan sekiranya pernyataan masalah, tujuan kajian serta persoalan kajian telah dikenal pasti. Bagi kajian ini, reka bentuk kajian yang akan diaplikasikan adalah kaedah tinjauan berbentuk deskriptif. Kaedah tinjauan ialah satu kaedah yang mudah dan popular (Mohd. Najib, 2003). Kaedah tinjauan merupakan kajian terhadap perkara yang sedang berlaku. Ia dijalankan dengan cara mendapatkan data dalam tempoh suatu masa tertentu sahaja. Selain itu, kaedah ini juga digunakan untuk mengukur pembolehubah-pembolehubah yang berkaitan dengan suatu fenomena tanpa menyoal mengapa pembolehubah tersebut wujud (Mohd. Majid, 2005).

4. Dapatan Kajian Dan Perbincangan

Kajian ini dijalankan untuk mengukur keberkesanan penggunaan Borang Penilaian Keberkesanan Latihan secara atas talian kepada peserta kursus anjuran Unit Latihan Dan Pendidikan Lanjutan, Politeknik Ibrahim Sultan. Data yang diperolehi daripada jawapan soal selidik dianalisis dan dikemukakan dalam bab ini. Keputusan yang diambil semuanya berdasarkan pentafsiran ke atas hasil pemprosesan data yang diperolehi daripada jawapan soalselidik. Berpandukan data demografi

dari Jadual 1 di bawah seramai 45 orang respondan daripada 50 borang soal selidik yang terdiri daripada jabatan dan unit yang berbeza yang telah memberikan maklumbalas. Ini bermakna 90% respondan memberikan kerjasama menjawab dan memulangkan soal selidik tersebut.

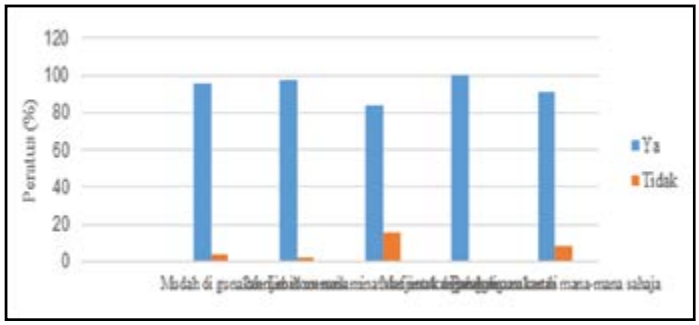
Jadual 1. Demografi responden

Jumlah responden	=	**45 orang**
Lelaki	=	15 orang
Perempuan	=	30 orang
Umur responden (tahun)		
18 – 29 orang	=	27 orang
30 – 45 orang	=	15 orang
45 ke atas	=	3 orang
Bilangan tahun bekerja (tahun)		
1-5 tahun	=	10 orang
6-10 tahun	=	15 orang
11 ke atas	=	20 orang

Jadual 2. Analisis soal selidik keberkesanan penggunaan boring secara atas talian.

Item	Ya	Tidak
	Kekerapan	
Mudah di gunakan	43	2
Menjimatkan masa	44	1
Lebih menarik minat staf untuk digunakan	38	7
Menjimatkan penggunaan kertas	45	0
Boleh digunakan di mana-mana sahaja	41	4

Rajah 1 di bawah menunjukkan sebanyak 95.5% respondan menyatakan borang secara atas talian ini sangat mudah digunakan. Sebanyak 97.7% menyatakan menjimatkan masa, sebanyak 84.4% menarik minat staf untuk menggunakannya, sebanyak 100% menjimatkan penggunaan kertas dan 91.1% boleh digunakan dimana-mana sahaja mereka berada. Ini menunjukkan penggunaan borang secara atas talian ini terbukti berkesan hasil daripada maklumbalas soal selidik yang diberikan.



Rajah 1 : Taburan keberkesanan penggunaan borang secara atas talian.

Walaupun pada awalnya, pendekatan pembelajaran atas talian dianggap sebagai satu pendekatan biasa, namun pada masa sekarang kerajaan telah mula memfokuskan teknologi sebagai jalan penyelesaian kepada kekurangan kemahiran dan pencapaian yang rendah dalam kalangan pelajar (Gorard, 1999). Pada masa yang sama, kedatangan teknologi ini membawa bersama ciri-ciri yang dapat memudahkan urusan harian manusia. Malah ICT dikenal pasti sebagai kuasa tolakan yang mengandungi ciri-ciri yang dapat menyelesaikan masalah pendidikan seluruh dunia (Owen, 2000).

Kesimpulan

Melalui kajian ini, objektif yang telah ditetapkan oleh pengkaji dalam mengetahui keberkesanan penggunaan borang secara atas talian telah tercapai. Data yang diperolehi menunjukkan borang secara atas talian ini memberikan keberkesanan terhadap peserta kursus anjuran Unit Latihan Dan Pendidikan Lanjutan, Politeknik Ibrahim Sultan. Sebanyak 100% peserta kursus bersetuju bahawa sistem ini dapat mengurangkan penggunaan kertas.

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Penghasilan Prototaip Inovasi Lemang Roaster

Sariah Binti Ahmad1, a, Safiah Binti Abdul Razak2,b, Rosedhila Binti Ramli3,c
1,2,3Politeknik Banting Selangor, Persiaran Ilmu,
Jalan Sultan Abdul Samad, 42700, Banting, Selangor
asariah@polibanting.edu.my, bsafiah@polibanting.edu.my, crosedhila@polibanting .edu.my

Katakunci: Lemang Roaster, inovasi, kesan asap kayu, menjimatkan masa.

Abstrak. Prototaip Lemang Roaster dihasilkan bagi menggantikan kaedah pembakaran lemang secara tradisional. Kaedah pembakaran lemang secara tradisional adalah sangat rumit kerana ia mengambil masa yang panjang dan memberi kesan negatif terhadap pengusaha lemang akibat dari penghasilan asap kayu semasa proses pembakaran. Kerangka utama prototaip terdiri daripada tong drum, rak yang diperbuat daripada bahan aluminium dan kaki yang diperbuat daripada mild steel. Prototaip yang dihasilkan mudah dibuka dan dipasang bagi tujuan pembersihan. Prototaip ini menggunakan bahan pembakaran gas LPG yang tidak menghasilkan asap semasa proses pembakaran. Ujian masa dan suhu telah dijalankan bagi mengetahui masa dan suhu yang sesuai diperlukan untuk pembakaran lemang dan juga bahan lain seperti ikan, ayam, daging dan kek. Keputusan ujian masa menunjukkan penggunaan protaip Lemang Roaster dapat mengurangkan masa pembakaran lemang sebanyak 79% di mana kaedah tradisional mengambil masa sehingga 240 minit bagi setiap pembakaran manakala masa pembakaran menggunakan Lemang Roaster mengambil masa 50 minit sahaja bagi 12 batang lemang. Prototaip Lemang Roaster juga dapat menahan haba sehingga 3500C. Selain itu, ujian bending stress dilakukan terhadap rak yang dipasang bagi meletakkan bahan makanan yang dibakar. Hasil ujian mendapati berat maksimum beban yang dapat ditampung bagi setiap rak adalah 25 kg. Kajian soal selidik juga dijalankan kepada 6 pengusaha lemang bagi menilai kriteria prototaip yang telah dikenalpasti iaitu saiz, hasil masakan, mudah digunakan dan dibersihkan, kos bahan api, masa, memerlukan ruang yang minimum, keselamatan dan kurang pencemaran udara. Hasil kajian soal selidik menunjukkan 67% pengusaha sangat setuju bahawa prototaip Lemang Roaster dapat menjimatkan masa dan mengurangkan pencemaran alam sekitar. Kesimpulannya, penghasilan prototaip Lemang Roaster dapat menyelesaikan kerumitan dalam proses pembakaran lemang, menjimatkan masa dan mengurangkan pencemaran alam sekitar.

Pengenalan

Di Malaysia, lemang, rendang, ketupat dan beberapa makanan lain adalah sinonim dengan perayaan Hari Raya Aidilfitri dan Aidiladha. Kebiasaanya semasa perayaan, lemang yang disediakan menggunakan beras pulut dan santan akan dimasak di dalam ruas buluh dan dimakan bersama-sama rendang. Rendang adalah hidangan daripada daging atau ayam yang dimasak bersama cili dan herba. Hidangan ini adalah pelengkap kepada sambutan perayaan iaitu tanpa hidangan ini sambutan perayaan seperti tiada makna [1].

Disebabkan proses pembuatan yang rumit ini, tidak ramai yang sanggup untuk menyediakan

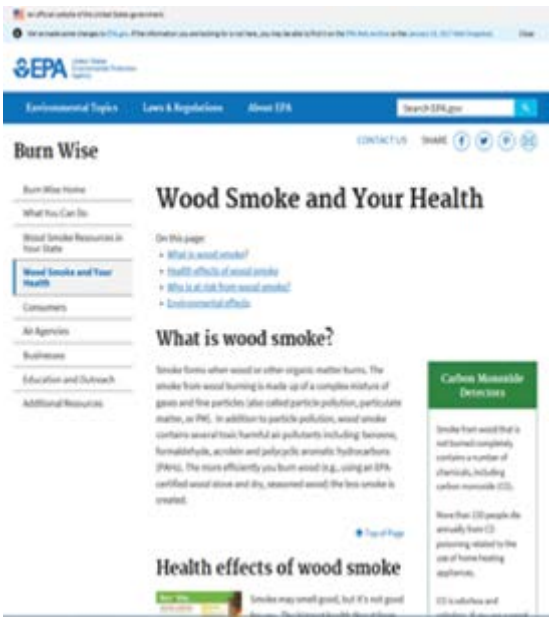
lemang semasa perayaan. Oleh itu, satu prototaip Lemang Roaster telah dibangunkan bagi memudahkan proses pembakaran lemang. Ia akan memudahkan pengusaha lemang serta orang perseorangan dalam proses pembakaran lemang. Hasil lemang yang dimasak juga menghasilkan rasa yang sama dengan pembakaran secara tradisional dan lemang akan masak sekata tanpa perlu memusingkan buluh lemang semasa proses pembakaran.

Kerangka utama prototaip terdiri daripada tong drum yang diperbuat daripada bahan steel dan dipasang kepingan aluminium di bahagian dalam bagi memerangkap haba, rak yang diperbuat daripada bahan aluminium dan kaki yang diperbuat daripada mild steel. Prototaip yang dihasilkan mudah dibuka dan dipasang bagi tujuan pembersihan. Prototaip ini menggunakan bahan pembakaran gas LPG yang tidak menghasilkan asap semasa proses pembakaran.

Penyataan Masalah

Proses penyediaan lemang secara tradisional adalah rumit dan mengambil masa yang lama iaitu bermula dari proses mencari buluh, menyediakan beras pulut dan santan sehingga kepada proses pembakaran lemang. Lemang akan dibakar dan proses memasak ini mengambil masa 4 hingga 5 jam. Semasa proses pembakaran, api perlu dijaga dan lemang perlu dipusing supaya tidak hangus dan masak sekata. Proses penyediaan ini memenatkan dan memerlukan tenaga kerja yang ramai.

Proses pembakaran lemang menggunakan kayu api menghasilkan asap yang bahaya kepada kesihatan manusia. Rajah 1 menunjukkan kajian daripada United States Environmental Protection Agency (EPA) telah membuktikan bahawa asap kayu menghasilkan partikel halus yang akan memberi kesan buruk kepada kesihatan manusia iaitu masalah pernafasan, paru-paru, jantung dan banyak lagi [2].



Rajah 1: Kajian Kesan Pembakaran Asap Kayu (Sumber: United States Environmental Protection Agency (EPA) https://www.epa.gov/burnwise/wood-smoke-and-your-health)

Oleh sebab itu penghasilan prototaip Lemang Roaster yang menggunakan gas LPG adalah satu kaedah penggantian proses dalam hierarki kawalan keselamatan dan kesihatan pekerjaan. Hierarki kawalan bermakna tertib keutamaan yang bersesuaian yang ditetapkan bagi jenis langkah yang akan diambil untuk mengawal risiko [3] seperti yang ditunjukkan dalam Rajah 2 di bawah:



Rajah 2: Hierarki Kawalan Keselamatan dan Kesihatan Pekerjaan

Selain daripada itu, sumber kayu api bagi proses pembakaran lemang juga semakin terhad. Pengusaha menghadapi masalah untuk mendapatkan kayu api dan harganya juga semakin meningkat. Penyelesaian masalah yang dihadapi oleh pengusaha lemang ini boleh diselesaikan melalui kaedah pembakaran menggunakan Lemang Roaster. Penciptaan prototaip inovasi Lemang Roaster dari Politeknik Banting Selangor ini adalah sejajar dengan Pelan Pembangunan Pendidikan Malaysia (Pendidikan Tinggi) 2015-2025 PPPM (PT) Lonjakan 4: Graduan TVET berkualiti menyatakan bahawa Politeknik, Kolej Komuniti dan Kolej Vokasional yang akan menyediakan pendidikan tinggi vokasional untuk memenuhi keperluan industri [4].

Metodologi Kajian

Penghasilan prototaip inovasi ini adalah bersesuaian dengan perkembangan arus pemodenan. Menurut Gillette (2005), menyatakan bahawa beberapa perubahan tingkah laku berlaku dalam penyediaan dan penggunaan makanan, dan amalan penggunaan makanan tempatan, terutamanya makanan tradisional telah dikurangkan dan ini sebahagian besarnya dikaitkan dengan pemodenan [5].

Terdapat 6 fasa dalam pembangunan prototaip Lemang Roaster Fasa 1- Permintaan Pasaran, Fasa 2- Penentuan Spesifikasi, Fasa 3 - Rekabentuk Konseptual, Fasa 4 – Perincian Rekabentuk, Fasa 5 – Pembangunan Rekabentuk dan Fasa 6 – Promosi.

Kaedah yang digunakan bagi fasa permintaaan pasaran ialah sesi temubual bersama pengusaha untuk mendapatkan maklumbalas terhadap kaedah pembakaran lemang secara

tradisional. Sesi temuduga direkodkan dalam bentuk video dan skop soalan temuduga adalah berkaitan dengan masa pembakaran lemang, kos bahan bakar, kaedah yang digunakan dan masalah yang dihadapi oleh pengusaha.

Bagi fasa penentuan spesifikasi yang menggunakan Product Design Specification (PDS) yang mana spesifikasi yang telah dipilih ialah persekitaran, keselamatan, penyelenggaraan dan masa [6]. Spesifikasi ini digunakan dalam borang kaji selidik maklumbalas pengusaha terhadap prototaip Lemang Roaster. Bagi fasa rekabentuk konseptual pula, 3 model Lemang Roaster telah direkabentuk berdasarkan maklumbalas dari sesi temuduga dan juga spesifikasi yang telah dipilih. Seterusnya dalam fasa perincian, 3 pemodelan tersebut dinilai menggunakan Pugh Method bagi memilih pemodelan yang terbaik bagi penghasilan prototaip [7]. Rekabentuk yang telah dipilih dihasilkan menggunakan perisian CAD iaitu AutoCAD bagi rujukan dalam proses fabrikasi.

Dalam fasa pembangunan rekabentuk pula, proses fabrikasi yang terlibat ialah proses pemotongan rangka luar dan lantai kaki, pemasangan pintu depan, kaki dan slot bagi rak, proses kimpalan bagi kaki, penghasilan rak dan proses mengecat. Prototaip juga dipasang temperature sensor dan mempunyai bukaan lubang dibahagian atas bagi membebaskan wap panas.

Setelah penghasilan prototaip selesai, beberapa ujikaji telah dijalankan iaitu ujian bending stress, ujian masa dan suhu bagi pembakaran lemang, ayam, ikan, daging dan juga kek serta ujian ketahanan haba. Bagi ujian bending stress bebanan secara ditambah secara berperingkat bagi mengetahui had bebanan setiap rak yang telah dihasilkan.

Ujian masa dan suhu pula dilakukan sebanyak 3 kali pembakaran bagi setiap bahan dalam menentukan masa dan suhu yang bersesuaian. Ini adalah bagi memastikan bahan yang dibakar dapat masakan dengan sempurna. Bagi mengujilari prototaip, 6 pengusaha makanan yang terdiri daripada pengusaha lemang, restoran dan penyedia makanan telah dijemput bagi menggunakan prototaip Lemang Roaster. Dalam ujian tersebut, responden diberikan borang maklumbalas berdasarkan spesifikasi yang telah dipilih bagi menilai prototaip. Pengiraan kos juga dilakukan bagi membandingkan kos bagi prototaip dan kedah tradisional.

Seterusnya, beberapa kaedah promosi telah dikenalpasti bagi memperkenalkan Lemang Roaster kepada pasaran iaitu sebagai permulaan prototaip Lemang Roaster telah menyertai beberapa siri pertandingan inovasi iaitu Anugerah Inovasi Negeri Selangor dan juga pertandingan Konvensyen Kumpulan Inovasi Kreatif Peringkat Kebangsaan.

Dapatan Kajian

Hasil temubual mendapati beberapa masalah utama dihadapi oleh pengusaha dalam proses pembakaran lemang secara tradisional iaitu sumber kayu api yang mahal, memerlukan pengawasan semasa pembakaran supaya lemang masak dengan baik dan memerlukan tenaga kerja yang ramai. Bagi ujian bending stress pula, hasil ujian mendapati setiap rak mampu menahan bebanan sehingga 25 kg. Hasil ujian masa dan suhu pembakaran bagi setiap bahan pula ditunjukkan dalam Jadual 1 di bawah:

Jadual 1: Keputusan Ujian Masa dan Suhu bagi Setiap Bahan yang dimasak.

Proses	Suhu	Masa
Membakar lemang	250-300° C	50 minit
Membakar ayam	250-300° C	60 minit
Menyalai ikan	150-200° C	20 minit
Menyalai daging	200-250° C	40 minit
Membakar Kek	160-180° C	45 minit

Hasil analisa bagi borang maklum balas prototaip Lemang Roaster adalah seperti Jadual 2 di bawah:

Jadual 2: Hasil Analisa Borang Maklumbalas Prototaip Lemang Roaster.

NO	Kriteria	Bilangan respondan			
		Tidak setuju (1)	Kurang setuju (2)	Setuju (3)	Sangat Setuju (4)
1	Saiz yang bersesuaian	0	2	4	0
2	Proses pembakaran lemang dan makanan lain lebih mudah	0	0	5	1
3	Hasil masakan menggunakan peralatan ini adalah baik dan sempurna	0	0	4	2
4	Peralatan ini mudah untuk dikendalikan	0	0	4	2
5	Penggunaan kos bahan api berkurang berbanding menggunakan kaedah tradisional	0	0	4	2
6	Masa yang diperlukan untuk memasak lebih singkat	0	0	2	4
7	Peralatan mudah untuk disimpan dan dibersihkan	0	1	2	3
8	Peralatan ini dapat mengurangkan pencemaran alam sekitar	0	0	2	4
9	Memerlukan ruang yang kecil semasa menggunakan peralatan	0	1	2	3
10	Peralatan adalah selamat digunakan	0	1	3	2

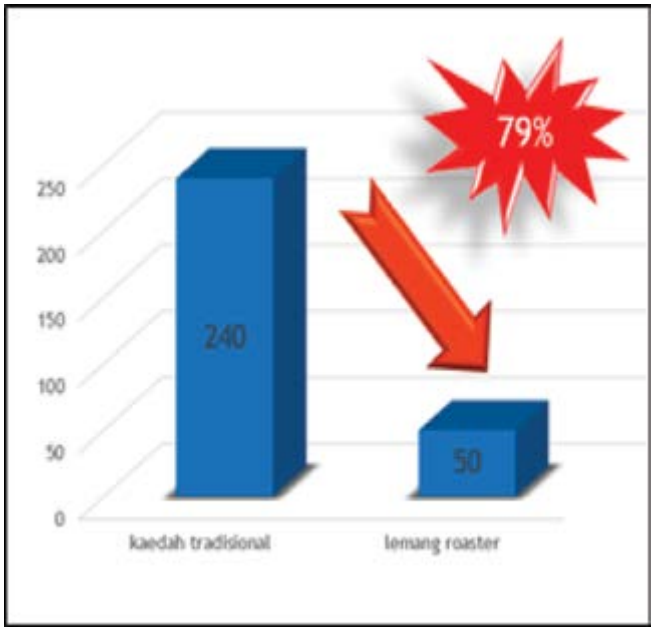
Hasil pengiraan kos yang telah dibuat, kos keseluruhan yang digunakan dalam menghasilkan Lemang Roaster ini adalah RM500. Ia dihasilkan daripada tong drum terpakai yang dijadikan rangka utama. Penciptaan ini telah menjimatkan masa pembakaran lemang

Perbincangan Hasil Analisis Dapatan Kajian

Bagi kaedah temubual, secara keseluruhan mendapati prototaip yang dihasilkan perlu mempunyai masa pembakaran yang lebih singkat, kos yang lebih rendah dan dapat mengurangkan tenaga kerja.

Ujian bending stress menunjukkan setiap rak sesuai bagi menampung beban maksimum 12 batang lemang bagi 1 kali proses pembakaran. Ini kerana terdapat 3 rak yang dihasilkan iaitu rak pembakaran lemang yang mana 12 batang mampu dibakar dalam satu-satu masa, rak pembakaran ayam dan rak pembakaran lain-lain. Berat bebanan maksimum sebanyak 25kg adalah sesuai untuk kesemua bahan masakan yang telah dinyatakan.

Bagi ujian suhu dan masa pula, kaedah tradisional pembakaran lemang mengambil masa sehingga 4 jam untuk masak dengan sempurna manakala pembakaran lemang menggunakan Lemang Roaster ini hanya mengambil masa selama 50 minit seperti Rajah 3 di bawah.



Rajah 3: Perbandingan Pembakaran Kaedah Tradisional dan Lemang Roaster

Pengurangan masa memasak sebanyak 79% secara langsung menjimatkan kos penggunaan bahan api semasa proses pembakaran.

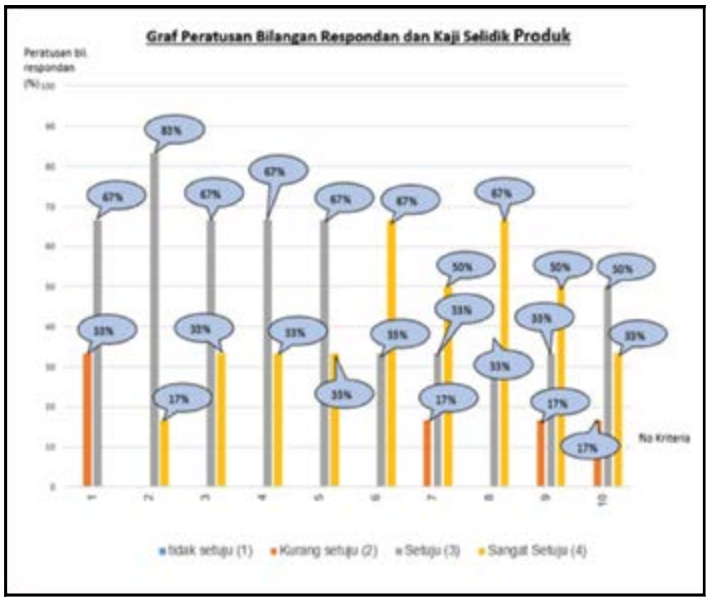
Bagi borang maklumbalas pelanggan, secara keseluruhan, terdapat 4 orang responden iaitu 67% sangat setuju bagi kriteria 6 iaitu masa yang diperlukan untuk memasak lebih singkat dan kriteria 8 iaitu peralatan ini dapat mengurangkan pencemaran alam sekitar. Asap pembakaran kayu mempunyai kesan yang membahayakan kesihatan dan asap juga merupakan pencemaran udara yang berpotensi merosakkan lapisan ozon [8]. Selain itu, hasil kaji selidik bagi kriteria 6 dan 8 juga menunjukkan objektif utama inovasi prototaip Lemang Roaster tercapai iaitu meminimumkan tempoh pembakaran lemang.

Selain itu, 3 responden iaitu 50% sangat setuju dengan kriteria 7 dan 9 masing-masing adalah peralatan mudah untuk disimpan dan dibersihkan dan memerlukan ruang yang kecil semasa menggunakan peralatan. Hasil kaji selidik menunjukkan alat inovasi ini dapat menyelesaikan masalah kaedah secara tradisional iaitu pembakaran lemang memerlukan kawasan yang luas serta kawasan

yang setempat bagi melakukan proses pembakaran lemang serta tidak mudah untuk dialihkan. Hal ini menyebabkan peniaga sukar untuk menjaga serta mengendalikan proses pembakaran lemang tersebut [9].

Bagi kriteria 1, 3, 4 dan 5, 67% responden setuju dengan saiz Lemang Roaster yang bersesuaian, hasil masakan yang baik dan sempurna, mudah dikendalikan dan penggunaan kos bahan api berkurang berbanding kaedah tradisional. Lemang akan cepat masak kerana wap panas akan terperangkap di dalam Lemang Roaster, malah kualiti lemang yang dimasak menggunakan kaedah Lemang Roaster ini pun serupa dengan kaedah memasak secara salai dan buluhnya tidak cepat terbakar [10].

Rajah 4 menunjukkan graf peratusan bilangan responden bagi semua kriteria. Berdasarkan graf tersebut, hasil kaji selidik menunjukkan peratusan responden yang kurang setuju dengan beberapa kriteria yang dinyatakan adalah dalam lingkungan 17~33 %. Kriteria yang kurang dipersetujui oleh responden ialah kriteria 1, 7, 9 dan 10. Peratusan responden setuju dan sangat setuju pula adalah dalam lingkungan 33%~83% bagi semua kriteria. Oleh itu, dapat dirumuskan bahawa prototaip Lemang Roaster ini memberi impak yang besar dan positif kepada semua responden.



Rajah 4: Graf Peratusan Bilangan Responden Mengikut Kriteria Produk

Selain daripada itu, berdasarkan hasil perbandingan proses pembakaran lemang menggunakan Lemang Roaster dan kaedah tradisional menunjukkan perbezaan ketara daripada beberapa aspek terutamanya masa, kesihatan, keselamatan, tenaga kerja, dan juga persekitaran. Oleh itu, dapat dirumuskan bahawa prototaip ini mempunyai banyak kelebihan berbanding tradisional. Tambahan pula, teknologi yang memberangsangkan ini membuktikan makanan tradisional boleh dihasilkan dengan kaedah lebih moden, sekali gus dapat memperluaskan pasarannya. Namun, apa yang lebih penting ialah ia membantu mengurangkan kerumitan tanpa menghilangkan keenakan rasanya

[11]. Perbandingan tersebut boleh dilihat dalam Jadual 3 seperti di bawah:

Jadual 3: Perbandingan Keputusan bagi Proses pembakaran Lemang Roaster dan Kaedah

	TRADISIONAL	LEMANG ROASTER
Tenaga Kerja	3 orang	Seorang
Persekitaran	Penghasilan asap	Tiada asap
Kesihatan	Bahaya	Terjamin
Tenaga Haba	Pembaziran tenaga	Penjimatan tenaga
Masa	4 jam	50 minit
Keselamatan	tiada	ada
Kos Bahan Bakar	Rm200/tan	Rm28/tong
Kualiti rasa	sama	sama

Kesimpulan

Secara kesimpulannya, produk inovasi lemang ini dapat menyelesaikan masalah kerumitan dalam proses pembakaran lemang. Hasil kaji selidik juga menunjukkan responden secara khususnya bersetuju dengan hasil yang diperolehi daripada produk ini terutamanya dari segi masa yang singkat dan tiada pencemaran udara. Lemang Roaster juga dapat membantu pihak pengusaha lemang dan restoran menghasilkan lemang dalam masa yang singkat sekiranya terdapat permintaan daripada pelanggan. Selain daripada dapat mengekalkan udara yang bersih, pelanggan juga dapat menikmati kualiti dan rasa lemang yang sama seperti kaedah tradisional. Dengan terhasilnya produk ini, secara tidak langsung dapat meningkatkan dan memperluaskan permintaan pasaran untuk lemang.

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The Internet of Things Implementation for Remote Controls of Classroom's Electronic Devices Based on Android

Silfia Rifka1,a, Firdaus2,b , Ihsan Lumasa R3,c
1,2,3 Politeknik Negeri Padang, Padang, Indonesia
asilfia_rifka@pnp.ac.id, b mrdauz@pnp.ac.id, rimra@pnp.ac.id

Keywords: Internet of things; remote control; Android

Abstract. Smart class is one of application for smart systems using the internet of things technology. In this paper, the internet of things is applied to smart systems remotely controlling electronic devices in the classroom such as projectors and air conditioner (AC) using Android-based applications. In this system, the hardware control is centered on control systems use Intel Galileo Gen 2 microcontroller module. This Android application replaces the remote control function separate devices but in this system, the remote control is made in one application system. It will help the teachers or class officers to control the electronic devices remotely or when they are not in the classroom because these systems can be used anywhere and anytime.

Introduction

Internet of things are widely applied in smart systems. In the concept of it use the internet network, sensors and others to interact with multiple devices with the aim of providing services to the public [1]. One application of smart system is smart class. Smart class is a technology used to organize and monitor classroom learning systems so that students and teachers can interact through the network [2]. But in the classroom or laboratory there are various electronic devices used. So to realize the smart class, in addition to control the learning system, all electronic devices that exist in the classroom must also be controlled with smart system. In this paper proposes a smart system for controlling electronic devices in the classroom in this case is air conditioner (AC) and projector. On paper [3], have been made within the multi device classroom control system web and Intel Galileo-based. In this smart system controlled devices such as lights (DC LED), AC, projector and IP Camera with web-based remote control stored in Intel Galileo. For the control of AC LED lamps with Android-based remote control has been done in [4]. In [5], proposed about AC control methods using self learning wireless energy in order to reduce the power consumption in a building. In [6], it discusses automated systems for projector focusing to reduce trapezoidal defects using LDR and RF modules. While in this paper the projector and AC controller with hardware control center using Intel Galileo Gen 2 and remote controller based on android. The choice of Android as a controller in this system is based because many users of Android smartphone in the world with various applications that are easy to use. By creating a remote control for the projector and the AC used in the classroom it will make it easier for teachers or classroom officer to remotely control the device in the classroom via Android smartphone using the applications already installed in their smartphone. The system is presented with methods of using algorithms that are easy to understand and apply. The system also uses a simple web to bridge communications with Android and the main controlling device to run for all networks where the system will be installed. By applying IoT in this system so that it can control the electronic devices remotely anywhere and anytime without being

limited by the distance and place by accessing the system through the internet network.

Methods

In making this system is done with several stages such as determining the algorithm and system network scheme used so that the system easily applied, designing the user interface used through App Inventor, programming so that the system can control the device whose hardware controller is embedded in Intel Galileo Gen 2 system through the internet.

1. Algorithm

In this system, the algorithm can be represented in a flowchart shows that Fig. 1. This system performs remote control of electronic devices in the classroom such as AC and projector by utilizing internet and web as via communication between Android and hardware controller. The Web is utilized in this system so that the system can run in any network conditions such as campus, school and office environments so there is no need to use a special public IP of that environment. Communication with the web in this Android based system, by utilizing existing web facilities on App Inventor.

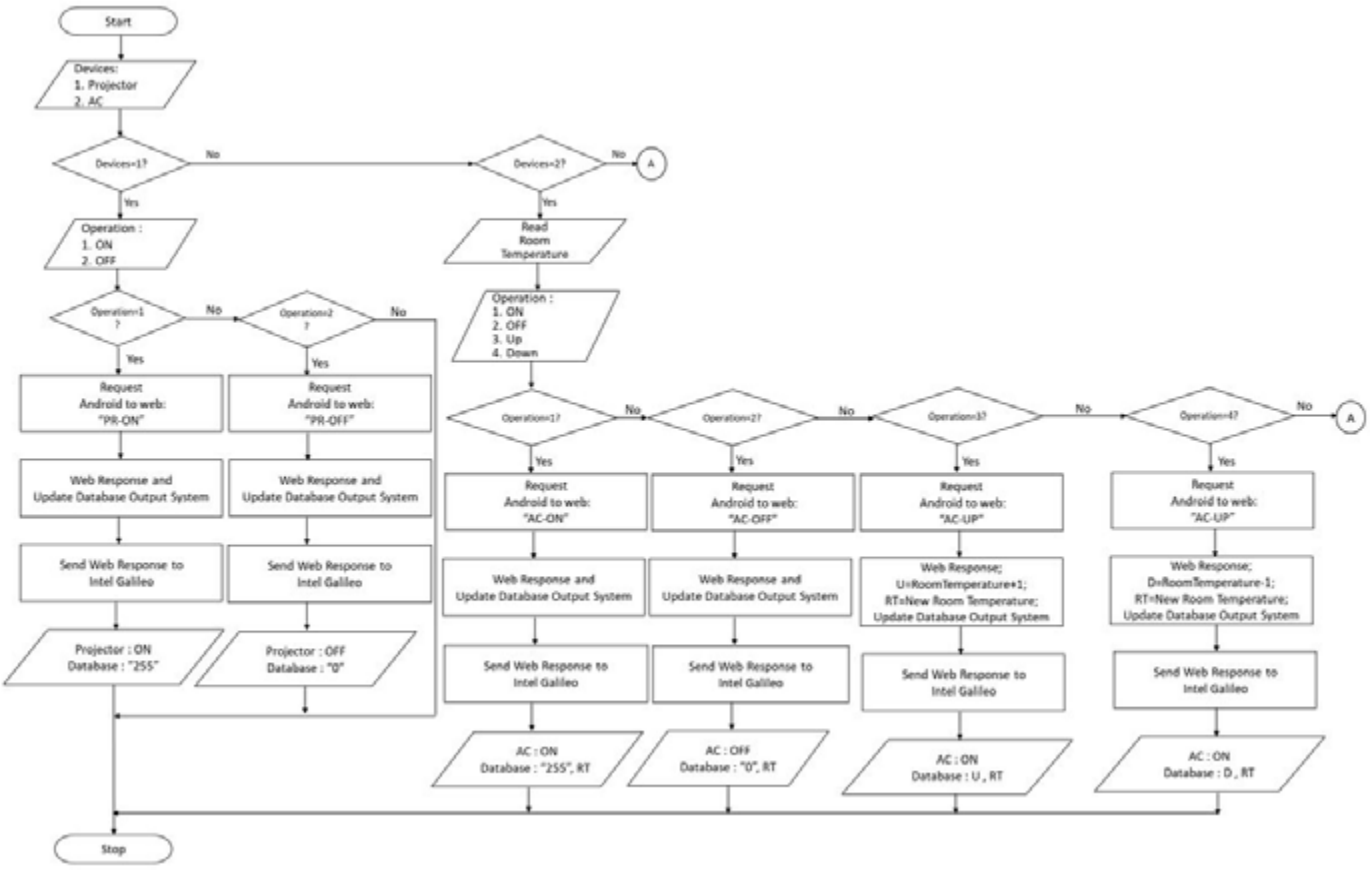


Fig. 1. Flowchart of Remote Controls System

The Web in this case is also used to display the output of the system which is the response of the main controls.And then it will be sent to Android to give response to the remote control request. Operations performed on the system or on-off for projectors and on-off, adjusting the temperature on the AC (up and down) based on the value of room temperature read on the Android app.

2. System Network Scheme

The communication network for this remote control system can be described as shown in Fig. 2. The remote command will be provided via Android apps to the web, the web receives this request and gives the response back to hardware control center (Intel Galileo) and Android aplication. Then the web gives responses to Android and Intel Galileo. And Intel Galileo runs an operating command on the device according to the data in the database via the web display. Intel Galileo automatically requests within a certain time to update the operation that will be carried out to AC and projector devices.

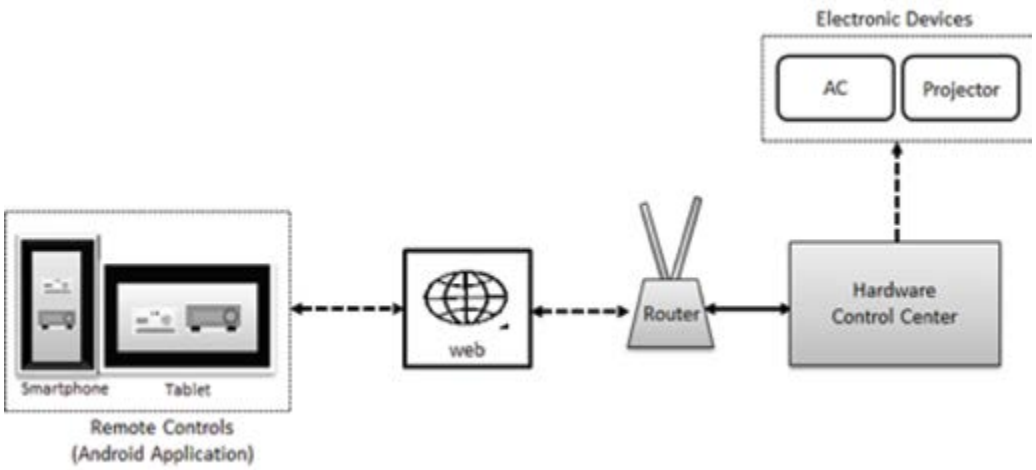


Fig. 2. Remote Control System Scheme

2. Android Applications

Applications for remote controls in this system are designed with a view as shown in Fig. 3. Consists of the first display screen for “Login” into the system and screen for remote controls of electronic devices in the classroom, in this case AC and projector. This app is designed using App Inventor

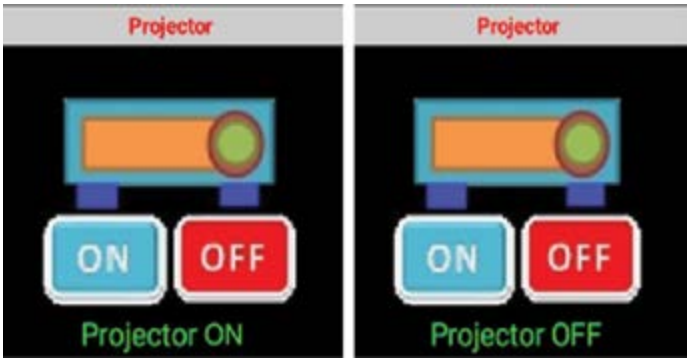


a b

Fig. 3. Remote Control based Android Application (a) Login Screen (b) Remote Controls Screen

Result and Discussion

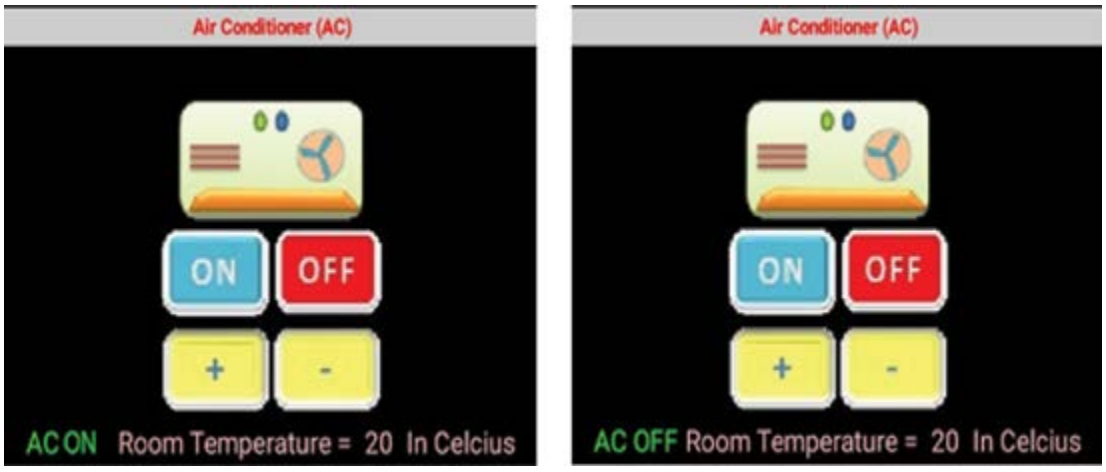
The system in the test by opening the application already installed on the smart phone or tablet users by clicking the application icon. Then it will look like Fig. 3 (a) which is the “Login” menu. By entering the username and password of the system user, it will display screen like Fig. 3 (b). Control of the projector is done by pressing the button “ON”, then the Android system will send a request to the web of “PR-ON”. On the other hand, hardware controllers also make requests to the web and read the status of the equipment stored in the database displayed on the web. The web gives a response to Intel Galileo and Android applications. Then Intel Galileo runs the command for projector operation according to data read on the web and projector has on. On Android will display the status “Projector ON” shows that Fig. 4 (a).



(a) (b)

Fig. 4. Projector Operation (a) ON (b) OFF

As for the operation “OFF”, on the projector is done by pressing the button “OFF”. Android sends the request by sending the variable “PR-OFF”. The Intel Galileo sends request to read data on the web. The web runs a request to turn on the projector from the Android application and update the system output data stored on the database. Intel Galileo performed an operation to turn off the projector. Web responds to Android, then on Android will show the status of “Projector OFF” as seen in Fig. 4 (b). The system will read the room temperature and display the temperature in the Android app. Operation on for AC is done by click “ON” button on AC interface part. Android sends a request to the web by sending the command “AC-ON”, then the web will send the command to the Web forwarding back to Android, an Android will read status “AC ON” as seen in Fig. 5 (a). Likewise, in the off process is done in the same way, but the send variable is “AC-OFF” and on Android will be displayed as shown in Fig. 5 (b).



(a) (b)

Fig. 5. Operasi pada AC (a) ON (b) OFF

Based on the value of room temperature read, then the operation to raise and lower the temperature of the AC can be done by pressing the “+” or “-”. Then, with the same procedure with the operation “ON” and “OFF”, operating temperature changes can also be done. The new room temperature value will be updated and displayed in the Android app. To raise the temperature sent the command “RoomTemp = RoomTemp + 1” and to decrease with the command “RoomTemp = RoomTemp - 1”. By utilizing the internet then this system can do remote control of electronic devices used in the classroom by utilizing Android-based applications are access via Android smartphones and tablet without being limited by distance, place and time.

Conclusion

The internet of things implementation in this system, will make it easier for application users to control electronic devices in the classroom from anywhere and anytime while the system is on or active and connected to the internet network. With this system, it will make it more effective in remote control of devices such as air conditioner and projector because remote controls are made

in one embedded system by accessing applications through smartphones and tablets that have already been installed. This application is made with an interface that is easy to use and understood by the user is by pressing a button that has been provided on the user interface.

Acknowledgements

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The Effectiveness Of Four Band Resistor Wheel As Learning Aids For Basic Electric And Electronic (SSK 1033) And Electrical Technology (DET 1013) Courses.

Hasealah Binti Ishak 1,a, Mardiah Binti Morsin2,b
1KK Tg. Piai, Johor, Malaysia
2Politeknik Ibrahim Sultan, Johor, Malaysia
ahasealah@kktanjungpiai.edu.my, bmardiahmorsin@pis.edu.my
Keywords: Resistor code1; Resistor value2;

Abstract. This paper is for publication in ICO-ASCNITECH 2018. Currently, traditional learning methods that tend to books are simply not popular. To face this complex global world, the challenges of education field also rising. Creative learning revolution on a subject or component can contribute to a change in knowledge demand session. Resistor is a unique passive component that has a color represents certain values. Unfortunately, it is difficult to attract students to understand and calculate the resistance value. Exploring the Basic Electric and Electronic (SSK 1033) and Electrical Technology (DET1013) courses for semester 1, students are exposed to the resistance code values for those who has took any technical stream especially in electrical program previously. The important resistance value is mastered by students as the basis that leads students to know the value of the resistance and also to troubleshoot any circuit. The Four Band Resistor Wheel represents the four stripes of values of the resistors, as a learning material in helping students understand it more easily. The wheel movement along with color and certain value codes utilize the diligence of students in breaking the traditional learning methods of the component resistors. A total of 44 respondents from SSK program and DEE program were selected in the questionnaire distributed as the instrument of study. Using Statistical Packages For Social Sciences (SPSS) version 23.0, the data obtained were analyzed to obtain an average of mean data. The average mean of data in three parts of the question is a very high value of 4.70. Clearly illustrating the effectiveness of the Four Band Resistor Wheel gives an excellent impact on learning.

Introduction

Institutions that tend to the value of the skills drive the creative teaching technic even in technical aspect[1][2][5][6][11]. According to Zamri (2012), the form of teaching and learning (PdP) in the 21st century is still teacher-centered, but teachers play a more important role in actively engaging students in learning activities[3]. Teaching techniques can be interpreted as a special way one conducts in implementing a method of teaching [4]. Thus, the basis of knowledge determines the value of resistors should be strengthened from the early stages so that the determination of resistance values is clearer and more efficient. For electrical student, various basic electronic components which are essential to be learned in Electrical and Electronic Basic (SSK 1033) and Electrical Technology (DET 1013) courses. Among the unique components to study is resistor. Resistors are components that attempt to limit any current value in a circuit. This four colored band resistors categories measured using the ohm unit. The value of the first digit represents the first color strip. The second line represents the second digit value. The multiplier represents the third

band and the tolerance represents the fourth value band. Color codes that represent certain values are selected according to their use in a circuit.

Table 1.Resistor Color Code

Colour	1st. Value	2nd. value	Multiplier	Tolerance
Black	0	0	10^0	-
Brown	1	1	10^1	-
Red	2	2	10^2	-
Orange	3	3	10^3	-
Yellow	4	4	10^4	-
Green	5	5	10^5	-
Blue	6	6	10^6	-
Violet	7	7	10^7	-
Grey	8	8	10^8	-
White	9	9	10^9	-
Gold	-	-	-	± 5%
Silver	-	-	-	± 10%
None	-	-	-	± 20%

Table 1 shows a color code that represents certain values and becomes a reference to determine the resistance value of a resistor. There are two determinant conditions; first is to determine the color of the resistor when the value is given. The second condition is given the value of the resistance and determines the color code.

Problem Statement

Some students mistakenly rank values on each color band. The basic knowledge of specify the resistance value of this resistor is a requirement, so that basic concepts can be understood and not simply memorization. Ensure that each band color of the resistor is interpreted with the correct value should be noted but students take a long time to determine the value of a resistor. This affects the time taken during the experiment. The error in determining the resistance value of the resistor also affects the flow during comparisons between measurements and calculations inside the series and parallel circuit.

Objective of the Study

i) Study the student problem about resistor value determination.
ii) Design Four Band Resistor Wheel.
iii) Analyze the effectiveness of Four Band Resistor Wheel.

Scope of the Study

i) Semester 1 Session of July 2016, Computer System and Network Certificate (SSK), Tanjung Piai Community College. The survey only involved 14 respondents [10] in the Tanjung Piai Community College that study Electrical and Electronic Basic (SSK 1033) in Topic 2.0 Basic Passive Semiconductor Component.

ii) Semester 1 Session of Dec 2016 Diploma of Electric and Electronic (DEE) at Politeknik Ibrahim Sultan on student's knowledge of the resistance value of four color strip resistors. The survey only involved 30 respondents [10] in the Politeknik Ibrahim Sultan that study Electrical Technology (DET 1013) in Topic 2.0 Introduction to Electric Circuit.

Methodology of study

Soon Sang (2009) states that the design of the study is a way of planning provided with the structure of investigation to get the answer to the question of study [7]. Based on Linacre's (2007) statement, the design of the study is all steps or procedures planned to achieve all study goals [8] [9]. The action study was quantitative because the data were analyzed using percentage, frequency, standard deviation and mean score analysis. The study was conducted in the form of questionnaire distributed to respondents involved and not require much cost and facilitate the respondents to answer the given questions. The data were analyzed using Static Package for Social Science (SPSS) version 23.0 software. The questionnaire consists of 31 question items that present questions based on three parts which is Part A (12 questions), Part B (12 questions) and Part C (7 questions). The form of items in sections A, B and C is using the Likert Scale as in the table 2 and 3 below:-

Table 2. Likert Scale

Scale	Definition
1	Strongly disagree
2	Do not agree
3	Not sure
4	Agree
5	Strongly agree

Table 3. Guidelines For Min Score Values

Mean Score Range	Min Score Value
1.00 – 1.49	Very low
1.50 -2.49	Low
2.50 – 3.49	Moderate
3.50 – 4.49	High
4.50 – 5.00	Very High

Result of the Study

Results of the analysis obtained through questionnaires to respondents are discussed in this section. Prior to the actual study, a total of 10 semester one SSK students and 25 semester one DEE student were selected for a pilot study. The purpose of this pilot study is to obtain high reliability coefficient. Analysis of the data shows the value of Cronbach's Alpha is 0.547 for 31 item (question). This proves that the questionnaire has high reliability and can be used in actual studies. The results for each part are discussed below:

A. Part A: Table 4 illustrates the Four Band Resistor Wheel that has a suitable content structure as

a student learning medium.

Table 4. Four Band Resistor Wheel That Have Structural Contents

Bil	Item	Min	Standard Deviation	Min Score Value Level
1	The content of the teaching according to the syllabus	4.71	.611	Very high
2	The content is organized in order	4.79	.426	Very high
3	There are no errors in the content	4.71	.469	Very high
4	Learning materials are easy to understand	4.71	.469	Very high
5	Teaching relevant to component applications	4.50	.519	Very high
6	Information is linked to available knowledge	4.57	.514	Very high
7	Examples provided are sufficient	4.71	.469	Very high
8	Realistic examples	4.43	.646	High
9	Language of presentation is easy to understand	4.86	.363	Very high
10	No spelling mistake	4.79	.426	Very high
11	Difficulty levels such as terms are suitable	4.79	.426	Very high
12	Learning content can be used for different users	4.93	.267	Very high
	Average Min	4.71		

Through this questionnaire it is proved that the Four Band Resistor Wheel has a suitable content structure as learning. Average mean 4.71 is very high value. This clearly demonstrates that the content structure found on the Four Band Resistor Wheel is very effective for learning sessions. Students can understand the content they contain as useful teaching aids. The content used is according to the syllabus.

B. Part B: Table 5 shows the producers Four Band Resistor Wheel that have an interesting design as a learning strategy for students.

Table 5. Investment Effects Of Four Band Resistor Wheel

Bil	Item	Min	Standard Deviation	Quality
1	The teaching objectives are clearly stated	4.71	.469	Very high
2	The teaching objective can be achieved	4.71	.469	Very high
3	Introduction set is effective	4.71	.469	Very high
4	Challenging question	4.43	.646	High
5	Users can move freely according to the favorite menu	4.57	.646	Very high
6	The user moves the color band wheel as needed	4.86	.363	Very high
7	Presentation is well organized	4.71	.469	Very high
8	Interesting presentation	4.71	.469	Very high
9	*Four Band Resistor* encourages users to continue exploring	4.64	.497	Very high
10	Information is communicated in various methods such as direct delivery and exploration	4.64	.497	Very high
11	Band code and value codes as a medium are accurate and relevant	4.57	.514	Very high
12	Movement between the band is well connected	4.57	.514	Very high
	Average Min	4.65		

The score for attractive design is 4.65. It show that the creative design of Four Band Resistor Wheel attract student to learn more faster.

C. Part C: Table 6 show that Four Band Resistor Wheel is effective for student aid learning.

Table 6. Four Band Resistor Wheel ais effective for student aid learning

Bil	Item	Min	Standard Deviation	Quality
1	Four Band Resistor Wheel suitable for teaching and learning aid.	4.71	.469	Very High
2	Four Band Resistor Wheel follow the right design for teaching and learning objectives	4.79	.426	Very High
3	Four Band Resistor Wheel suitable for student learning aid.	4.64	.497	Very High
4	I'm motivated while using Four Band Resistor Wheel in my learning process.	4.79	.426	Very High
5	I will introduce other student to use Four Band Resistor Wheel as one of learning aid.	4.57	.514	Very High
6	I'm interested to use Four Band Resistor Wheel to study at home.	4.79	.579	Very High
7	In my opinion Four Band Resistor Wheel is an effective and interesting learning aid to help me in my study.	4.64	.497	Very High
	Average Min	4.70		

The mean score was 4.70 and it is prove that the effectiveness of Four Band Resistor Wheel is extremely high. Despite the very minimal use of the material, it can produce an attractive, effective and facilitating teaching tool for students to understand. The positive impact on the student feedback assessment made this innovation as a new teaching medium to study resistor

Discussion and Conclusion

From the result, show that students were interested in a different variations of a learning method. The method that combines the value and color codes of these resistors is an example where students are deeply involved in a technical component of the game with fun. This four-color band resistor, which appears to be a giant resistor, is supported by elements of color strip movement for easier understanding. Based on that, the Four Band Resistor Wheel is particularly suitable for teaching and learning, especially resistance components. The understanding in determining the resistance value of the resistor correctly will directly facilitate the calculation of the parallel and serial circuit.

In conclusion, planning and detailing in the production of the Four Band Resistor Wheel is carefully designed to meet the objectives. Not only does it fulfill the requirements of the syllabus, but creativity in its production can also be filled with interesting designs. Hence, the proposal to extend its use to other institutions that want to diversify learning such as in Tanjung Piai Community College and Politeknik Ibrahim Sultan is very much encouraged. Sharing the benefits the user will gain over the experience, pushing the Four Band Resistor Wheel to be commercialized in future.

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Measuring The Sustainability Of Urban Development For Johor Bahru Using Geographic Information System

Siti Hajar Binti Ismail1, a, Siti Nurhidayah Binti Ramli,b and Ayati Binti Parmen,c
1Politeknik Sultan Haji Ahmad Shah, Kuantan, Malaysia
2Universiti Teknologi Malaysia, Skudai, Malaysia
3Politeknik Merlimau, Melaka, Malaysia
acthajarismail5881@gmail.com, bsitinurhidayah.1507@gmail.com, cayati@pmm.edu.my

Keywords: Sustainable; Urban Development; MURNInet; Geographical Information System;

Abstract. Malaysia has undergone rapid environmental, economic and social transformations for the last five decades, which have been accompanied by an unprecedented rate of change in the natural environment. Consequently, as with many other developing countries, it faces a continuous conflict between economic growth and conservation of its environment. The concept of sustainable urban development seeks to balance between the economic, environment and social. Sustainable are fulfill the human needs and environmental preservation. This need to consider maintaining sustainable urban development derailment in extending and renovating urbans areas. However, in terms of local sustainability, it has unfortunately faced an uphill task, not only by the absence of a comprehensive framework of sustainable development but also the lack of explicit and sufficient sustainable development strategy and indicators. In order to measuring the sustainability there are indicator that being used to measure the sustainable for the urban area of Johor Bahru City Council (MBJB), Johor Bahru Tengah Municipal Council (MPJBT), Pasir Gudang Municipal Council (MPPG) and Kulai Municipal Council (MPKu). Using MURNInet can be evaluate the overall urban area and it is rather difficult to evaluate in details area. Cross-Scale Indicator can be used to measure the area of selection according to the selected indicators. There are some aspects need to be considered in order to achieve the sustainable development for Johor Bahru. The local authorities and state government able to identify which area or which block of planning (BP) that need to control the development for better sustainable urban development in the future.

Introduction

Land uses contribute to the sustainability of urban development and their collective contribution towards achieving urban sustainability has attracted the attention of scholars to investigate the links

between urban development and sustainability. Whilst urbanisation is inevitable, growing concern about its undesirable impact has led to an increased awareness that the development of urban land use should be carefully managed in order to be sustainable. Such effects emerge as a result of the proceeded with urbanization and populace development that undeniably the resources and debilitate the proceeded with existing of ecosystem (Marcotullio et al, 2004). The sustainability level of urban living spaces has turned into the contribute to the urban development (Choguill, 2008). Strategic for the improvement on the sustainable development are obviously inside in the Malaysia Plan. The arrangement additionally added the measures taken to highlight sustainable improvement in the midst of earlier Malaysia Plan periods, outlines new measures that may be begun in the midst of the seventh Malaysia Plan (1996 - 2000) to upgrade Malaysia's capacity to create sustainable.

The tenth Malaysia Plan expresses that there is a need to reinforce natural database and data frameworks obviously depict the relationship between the environment and sustainability development on the tenth Malaysia Plan and that the improvement of sustainable indicator will be directed, to give as a guideline to observing and assessing progress towards urban sustainability in Malaysia. The Brundlant Commission on Environment and Development describes urban sustainability as "Progression that addresses the issues of the current while not exchanging off the limit of future times to fulfil their own specific needs" (WCED 1987). There no specific definition for sustainable. This can be a bit of supportable change is seen as a dynamic strategy, not a static condition that may be unmistakably clear up. The idea of sustainable relates to an outsize extent, to models and qualities which tend to spring from social traditions, and relates a different environment.

Methodology

2.1 Study area and methods

This study are measuring the sustainability of Johor Bahru City Council (MBJB), Johor Bahru Tengah Municipal Council (MPJBT), Pasir Gudang Municipal Council (MPPG) and Kulai Municipal Council (MPKu). Using MURNInet can be evaluate the overall urban area and it is rather difficult to evaluate in details area. Cross-Scale Indicator can be used to measure the area of selection according to the selected indicators. ArcGIS10 software has been used to process and analyze data.

2.1.1 Malaysian Urban Rural National Indicators Network on Sustainable Development (MURNInet)

The interest in sustainable development indicators is new but indicators in general are not new. The urban sustainability can be developing based to the MURNInet. Through this MURNInet can be used as a guideline in order to achieve the sustainable urban development.
The review has resulted in the rebranded of MURNInet which now known as the Malaysian Urban Rural National Indicators Network on Sustainable Development (MURNInets). The review asserts that indicators are no longer grouped according to "sectors" but rather according to dimensions better reflects the sustainable development concept which is a cross and multi sectoral concept encompassing all pillars of development. The indicators developed were based on the sustainable development strategies as outlined below:

i. Efficient and Competitive Economic Development
ii. Optimum Use of Land and Natural Resources
iii. Regional Development via Infrastructure and Transport Action Programmes
iv. Enhancement of Spatial, Environmental and Social Quality, Safety and Physical Diversity
v. Effective Governance Through Communication and Provision of Public and Infrastructure Services and Facilities

Based on these strategies, a set of the most compatible sustainable indicators were identified to measure level of sustainable development at local level, taking into considerations the country's present development policies. The MURNInets system at present has 36 indicators. The selected indicators are benchmarked against the present indicators used at all levels of planning in the country example National Physical Plan (NPP), National Urbanisation Policies (NUP), Sustainability Assessment (SA) for Local Plans preparation, Rural Planning and indicators being used at the international level in the UN Conference on Sustainable Development (UNCSD), United Kingdom, Australia, Korea, Japan and Bhutan. Detail discussions on the proposed indicators were held with stakeholders at workshop sessions and meetings. Figure 2.1 below shows the framework for MURNInets.



Figure 2.1 Framework

2.1.2 Methodology of MURNInets Implementation

According to the Federal Department of Town and Country Planning Peninsular Malaysia (2016) there are four stages in the implementation approach of MURNInets. Among the four major stages are based on below:

i. First Stage: Controlled by LA and Data Provider Agency

This basis level is the key stages to be completed successfully by collecting data collection such primary and secondary sources through indicators that have been selected for MURNInets system. The selection is guided through the availability to get data which the data was difficult to be obtained as the lack of data at the local level will be rejected. After the selection of indicators is complete, the collection of data was carried out by Local Authority from other agencies and from the Local Authority itself. After data collection are circulation Form A notification to the Agency data collection related to Data Providers. Then Data entry into the Gateway by LA and relevant Data Provider Agency.

ii. Second Stage: Controlled by State MURNInets Operations Centre with monitoring by inspectorate team

Once the data collection process has been done, the data will be reviewed to find out the authenticity of that data, in order to avoid the use of data that is not true and non-accurate. Once the authenticity is proved, then, the data will be documented in the database report. After data collection, complete the Form B which is Coordination and Data Verification. After that, if complete data will proceed to Generation Sustainability Index through MURNInets Gateway. The Sustainability Index will have analysed that more the 80% are Sustainable, 50% to 79% are moderate Sustainable and below than 50% are Less Sustainable. If the data not complete the Red Alert Shown by Gateway System than have to redo it again the stage one for collecting the data.

iii. Third Stage: Controlled by State MURNInets Operations Centre

At this stage, MURNInets system will use the data that has been documented in this stages. After the analysis done by the system, the findings will be used as information to be recorded in the technical report. This report will brief on the issue, the weaknesses and strengths of the city as well as to create proposals that can increase the sustainability of the city. After entering data into system, it will be analysed by the system and the output and findings for that analysis need to been done in this stages and will come out with the preparation of the States Sustainability Report.

iv. Fourth Stage: Controlled by National MURNInets Operations Centre

In the last stage, the Malaysian Urban Sustainability Report will be prepared which includes summary of the findings of the analysis, policy recommendations and proposed development in accordance with the sustainable urban development. If the data is completely valid and meet the requirements of MURNInets, the Local Authority will enter the data into the MURNInets system. Data were entered into the MURNInets will be distributed and delivered to the Federal Department of Town and Country Planning Peninsular Malaysia where the department will make a second evaluation of the data were included in the MURNInets system whether it is really outperforming in any required by the system. If it had been met, the results of sustainability that have been released by MURNInets system will be appointed to the National Physical Planning Council meeting. At the meeting of the National Physical Planning Council, the decision of the sustainability of the towns and cities will be discussed and approved. Once the decision is agreed, it will be announced on World

Town Planning Day which normally held in month of November every year awards will be given to cities that have achieved highest scores as a sustainable city. This complete process will take about a year to run.

MURNInet is a system that translates the role of the various parties that responsible for achieving a sustainable development. This refers back to the importance of sustainable development that could be very useful and have an impact on the effects of development is seen less support to the needs of future generations. Sustainable development that will be achieved will be able to give a life that should be received by the next generation where it will provide a balance between the built environment and nature. To achieve sustainable development, it is necessary to use an effective tool that can assist in achieving sustainability for the area. Refer to the case, it is necessary to implement this system is seen MURNInets is able to lead the sustainability of a city and region that also involved.

2.2 Cross-Scale Indicator

The cross-scale indicator is a new system of indicator that different view compare to MURNInet. It can be used to get much better understanding to evaluate and measure the urban sustainability. The list of indicator of cross scaled offer a new analysis for the city, component and interaction between the indicators. The indicator was construct using mathematical theory. This theory can be used for government, public, town planner, architect and property developer. There also can used this theory to better understanding between urban build form and urban content. The important for this content of urban development issues according to cross-scale such as urban morphology, mixed use and diversity. Cross-scale can be defined more than 60 indicators that be use in order to measure the sustainability of urban development.

In order to measure the sustainability of urban development the cross-scale indicators are the best tool to evaluate and measure the sustainability of urban development. According to Bourdic and Salt (2012), this cross-scale are the better to assessment to evaluate sustainable from district, city, neighbourhood and block until the building. These indicator being measured and evaluate every each of the area selection, the scale also the important role to specify the area which each indicator computation that make sense. The area selection can be defining a smaller cross-scale than to the whole entire urban area. These concepts much accurate to ensure the better and the best results and will give the effectiveness indicator selection consider to the data availability. Cross-

scale indicators provided 60 indicators to the spatial indicators ranging that more specific index deal with the urban complexity.

2.3 Spatial Indicator

The sustainability level for the urban area of Johor Bahru City Council (MBJB), Johor Bahru Tengah Municipal Council (MPJBT), Pasir Gudang Municipal Council (MPPG) and Kulai Municipal Council (MPKu) can be measure using MURNInets and Cross-Scale Indicators. Using MURNInet can be evaluate the overall urban area and it is rather difficult to evaluate in details area. Cross-scale indicator can be used to measure the area of selection according to the selected indicators. According to the MURNInet there are 36 indicators from these indicators only 6 indicators will be selected in order to measure level of the urban sustainability. For the Cross-Scale Indicators there have around 60 indicators to represent the urban sustainability and only 6 indicators will be choosing and selected to evaluate the level of urban sustainability. These 12 selected indicators are as a guide to evaluate and measure the level of sustainability in Johor Bahru. With these selection indicators are based on the data accuracy, reliability and the completeness of the data.

2.4 Analytical Hierarchy Process (AHP)

AHP are one of multi criteria decision making method that was develop originally by Prof. Thomas L. Saaty. According to Prof Thomas L. Saaty AHP a method that derive ratio scales from pair-wise comparisons. The input can be gotten from actual measurement such as price, style or from subjective opinion such as satisfaction feelings and preference. AHP allow some small inconsistency in judgment because human is invariably consistent. The ratio scales are derived from the principal Eigen vectors and the consistency index is derived from the principal Eigen value. This AHP methods are used for the compare the of analysed decision for goal, criterion and alternative. In these research study the goal is Sustainable Urban Development and the criterion are Economic, Environment and Social. Figure 2.2 below show the hierarchical decision model for AHP that being use to evaluate the MURNInet and Cross-Scaled Indicator results.

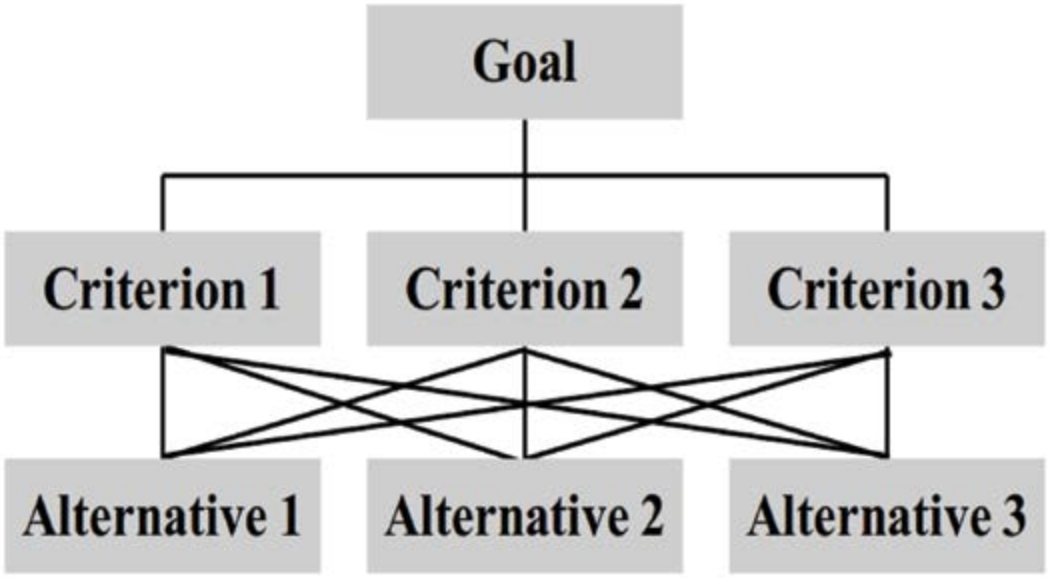

Figure 2.2 Hierarchical Decision Model

In the hierarchical decision model these AHP model consists of three layer for decision making process. The first layers are the goal level at these level describing the decision problem and the result will be solving the problem at the end of this layer. The second layers are describing the criterion that will used to get a better result and the further results. For example, at the second layer are the sustainability concept like economic, environment and social. Lastly, the third layer are the alternative consists of criteria that describe the criterion at second layer. These hierarchical decision model will come out with the pair-wise comparison in order to identify which sustainability concept will be the most important in order to measure the sustainable urban development.

Result and Conclusion

3.1 Determination of Spatial Indicator Ranking

This spatial indicator is ranking based on the scale of important using pair-wise comparison in the AHP methods. From the hierarchical decision model consists of three layer for decision making process. This AHP methods are used to compare the analysed decision for goal, criterion and alternative. In these research study the goal is Sustainable Urban Development and the criterion are Economic, Environment and Social. Figure Hierarchical Decision Model is create for AHP that being use to evaluate the MURNInet and Cross-Scaled Indicator results. The first layers are the goal level

at these level describing the decision problem and the result will be solving the problem at the end of this layer. The second layers are describing the criterion that will used to get a better result and the further results.

At these second layer are the sustainability concept like economic, environment and social. Lastly, the third layer are the alternative consists of criteriathat describe the criterion at second layer such as all the indicator selected from MURNInet and Cross-Scale Indicator. After structural spatial indicator in the hierarchical decision model, the judgement ranking can be made. The judgment ranking is made base on the priority from the local authority. Based on the judgement ranking, the higher value is the more important dimension to evaluate the sustainability of urban development for City of Johor Bahru. After done doing the eight vector for both of MURNInet and Cross-Scale Indicator. The sustainability of urban development for all four local authority need to determine. The AHP scale of importance use to determine the extreme importance and least importance.Table 3.1 below show the sustainability of urban development ranking for MURNInet and Cross-Scale Indicator.

Table 3.1 Sustainability Rank for MURNInet and Cross-Scale Indicator

MURNInet			Cross-Scale Indicator		
Ranking	Indicator	Value	Ranking	Indicator	Value
1	OS	0.3664	1	LF	0.3580
2	LU	0.2602	2	PT	0.2403
3	AH	0.1325	3	SH	0.1559
4	UR	0.1292	4	HD	0.1092
5	RC	0.0709	5	LO	0.0735
6	TP	0.0408	6	LE	0.0631

From Table 3.1 above show the sustainability rank for MURNInet and Cross-Scale Indicator. Sustainability for MURNInet the OS are the extremely importance follows by LU, AH, UR, RC and lastly the least importance are TP. MURNInet sustainability rank the most importance indicator are OS and the LU are indicator for Environment dimension. For the sustainability rank for Cross-Scale the extremely importance is LF follows by PT, SH, HD, LO and the least importance are LE.

3.2 Analysis of MURNInet Sustainable Urban Development in MBJB Area

The economic dimension there two indicators that be selected in the MURNInet there are the urbanization rate (UR) and percentages of quality affordable housing (AH). For environment dimension there two indicators that be selected in the MURNInet there are the ratio of public open space per 1,000 populations (OS) and the rate of change of land use from non-built-up to built-up (LU). For social dimension there two indicators that be selected in the MURNInet there are the number of integrated terminal and public transport station (TP) and percentages residential coverage within 400 meters of community facilities (RC). Table 3.2 show the MURNInet sustainability for MBJB and Figure 3.1 show the Area Impact On Urban Sustainable Map Using MURNInet for MBJB.

Table 3.2 MURNInet Sustainability for MBJB

BP	Name of BP	UR	AH	OS	LU	TP	RC	Sustainability
1	Daerah Sentral	2	1	3	1	3	1	Not Sustainable
2	Tasek Utara / Teluk Danga	1	1	2	3	3	1	Not Sustainable
3	Pelangi	3	1	3	2	3	2	Sustainable
4	Pasir Pelangi	2	1	1	2	1	2	Not Sustainable
5	Tampoi	3	3	2	2	2	3	Semi Sustainable
6	Larkin	3	2	1	1	3	1	Not Sustainable
7	Majidee	2	3	1	2	3	2	Semi Sustainable
8	Teluk Tebrau	3	2	1	3	1	3	Sustainable
9	Permas Jaya	3	3	2	1	1	1	Not Sustainable
10	Rinting	2	1	3	1	2	1	Not Sustainable
11	Kempas	3	3	2	1	3	2	Sustainable
12	Kangkar Tebrau	1	3	1	2	3	1	Not Sustainable
13	Pandan / Taman Molek	2	2	1	3	3	2	Semi Sustainable
14	Bandar Dato' Onn / Setia Tropika	2	1	3	1	2	1	Not Sustainable
15	Mount Austin / Taman Daya	2	1	3	1	2	1	Not Sustainable
16	Tebrau	3	1	3	2	3	2	Sustainable

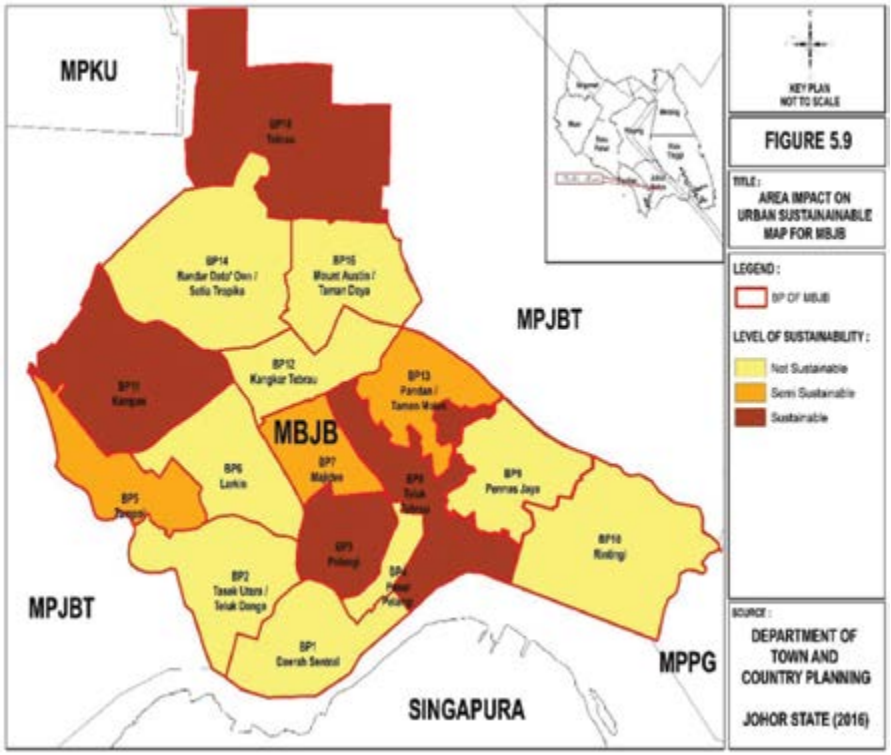

Figure 3.1 Area Impact On Urban Sustainable Map Using MURNInet for MBJB

3.3 Analysis of Cross-Scale Sustainable Urban Development in MBJB Area

Economic dimension there two indicators that be selected in the Cross-Scale Indicator. The selected indicators are the human density (HD) and proportion of social house (SH). For environment dimension there two indicators that be selected in the Cross-Scale Indicator. The selected indicators are the coefficient of land occupancy (LO) and the density of legal entities (LE). For social dimension there two indicators that be selected in the Cross-Scale Indicator. The selected indicators are the number of proportion of population more than 300 meters away from a public transport stop (PT) and proximity of leisure facilities (LF). Table 2.2 show the Cross-Scale sustainability for MBJB.

Table 3.3 Cross-Scale Sustainability for MBJB

BP	Name of BP	HD	SH	LO	LE	PT	LF	Sustainability
1	Daerah Sentral	1	1	1	3	2	1	Not Sustainable
2	Tasek Utara / Teluk Danga	2	1	2	3	1	1	Not Sustainable
3	Pelangi	1	2	3	3	2	2	Semi Sustainable
4	Pasir Pelangi	3	1	1	1	2	3	Not Sustainable
5	Tampoi	2	3	2	2	1	3	Semi Sustainable
6	Larkin	1	2	1	3	3	3	Sustainable
7	Majidee	1	1	1	3	2	2	Not Sustainable
8	Teluk Tebrau	2	1	1	1	3	3	Not Sustainable
9	Permas Jaya	3	3	2	1	2	3	Sustainable
10	Rinting	3	3	3	2	1	2	Sustainable
11	Kempas	1	3	2	3	2	2	Semi Sustainable
12	Kangkar Tebrau	2	1	1	3	2	2	Semi Sustainable
13	Pandan / Taman Molek	1	3	1	3	2	1	Not Sustainable
14	Bandar Dato' Onn / Setia Tropika	2	2	3	2	1	3	Semi Sustainable
15	Mount Austin / Taman Daya	3	1	2	2	3	2	Semi Sustainable
16	Tebrau	1	2	2	3	1	2	Semi Sustainable

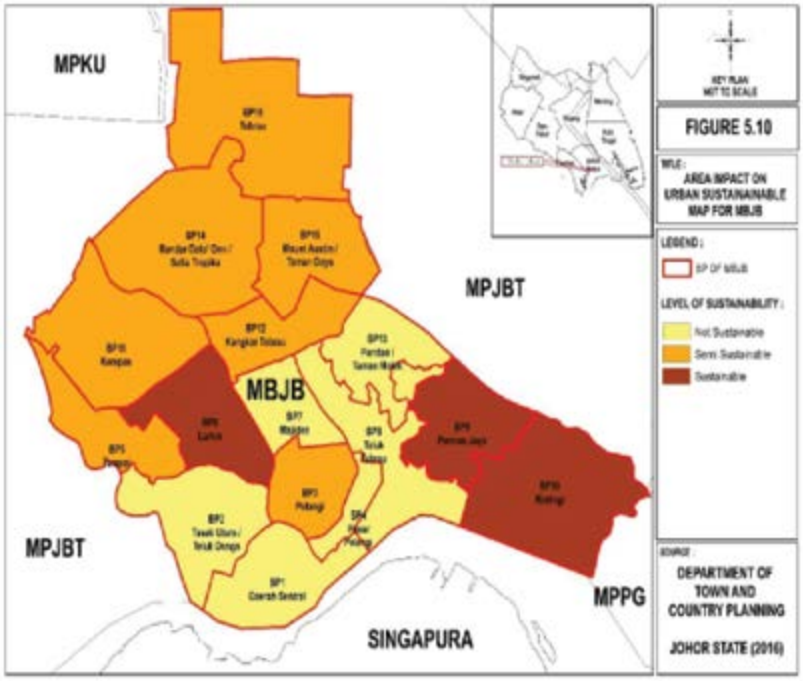

Figure 3.2 Area Impact On Urban Sustainable Map Using Cross-Scale for MBJB

3.4 Analysis of MURNInet Sustainable Urban Development in MPJBT Area

The economic dimension there two indicators that be selected in the MURNInet there are the urbanization rate (UR) and percentages of quality affordable housing (AH). For environment

dimension there two indicators that be selected in the MURNInet there are the ratio of public open space per 1,000 populations (OS) and the rate of change of land use from non-built-up to built-up (LU). For social dimension there two indicators that be selected in the MURNInet there are the number of integrated terminal and public transport station (TP) and percentages residential coverage within 400 meters of community facilities (RC). Table 3.4 be;ow show MURNInet Sustainability for MPJBT and Figure 3.3 Area Impact On Urban Sustainable Map Using MURNInet for MPJBT

Table 3.4 MURNInet Sustainability for MPJBT

BP	Name of BP	UR	AH	OS	LU	TP	RC	Sustainability
1	Skudai	1	2	2	1	2	2	Semi Sustainable
2	UTM / Bandar Pulai Jaya / Taman Universiti	2	3	3	1	3	2	Sustainable
3	Ulu Choh / Kangkar Pulai	3	1	2	2	2	1	Semi Sustainable
4	Taman Tun Aminah / Mutiara Rini / Lima Kedai	2	3	3	1	3	1	Sustainable
5	Taman Perling / Taman Sutera Utama	2	1	3	1	1	2	Not Sustainable
6	Nusajaya	3	1	2	1	3	3	Sustainable
7	Gelang Patah / Ramsar	3	1	1	3	2	1	Not Sustainable
8	Tanjung Pelepas	2	1	1	1	2	1	Not Sustainable
9	Maju Jaya / Ulu Tebrau	2	1	1	1	3	2	Not Sustainable
10	Ulu Tiram	2	1	2	1	3	1	Not Sustainable
11	Taman Gaya / Pelangi Indah / Desa Cemerlang / Johor Jaya	1	2	2	1	3	1	Not Sustainable
12	Empangan Sultan Iskandar	3	1	2	2	2	1	Semi Sustainable
13	Plentong	2	2	1	1	3	2	Semi Sustainable
14	Bandar Seri Alam / Masai	1	3	2	1	3	1	Not Sustainable

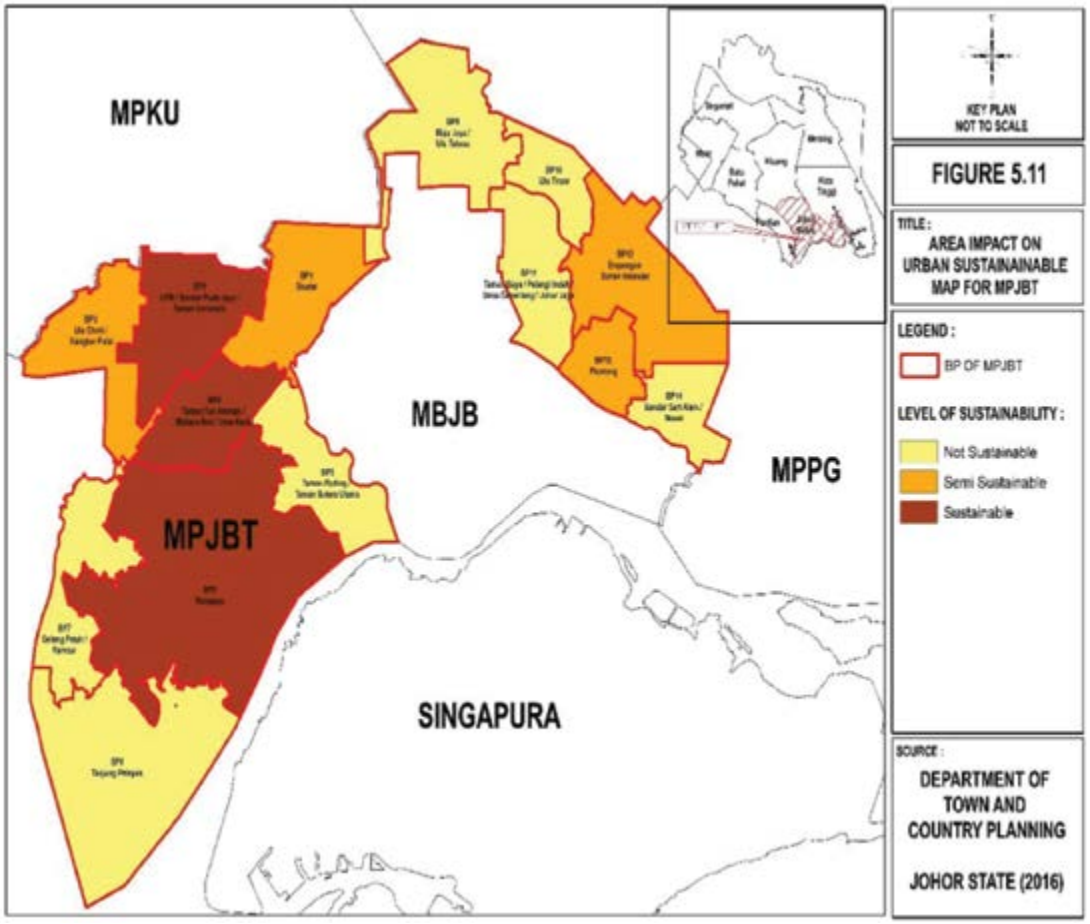

Figure 3.3 Area Impact On Urban Sustainable Map Using MURNInet for MPJBT

3.5 Analysis of Cross-Scale Sustainable Urban Development in MPJBT Area

Economic dimension there two indicators that be selected in the Cross-Scale Indicator. The selected indicators are the human density (HD) and proportion of social house (SH). For environment dimension there two indicators that be selected in the Cross-Scale Indicator. The selected indicators are the coefficient of land occupancy (LO) and the density of legal entities (LE). For social dimension there two indicators that be selected in the Cross-Scale Indicator. The selected indicators are the number of proportion of population more than 300 meters away from a public transport stop (PT) and proximity of leisure facilities (LF). Table 3.5 below show Cross-Scale Sustainability for MPJBT and Figure 3.4 Area Impact On Urban Sustainable Map Using Cross-Scale for MBJB.

Tale 3.5 Cross-Scale Sustainability for MPJBT

BP	Name of BP	HD	SH	LO	LE	PT	LF	Sustainability
1	Skudai	1	1	2	1	1	2	Not Sustainable
2	UTM / Bandar Pulai Jaya / Taman Universiti	3	3	2	1	3	2	Sustainable
3	Ulu Choh / Kangkar Pulai	2	1	1	3	1	1	Not Sustainable
4	Taman Tun Aminah / Mutiara Rini / Lima Kedai	3	3	2	1	3	1	Sustainable
5	Taman Perling / Taman Sutera Utama	1	1	1	1	1	2	Not Sustainable
6	Nusajaya	2	1	1	2	2	3	Semi Sustainable
7	Gelang Patah / Ramsar	3	1	2	3	3	1	Sustainable
8	Tanjung Pelepas	3	1	1	2	1	1	Not Sustainable
9	Maju Jaya / Ulu Tebrau	2	1	1	3	1	2	Not Sustainable
10	Ulu Tiram	1	1	2	2	3	1	Not Sustainable
11	Taman Gaya / Pelangi Indah / Desa Cemerlang / Johor Jaya	2	2	1	1	3	1	Semi Sustainable
12	Empangan Sultan Iskandar	2	1	3	3	3	1	Sustainable
13	Plentong	1	2	2	1	2	2	Semi Sustainable
14	Bandar Seri Alam / Masai	1	3	2	1	2	1	Not Sustainable

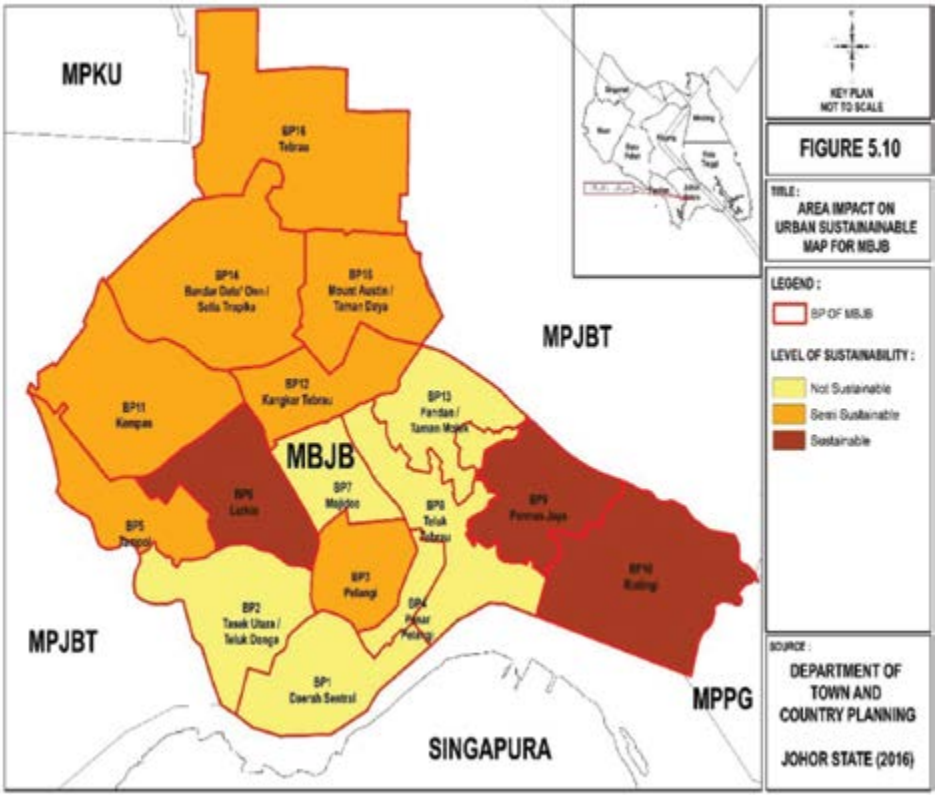

Figure 3.4 Area Impact On Urban Sustainable Map Using Cross-Scale for MBJB

3.6 Analysis of MURNInet Sustainable Urban Development in MPPG Area

The economic dimension there two indicators that be selected in the MURNInet there are the urbanization rate (UR) and percentages of quality affordable housing (AH). For environment dimension there two indicators that be selected in the MURNInet there are the ratio of public open space per 1,000 populations (OS) and the rate of change of land use from non-built-up to built-up (LU). For social dimension there two indicators that be selected in the MURNInet there are the number of integrated terminal and public transport station (TP) and percentages residential coverage within 400 meters of community facilities (RC). Table 3.6 below show MURNInet Sustainability for MPPG and Figure 3.4 Area Impact On Urban Sustainable Map Using MURNInet for MPPG.

Table 3.6 MURNInet Sustainability for MPPG

BP	Name of BP	UR	AH	OS	LU	TP	RC	Sustainability
1	Bandar Pasir Gudang	1	2	3	1	3	3	Semi Sustainable
2	Kawasan Perindustrian Pasir Gudang	1	1	3	1	3	2	Not Sustainable
3	Kota Masai / Nusa Damai	1	3	3	1	2	3	Sustainable
4	Pasir Putih / Sungai Kim Kim	2	2	1	2	1	2	Semi Sustainable
5	Kawasan Perindustrian Tanjung Langsat	1	1	1	2	1	1	Not Sustainable
6	Bandar Layangsaka	2	2	3	2	1	1	Semi Sustainable
7	Sungai Tiram	3	2	3	3	1	1	Sustainable

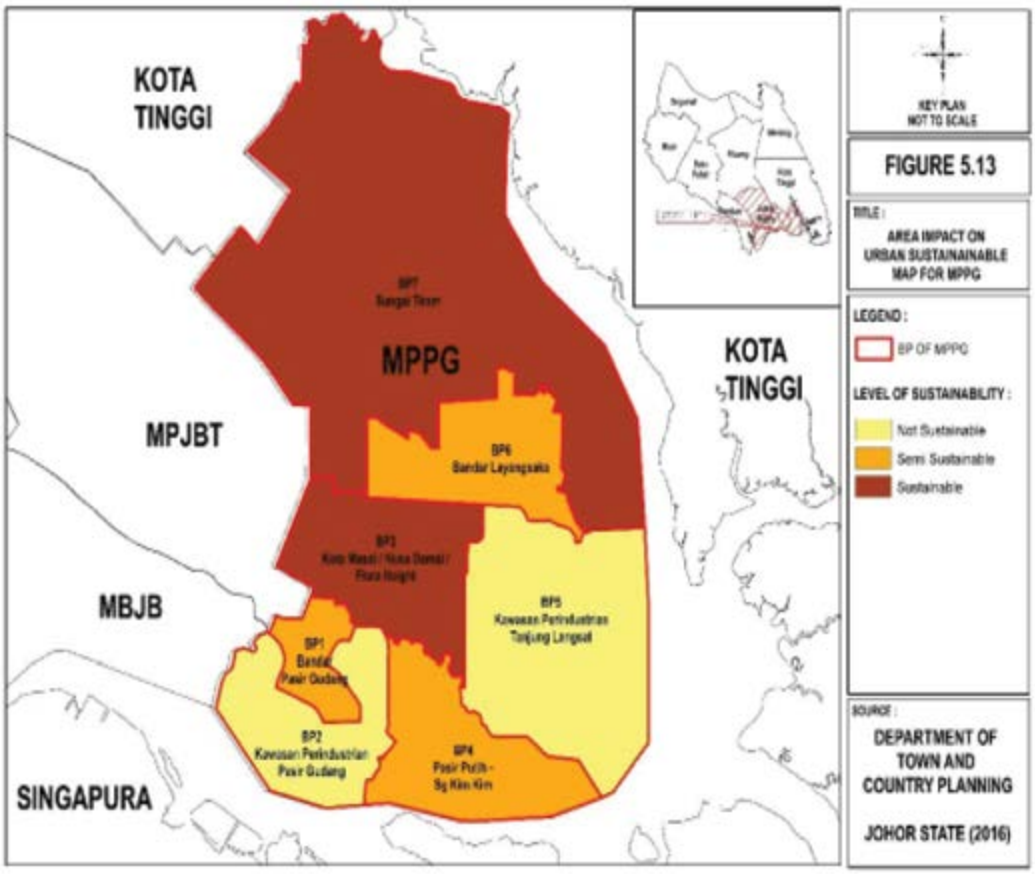

Figure 3.4 Area Impact On Urban Sustainable Map Using MURNInet for MPPG

3.7 Analysis of Cross-Scale Sustainable Urban Development in MPPG Area

Economic dimension there two indicators that be selected in the Cross-Scale Indicator. The selected indicators are the human density (HD) and proportion of social house (SH). For environment dimension there two indicators that be selected in the Cross-Scale Indicator. The selected indicators are the coefficient of land occupancy (LO) and the density of legal entities (LE). For social dimension there two indicators that be selected in the Cross-Scale Indicator. The selected indicators are the number of proportion of population more than 300 meters away from a public transport stop (PT) and proximity of leisure facilities (LF). Table below show the level of sustainability measure using Cross-Scale Indicator for MPPG. From the table above show the level of sustainability is divided to three type of sustainability there are sustainable, semi sustainable and not sustainable. Table 3.7 below show Cross-Scale Sustainability for MPPG and Figure 3.5 Area Impact On Urban Sustainable Map Using Cross-Scale for MPPG.

Table 3.7 Cross-Scale Sustainability for MPPG

BP	Name of BP	HD	SH	LO	LE	PT	LF	Sustainability
1	Bandar Pasir Gudang	2	1	3	1	3	3	Sustainable
2	Kawasan Perindustrian Pasir Gudang	2	2	2	2	3	2	Semi Sustainable
3	Kota Masai / Nusa Damai	3	1	3	1	2	3	Sustainable
4	Pasir Putih / Sungai Kim Kim	2	2	2	2	1	2	Semi Sustainable
5	Kawasan Perindustrian Tanjung Langsat	1	3	1	3	2	1	Not Sustainable
6	Bandar Layangsaka	1	2	1	3	1	1	Not Sustainable
7	Sungai Tiram	1	2	1	2	1	1	Not Sustainable

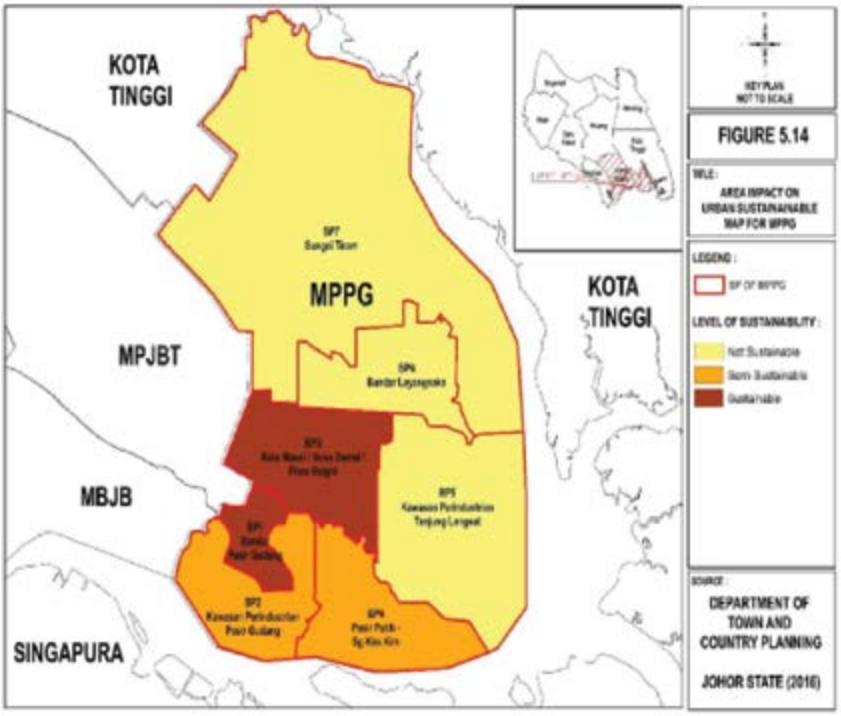

Figure 3.4 Area Impact On Urban Sustainable Map Using MURNInet for MPPG

3.7 Analysis of Cross-Scale Sustainable Urban Development in MPPG Area

Economic dimension there two indicators that be selected in the Cross-Scale Indicator. The selected indicators are the human density (HD) and proportion of social house (SH). For environment dimension there two indicators that be selected in the Cross-Scale Indicator. The selected indicators are the coefficient of land occupancy (LO) and the density of legal entities (LE). For social dimension there two indicators that be selected in the Cross-Scale Indicator. The selected indicators are the

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Table 3.7 Cross-Scale Sustainability for MPPG

BP	Name of BP	UR	AH	OS	LU	TP	RC	Sustainability
1	Senai	1	2	3	1	3	3	Sustainable
2	Kulai	2	2	3	1	3	3	Sustainable
3	Kelapa Sawit – Air Bemban	3	1	3	2	1	1	Sustainable
4	Seelong	1	1	1	3	3	3	Sustainable
5	Gunung Pulai – Felda Bukit Batu	1	1	3	3	2	1	Not Sustainable
6	Felda Inas	2	1	2	3	2	1	Semi Sustainable

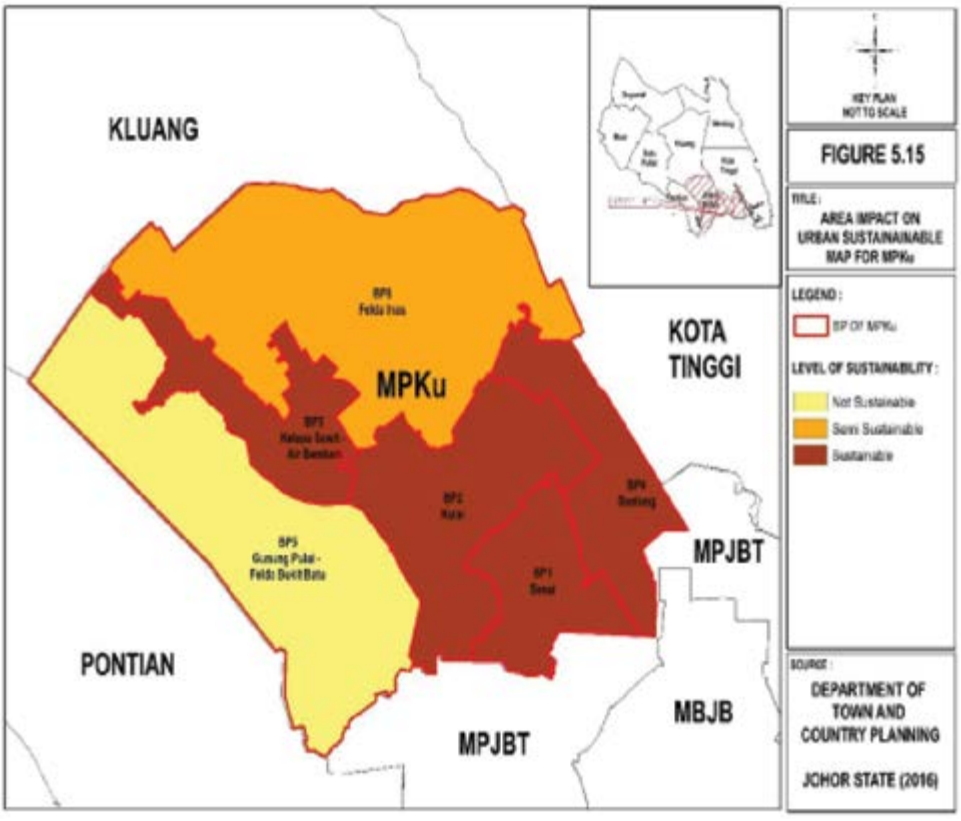

Figure 3.6 Area Impact On Urban Sustainable Map Using MURNInet for MPKu

3.9 Analysis of Cross-Scale Sustainable Urban Development in MPKu Area

Economic dimension there two indicators that be selected in the Cross-Scale Indicator. The selected indicators are the human density (HD) and proportion of social house (SH). For environment dimension there two indicators that be selected in the Cross-Scale Indicator. The selected indicators are the coefficient of land occupancy (LO) and the density of legal entities (LE). For social dimension there two indicators that be selected in the Cross-Scale Indicator. The selected indicators are the number of proportion of population more than 300 meters away from a public transport stop (PT) and proximity of leisure facilities (LF). Table 3.9 show Cross-Scale Sustainability for MPKu and Figure 3.7 Area Impact On Urban Sustainable Map Using Cross-Scale for MPKu.

Table 3.9 Cross-Scale Sustainability for MPKu

BP	Name of BP	HD	SH	LO	LE	PT	LF	Sustainability
1	Senai	1	1	1	1	3	3	Not Sustainable
2	Kulai	1	1	1	1	3	3	Not Sustainable
3	Kelapa Sawit – Air Bemban	1	2	2	3	1	1	Not Sustainable
4	Seelong	1	2	1	2	2	3	Semi Sustainable
5	Gunung Pulai – Felda Bukit Batu	3	3	3	2	1	1	Sustainable
6	Felda Inas	2	3	3	2	2	1	Semi Sustainable

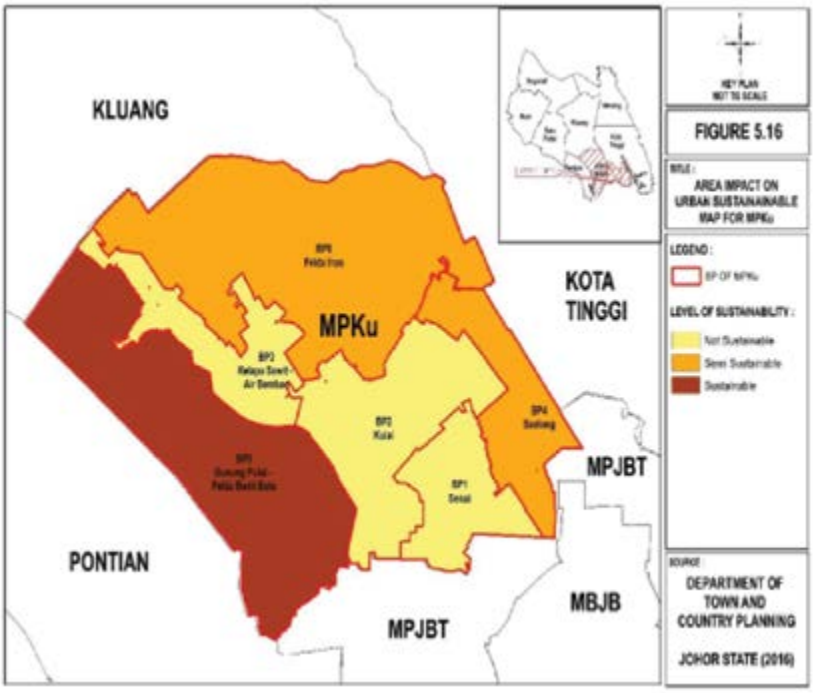

Figure 3.7 Area Impact On Urban Sustainable Map Using Cross-Scale for MPKu

Conclusion

In order to measure the sustainability urban development for four local authorities which is MBJB, MPJBT, MPPG and MPKu in City of Johor Bahru are can be determine based on the indicators. There are many indicators that can be use in order to measure the sustainability urban development. For this research, the terminology using the 3 dimension consist of economic dimension, environment dimension and social dimension. Every each of dimension only choose 2 indicators in order to measure the sustainability urban development. To measure the urban sustainability using the selected indicators, the level of sustainability can be ranking which are sustainable, semi sustainable and not sustainable. The results of the level of sustainability can give the different results depending to the area and indicators.

The results from the sustainability map should be improved in order to achieve the sustainable city. Using the sustainability map can be improved with three major dimension which is the economic dimension, environment and social dimension. After improved the three dimension the level of sustainability in Johor Bahru able to achieve the urban sustainability. From the 12 selected indicators from the MURNInet and Cross-Scale, there have a lot of different results. The 6 indicators from MURNInet and 6 indicators from the Cross-Scale are chosen based on spatial indicators and have same similarity indicator. With these 12 selected indicators will be calculate for the four local authorities which is MBJB, MPJBT, MPPG and MPKu. Based on the 12 spatial indicator, the measurement score and ranking can be used for the development control and planning approval. Local authorities and the state government like Department of Town and Country Planning can be used to control the urban development in order to achieve the urban sustainability. The local authorities and state government able to identify which area or which block of planning (BP) that need to control the development for better sustainable urban development in the future. For recommendation for further study is this research can be used and able to apply to the other area especially the area of rapidly urban development growth. The rapidly urban development growth need to be under control because of it will affect the level of sustainability at the selected area. This comparison can being apply to the other state or cities in order to measure the level of sustainability. From this results of sustainability can be used to local authorities to manage their administration area.

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