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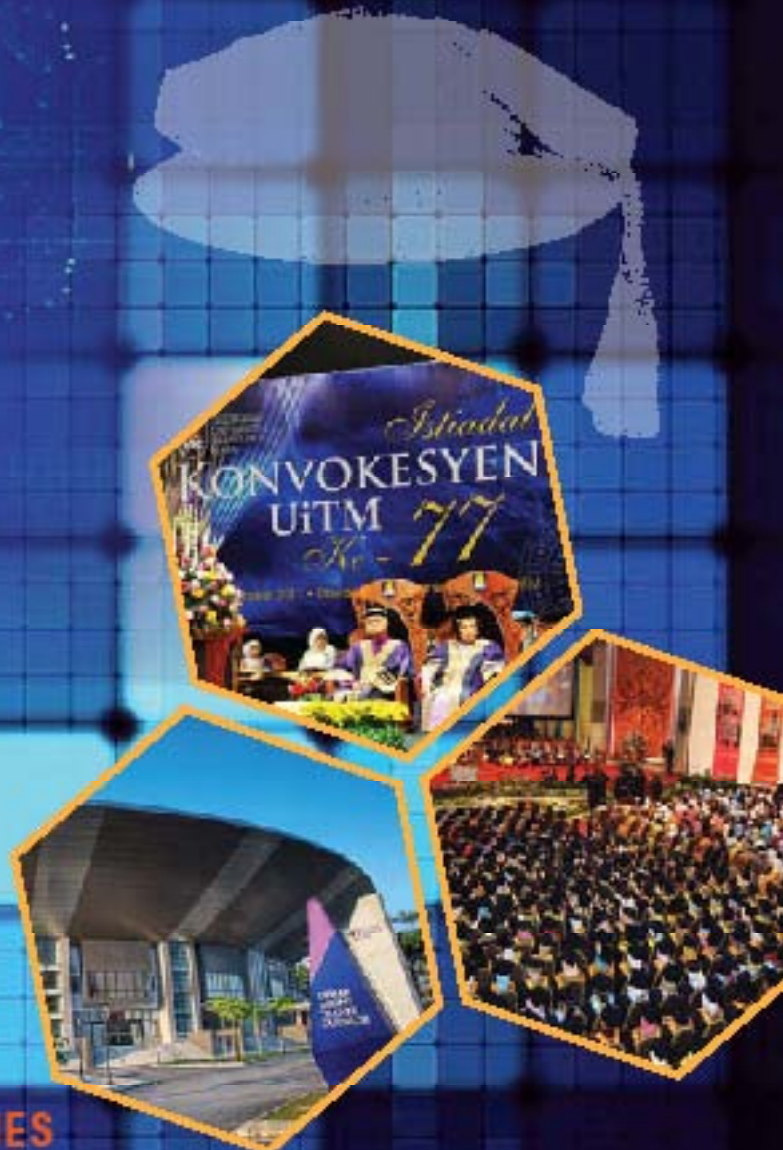
THE DOCTORAL RESEARCH

ABSTRACTS

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SECOND ISSUE

INSTITUTE of GRADUATE STUDIES

Leading You To Greater Heights, Degree by Degree

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FOREWORD

Congratulations to Institute of Graduate studies on the conscientious efforts to publish yet another issue of the doctoral research abstracts. The second issue, I believe reflects IGS continuity in the pursuit of academic excellence in research following the inaugural publication during the 76th convocation ceremony.

The publication epitomizes knowledge par excellence and marks UiTM acknowledgment and tribute to the 27 doctorates whose achievements we proudly celebrate. Doctoral researches transcend beyond academic achievements which launch doctorates wherever they want to go or whatever they want to do. It is indeed the beginning of a lifelong learning and merely not a milestone, but a stepping stone in the lives of doctorates.

This issue features the PhD abstracts from across the faculties from the disciplines of science and technology, social science and humanities; and business and administration.

May the Almighty guides us to the straight path, in our endeavor for academic excellence and grant us success in this world and the next.

Dato' Sri Prof Ir Dr Sahol Hamid Bin Abu Bakar , *FASc*
Vice Chancellor
Universiti Teknologi MARA

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This newsletter was created to disseminate information on the research carried out by the doctoral graduates of UiTM by sharing the abstract of their thesis.
For more information do not hesitate to contact us at http:// ipsis.uitm.edu.my

Table of Content :

1

Name : Hasli Bin Ibrahim

Title : Modelling Time Performance for Construction of Public Building Projects in Peninsular Malaysia

Faculty : Civil Engineering

Supervisor : Associate Prof. Ir. Dr. Aminuddin Baki (MS)

Associate Prof. Dr. Hj. Ismail Atan (CS)

Completing project on time is symbolic of an efficient construction project. However, project delay is a common issue in construction industry today. The failure in estimating reasonable construction duration will jeopardize the successful completion of the projects. There are needs to establish a tool in order to estimate construction time performance. Thus, this study focuses on developing a model to predict reasonable construction duration in order to improve construction time performance for public building projects in Peninsular Malaysia. This study cover four types of public sector building projects namely; school and education building; public building; health and medical building; and security building. A document analysis method and quantitative approach were applied. Original contract duration and actual contract duration of 416 completed public building projects were used to assess the level of Time Performance Index (TPI). Independent variables (i.e. original contract duration, cost, complexity and location) had significant relationship to construction time performance were then regressed against TPI using multivariate analysis to establish time performance models. The regression models was successfully developed for school and education; public building; health and medical; and security building with level of $R2$ between 86.7% and 94.1% respectively. This level indicates that the models developed were significant and appropriate. The models were then validated via two approaches; namely numerical validation using actual completed building projects, and subjective validation using selected respondents by interview technique. Both numerical validation and subjective validation show that the models developed were acceptable and would be regarded as a valuable tool and workable to predict duration for construction of public sector building projects. The construction time performance of the public projects in Peninsular Malaysia was found to be affected more by variables related to excusable delays than project characteristic variables. The attributes that had significant relationship with time performance should be given attention by practitioner in order to minimise the occurrence of delay. The findings of this study is an important step in moving closer to a better understanding of construction time performance and also will provide statistical regression model available for public sector building projects.

2

Name : Jezan Bin Md Diah

Title : Development of Weaving Section Flow Model of Conventional Roundabout

Faculty : Civil Engineering

Supervisor : Prof. Ir. Dr. Mohd Yusof Bin Abdul Rahman (MS)

Dr. Muhammad Akram Adnan (CS)

Roundabout has been used and becomes popular in sub-urban residential areas as one of a viable traffic control system at intersections. At roundabout vehicles need to make a circulatory movement before exiting to their respective directions without having to stop, thus minimize delay. Studies on roundabout capacity and performance mostly focus on geometric configuration and flow at the entry, on the basis and acceptance of offside priority rule. Studies had shown that offside priority is most appropriate and efficient with small and mini roundabout. As for conventional roundabout or those with inscribe diameter DI > 50 m, the approach may give rise to differences in predicted capacities. This may be due to the phenomenon of flow interactions (driver behaviour related to lane selection and changing) at the weaving section, and this seems to be the 'gap' in present knowledge on roundabout capacity prediction. Inefficient traffic movement within the weaving section may affect discharge flow, and hence capacity at entry. As such it seems more appropriate to study and measure flow at the weaving area. Thus, this research focuses to understand and study the dynamic as well as complex traffic behaviour/interaction in the weaving section of conventional roundabout, and to give a measure (model) of weaving flow capacity. A typical 4-legs 2-circulatory lanes conventional roundabout was selected with video recorder set-up to capture traffic movements on one of its weaving section. Field data were collected during weekdays which cover both the morning and afternoon sessions. Data reduction was done using semi-automatic vehicle analyser (SAVA) software. Using Excel the raw data (vehicles types, pattern movement and time gap) were organised and tabulated. Statistical tools from MiniTAB were used for data screening and verification. Traffic flow at weaving section which exhibits dynamic and complex behaviour/interaction can be modelled

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(Qwsf), that comprises through (nonconflicting Qncf) and weaving (conflicting Qcf) movements. These flow patterns are critically governed by the available gaps between vehicles, thus time ideal safe gap (Tisg) been identified and retrieved. With the available data, data transformations and rigorous statistical tests were done during the model development process. Statistical tables and graph plots revealed the good correlations, relationships and significances between the variables/parameters being considered. The developed model (Qwsf = 2700 + 0.000028 Qncf 3/2.Qcf - 1.22Tisg .Qcf), was calibrated, verified and validated with independent field data (new data set). Comparison of weaving flow capacity between the develop model

and observed/field data was within approximately 5% difference. Sensitivity analysis was done to check on the measured of effectiveness (MOE) of the model. Integration between weaving section flow and practical capacity flow enable level of service (LOS) chart being deduced. The LOS chart is considered another significant contribution of this research to practising traffic engineers and academicians. Knowledge on the mechanics of traffic flow interactions at weaving section and the developed model are able to give better prediction on weaving capacity as well as performance level and, hence, the objectives set for this research works were accomplished.

3

Name : **Nurharniza Bt Abdul Rahman**

Title : **Performance of Wall-Slab Connection Enhanced with Steel Fibres under Reversible Cyclic Load**

Faculty : **Civil Engineering**

Supervisor : **Prof. Ir. Dr. Siti Hawa Hamzah** (MS)

Associate Prof Dr. Nor Hayati Abdul Hamid (CS)

The most critical stress concentration build-up in a tunnel-form construction is in the wall-slab connection at the first floor level. A total of twelve (12) wall-slab samples were cast, six (6) as anchorage connection and another six (6) as cross-bracing. All samples were tested under cyclic load using displacement control; six (6) samples under lateral and the remaining six (6) under vertical. Hooked end steel fibres (**SteFib**) were added in the concrete mix and placed at various locations in the wall-slab samples. The concrete grade used was 30 N/mm2. The anchorage connection with **SteFib** placed in the connection section only (L-A-C and V-A-C)

performed better in ductility, energy dissipation and crack control, when compared to cross-bracing samples (L-CB-C and V-CB-C), under both lateral and vertical cyclic load capacities. The displacement increased more than 100% in L-A-C when compared to L-CB-C. Crack propagations reduced by 50% with major cracks occurred at 200 mm above the connection. Likewise, the displacements increased by 75% and more than 100% under pushing and pulling load phases respectively, in V-A-C when compared to V-CB-C. A comparative study using Ruaumoko modelling showed experimental load in the anchorage connection with **SteFib** increased the displacement by 39% under lateral cyclic load. Further analysis using PROKON showed maximum stresses concentrated at the first floor wall-slab connection section. Therefore, it is recommended to the construction industry to adopt the anchorage wall-slab detailing with double layer steel fabric with **SteFib** placed in the connection section to provide good resistance under cyclic load.

4

Name : **Nor Rul Hasma Bt Abdullah**

Title : **Computational Intelligence Based Power System Security Assessment and Improvement under Multi-Contingencies Conditions**

Faculty : **Electrical Engineering**

Supervisor : **Associate Prof. Dr. Ismail Musirin**(MS)

Dr. Ahmad Murtadha (CS)

This thesis presents new techniques for voltage stability assessment and improvement in power system under multi-contingencies. A line-based voltage stability index termed as Static Voltage Stability Index (*SVSI*) was used to evaluate the voltage stability condition on a line. The value of *SVSI* was computed to identify the most sensitive line and corresponding weak bus in the system. The results obtained from the voltage stability analysis

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using *SVSI* were utilized to identify most sensitive line corresponds to a load bus and estimate the maximum loadability and operating margin in the system. The *SVSI* was consequently used as the line outage severity indicator in the implementation of contingency analysis and ranking. The application of *SVSI* was extended for the evaluation of the constrained power planning (CPP) and Flexible AC Transmission Systems (FACTS) devices installation using Evolutionary Programming (EP) by considering multi-contingencies occurrence in the system. The minimizations of *SVSI* and transmission loss are used as two separate objective functions for the development of optimization technique. The effect of reactive power load variation on transmission loss in the system is also investigated. Consequently, the EP optimization technique is extended for the evaluation of the operating generator scheduling (OGS) to be applied on reactive power control in power system. The results obtained from the study can be used by the power system operators to make a decision either to achieve minimal *SVSI*, minimal transmission loss or minimal installation cost. This has also avoided all generators to dispatch power at the same time. Finally, a novel multi-objective Constrained Reactive Power Control (CRPC) algorithm using the state-of-the-art of EP for voltage stability improvement has been developed. A performance comparison with Artificial Immune System (AIS) in terms of *SVSI* and loss minimization was made and it is found that the proposed algorithm has been able to produce better results as compared to AIS. The contributions of the studies among the others are the development EP and AIS engine for CPP considered multi-contingencies *(N-m)*, the development of EP and AIS engine for FACTS installation considered multi-contingencies *(N-m)* for the determination of FACTS placement using *SVSI* and optimal sizing of FACTS using EP and AIS, the development of new technique for OGS based on EP optimization technique and the development of multi-objective EP and AIS engines for CRPC considered multi-contingencies *(N-m)*.

5

Name : **Salina Bt Muhamad**

Title : **Schottky Behavior of Novel Synthesized Aligned Zinc Oxide Nanorod Arrays and Aligned Carbon Nanotube Arrays for Mesfet Device**

Faculty : **Electrical Engineering**

Supervisor : **Prof. Dr. Mohamad Rusop Mahmood (MS)**

Profesor Dr Zaki Awang (CS)

Profesor Dr Anuar Ahmad (CS)

This study is carried out to introduce new active layers in a Schottky diode for a metal-semiconductor field effect transistor (MESFET) device structure, which are novel aligned zinc oxide (ZnO) nanorod arrays and aligned carbon nanotubes (CNT) arrays. Both nanomaterials are successfully synthesized using the Chemical Bath Deposition (CBD) and Chemical Vapor Deposition (CVD) methods, respectively, which in nanoscale, exhibit 1-dimensional structure and quantum confinement effects that lead to better properties. Prior to the synthesis process, the novel seed layer, which is the Mg0.3Zn0.7O thin film, is introduced. In order to obtain a well-aligned and densely-packed ZnO nanorod arrays, parametric studies are conducted during the deposition process where the optimized parameters are finalized (substrate at top floating position, 4 hour deposition time, and molarities of 0.05 M or more). Further investigations reveal that the 0.1 M sample was the most conductive sample of 27.75 Scm-1 with the highest crystallinity, which then becomes the standard parameter to be applied in the Schottky diode. Then, the possible growth mechanism is proposed. Schottky behavior is observed in all samples with Au-, Ag- and Pt-gate contact where the highest barrier height of 0.77 eV and reasonable ideality factor are obtained from the Au/0.1 M aligned ZnO nanorod arrays/Mg0.3Zn0.7O. Applying this into the MESFET device structure, a common MESFET behavior is then obtained. This strongly indicates that the proposed new active nanomaterial, which is novel aligned ZnO nanorod arrays/Mg0.3Zn0.7O, is applicable in the MESFET device structure application, even though it exhibits a channel length modulation phenomenon. Simultaneously, the aligned CNT arrays are successfully grown on the Mg0.3Zn0.7O seed layer by a palm oil precursor mixed ferrocene. The existence of Mg and Zn in the seed layer increases the catalytic activity which results in physical and electrical improvement, where a conductivity of more than 100 kScm-1 is obtained. However, only weak Schottky-curves are obtained, leading to intolerable application in the MESFET device structure.

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6

Name : **Norliza Bt Ibrahim**

Title : **Development of Porous Ceramic Membrane from Industrial Sanitaryware Solid Waste**

Faculty : **Chemical Engineering**

Supervisor : **Dr. Abdul Hadi** (MS)

Dr. Teng Wang Dung (CS)

Fabrication of ceramic membrane has been related to commercially available material which can be considered as high cost and its reduction was thus of great importance. Silica and alumina were the main ingredients that had been utilized in the fabrication of ceramic membrane. In this study, industrial waste from sanitaryware company had been selected as the raw material for ceramic membrane fabrication since it shown the presence of silica. The first objective of this research was to study the effect of particle size distributions (PSD), sintering temperature and binder concentration on the fabrication of ceramic membrane. It was then followed by characterization of the fabricated membrane. Next, the fabricated membrane was applied in cell separation process, and finally curve fitting and fouling model was analyzed. Extrusion process has been selected as the fabrication method. Pfefferkorn method was applied to measure the plasticity behaviour of the waste-ceramic paste in order to gain an insight in preparing paste that can be extruded. Three different PSD chosen were 71-89, 56-62 and < 45 µm. The results indicated that smaller particle sizes tends to have higher plasticity index and hence plasticity behavior, where the recorded PI for the smallest PSD was at 26%. Characterization of the ceramic membrane focused on properties that are important in the separation process such as porosity and mechanical strength. This characterization was conducted under the effect of particle size, sintering temperature, molecular weight (MW) of the binder and its concentration. In this study, the sintering temperature has been varied from 980 to 1040°C, binder MW of 2000 and 6000, while the concentration was observed for 20, 50 and 80g/100 ml distilled water. The highest porosity of the fabricated ceramic membrane was obtained at sintering temperature of 980°C using PEG 6000 at 80 g/100 ml distilled water which was at 35% using the highest PSD. Mechanical strength of the fabricated membrane gave the highest value of 28 MPa at sintering temperature of 1040°C, using the smallest PSD which was <45 micron at the concentration of 20 g of PEG2000. The separation ability of the fabricated membrane was performed via filtration process at three transmembrane pressures of 1.5, 2 and 2.5 bar. For that purpose, MRS and Lactobacillus casei has been identified as the solution and the bacteria used respectively in the production of lactic acid. Higher flux of 40 L/m2.h was recorded by ceramic membrane having the highest porosity. A good agreement between the model representation and the experimental values were achieved for all of the particle size distributions and pressures of the filtration system applied. Analysis on the fouling mechanism showed an intermediate blocking model was followed. Utilization of industrial solid waste in the fabrication of ceramic membrane and in the in-situ separation of cell and organic acid was successfully done in this research.

7

Name : **Zulkifli Bin Ab Rahman**

Title : **Palm Biomass Downdraft Gasification for Producer Gas Production as Renewable Energy**

Faculty : **Chemical Engineering**

Supervisor : **Prof. Dr. Ku Halim Ku Hamid** (MS)

Biomass has been identified as a useful source material for many applications including the production of renewable energy after gasification of the biomass. The most promising future application of the thermal gasification of biomass will require a properly designed biomass gasification generating of tar free producer gas having trouble free operation of gasifier. In the current study, an experimental fixed-bed palm biomass gasification is utilized to investigate the gasification of empty fruit bunches using preheated air from 200°C to 400°C under autothermic conditions. The system consists of a gasifier and a gas cleaning system including cyclone separator, and venturi-wet scrubber. The pre-treated EFB in 2 - 3 cm sizes and 15 % moisture content was initially pyrolyzed and the resulting char was partially gasified in the oxidation zone followed by the combustion of the char residue at the reduction

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zone (bottom of gasifier) in an oxidation atmosphere. It was found that the system can be operated stability within the temperature range from 700 - 950°C.This study indicated that under the optimum operating conditions of the gasifier ranging between 1.71 and 2.34 Nm3/kg of air fuel ratios at values between 28.2 to 37.0 kg/h at 15 % moisture content feed rate, which gives the producer gas with a good heating value of about 5.18 MJ/Nm3 at a volumetric flow of 92.47 – 101.78 Nm3/h producer gas. As the temperature is increased from 750 to 860°C, the gas yield increases from 2.6 to 3.2 Nm3/kg of biomass. The maximum temperature of drying, pyrolysis, and throat zones were determined at 125°, 350° and 900°C respectively but the throat temperature fell to about 880°C at the optimum level. The carbon conversion efficiency and cold gas efficiency could reach 88 % and 76 %, respectively. The maximum total concentration of combustible fuel gas (H2 + CO + CH4) was 32.6 % with concentrations of H2, CO and CH4 were at 10.9 %, 18.5 % and 3.2 %, respectively. The majority of the material balance for most of the runs were fairly consistent and satisfactorily over a wide range of different operating conditions. The above results indicate that the proposed innovative design for palm oil mill biomass gasification is quite promising and it could be potential as an alternative energy resource in the future.

8

Name : **Wan Ahmad Najmi Bin Wan Mohamed**

Title : **Solid-State Thermal Analysis of Air-Cooled Polymer Electrolyte Membrane Fuel Cells with Predictive Empirical Profiling**

Faculty : **Mechanical Engineering**

Supervisor : **Associate Prof. Dr. Rahim Atan** (MS)

The operation of Polymer Electrolyte Membrane (PEM) fuel cells are thermally sensitive, requiring an effective thermal engineering to cope with the generated heat. Air cooling for closed cathode PEM fuel cells is limited to stacks under 1.5 kWe. Due to great demand for fuel cells of 3 kWe or less with minimal system sizing, an effortwas taken to academically investigate the effect and behavior of various cooling channel designs, relative to PEM fuel cell operation, as a method for complementing the commercial needs. A scaled-down development approach was identified where three stacks, three cells each, with different cooling channel designs were fabricated for thermal characterization. The main objective was to develop a mathematical procedure in converting the empirical data at low electrical loadings to predict the thermal behavior of the stacks at expanded size and load. This procedure acknowledges the unique operational signatures of individual stacks which are neglected in theoretical performance formulations. Through CFD, 14 cooling channel designs were analyzed and three designs were eventually selected; one of the designs was a chaotic flow cooling channel. Incorporating the cooling channels onto a commercial bipolar plate design with a large active area (230 cm2 per cell), the stacks were tested under different electrical loads and with four cooling fan settings, a fresh approach unreported in open literature in this field of study. Physical interpretations of the electrical and temperature profiles include the polarization curve, stack efficiency, generated powers, temperature increase ratio, averaged temperature gradient and identification of active areas within the cells. Subsequent solid-state heat transfer analysis focusing on the energy changes of the stack was performed and the cooling effectiveness as well as potential of each cooling mode and design was identified. The ensuing predictive thermal modeling of the stacks at elevated powers was based on linear extrapolation method of the available cooling trends. The outcome was a detail stack temperature profile for each design and cooling setting when it is subjected to loads up to 3 kWe, within a set of assumed operating conditions. In the area of thermal engineering, this work provided different perspectives on the internal thermally related characteristics of PEM fuel cells, minus the complexity of parametric convective analysis, compared to the standard approach in available literature. The predictive modeling tool based on individual stack behavior is also regarded as a valuable analytical approach in practical cost-effective PEM fuel cell stack development.

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9

Name : **Noorakmar Bt Abd Wahab**

Title : **Effect of Orange Sweet Potato (*ipomoea batatas*) Flour Substitution on the Pasting, Rheological And Textural Properties of Fish-Flours Mixtures of Extruded Fish Crackers**

Faculty : **Applied Sciences**

Supervisor : **Associate Prof. Dr. Cheow Chong Seng (MS)**

Associate Prof. Dr. Norizzah Bt Abd. Rashid (CS)

Fish cracker or more commonly known as *keropok* in Malaysia is popular snack food among countries in the ASEAN region. The main starchy flour component used is tapioca starch (*Manihot esculenta*) that gives cracker expansion which was strongly correlated with consumer preference. Very few studies have been carried out on potential of other tuber sources to replace tapioca flour in formulation of fish crackers. Besides, the information on utilization of freshwater fish in fish crackers was also limited. This study highlighted the potential usage of orange sweet potato (*Ipomoea batatas*) flour as ingredient to substitute tapioca flour in fish cracker and as for types of fish, the red tilapia (Oreochromis niloticus) is used. Fish cracker manufacturing is mostly practised in small scale and extrusion cooking could simplify the process of stuffing and steaming. This stresses the importance of this work which studied the effect of orange sweet potato flour substitution to tapioca flour on the extruded fish cracker quality. The amount of orange sweet potato flour studied was at 20%, 30%, and 50% of tapioca flour working range at fish contents of 20-70%. The physicochemical properties determined that orange sweet potato flour was lower in swelling power but higher in fat, protein and ash content and had higher gelatinisation temperature than tapioca flour. As a result, two endothermic gelatinisation temperatures were observed by differential scanning calorimetry (DSC) in fish-flours mixture with orange sweet potato flour substitution and the enthalpy gelatinisation was also low with orange sweet potato flour substitution. The DSC showed that the fish-flours mixture with 20% orange sweet potato substitution had lower gelatinisation temperature than fish flours mixture with 50% orange sweet potato flour substitution. The rheology results indicated that the fish-flours gel with 20% orange sweet potato flour substitution had high G', low gradients and low tan δ at all measured temperatures. The texture profile analysis (TPA) indicates that the fish-flours gel was also hard, cohesive and springy. The fried extruded fish cracker with 20% orange sweet potato flour substitution was high in linear expansion, oil absorption and water absorption index, and was low in hardness and water solubility index. The product was slightly yellow and the field emission scanning electron microscope revealed that this formulation had big air cells with thin cell walls. The fried extruded fish cracker with 20% orange sweet potato flour substitution had high crispiness score and was highly accepted by the trained panellists. In conclusion, partial substitution of tapioca flour with 20% orange sweet potato flour in fish-flours mixture was easier to gelatinize and the gel had better elasticity and texture. Hence, high quality of fried extruded fish cracker was achieved with the 20% orange sweet potato flour substitution.

10

Name : **Salmah Bt Ahmed**

Title : **Development of Integrated Daylighting and Natural Ventilation System for Energy Efficiency in Buildings for the Tropics**

Faculty : **Applied Sciences**

Supervisor : **Prof. Dr. Azni Zain Ahmed (MS)**

Natural ventilation and daylighting are two passive strategies that can improve the indoor performance as well as reduce energy consumption in buildings. Both strategies when used appropriately increase indoor quality and comfort. In terms of energy costs, daylighting can significantly reduce artificial lighting as well as heat dissipated from the resulting fixtures while natural ventilation can minimize the need for air-conditioning. This research was conducted to develop an integrated system, which combined the daylighting and natural ventilation specifically for energy efficiency in buildings in the tropical countries like Malaysia. The system, named as Daylight-Natvent System, was designed in such a way that, it uses the heat from the sun's light to induce the natural stack effect inside the building, thus creating air movement, whilst captures, reflects and transmits

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(CS) = Co Supervisor

daylight into interior space. With the impending threat of global warming and pollution, the system can thus offer an effective solution to reduce such problems while providing savings in total building energy consumption as it can reduce or even eliminate the installation of active energy consuming measures. Using research data conducted in local climatic conditions and utilization of as many locally available materials as possible, the system was specifically developed for use in residential houses or offices in hot humid, tropical conditions. The challenge was the creation of a triple function system which can extract hot air out of attic spaces, create indoor air movement and provide daylight with minimal dissipation of heat to the interiors. The development of the system, which includes obtaining the optimum dimensions and material, involved assessments and evaluation of thermal and airflow performances using Computational Fluid Dynamic (CFD) simulations and daylight performance evaluation using physical modeling. To really assess the performance of the integrated system, prototypes were built based on the predicted results by taking into consideration the materials chosen to ensure that it was economically viable. Evaluations on the performance of the prototypes were carried out in the full scale test cell in the campus of University Teknologi MARA. It was found that the system could provide an average internal illuminance of 344 lx, a level sufficient for indoor visual comfort. A simple analysis on the potential electricity energy saving upon using light pipe showed that an amount of 78.84 kWhr could be saved per room in one year for lighting, which in this case is equivalent to 4.93 $kWhr/m^2.yr$. In terms of ventilation, the monitoring results indicated that the performance of the integrated system was the same as the existing turbine ventilator, which improved the indoor air movement by 26.5%. In general, the newly innovated system has demonstrated very positive lighting performance besides maintaining the good ventilation performance of the original system for the improvement of indoor environment in the tropics.

11

Name : **Mohamed S. Abd. Elforgani**
Title : **The Influence of Building Project Characteristics, Quality of Clients and Design Team Attributes on Green Design Performance Measures Adoption**
Faculty : **Architecture, Planning & Surveying**
Supervisor : **Prof. Dr. Ismail Rahmat** (MS)

Increasing concern for environment has made building owners and designers to incorporate green design into their building projects. Buildings take about 40 per cent of energy consumption globally and have significant impact on the productivity and wellbeing of the occupants. However, the quality of design team attributes the quality of clients and the characteristics of the building projects have been argued to be the main factors that determine the green design performance of buildings. Therefore, the main objectives of this study are to measure the green design building performance, the quality of client and the attributes of the design team. This study also measures the extent to which the quality of design team attributes, the quality of clients and the characteristics of the building projects affect the green design performance of buildings.The study adopted a triangulation technique that combined both quantitative and qualitative methods of data collection. One-thousand one hundred and eighty (1,180) questionnaires were sent out to registered professional architects and consulting engineers in the preliminary questionnaire survey to partially validate the theoretical framAework of the study and to obtain a general profile of building design activities in Malaysia. A 23.5 percent response rate was achieved. In addition, 16 semi-structured interviews were conducted with selected architects and consulting engineers who responded to the preliminary questionnaire survey. The third part of triangulation involved a final questionnaire survey. One hundred and two (102) out of 274 questionnaires from the final questionnaire were found to be useful and formed a database for data analysis purposes. WINSTEP software was used to validate the data collected. The Statistical Package for Social Science (SPSS) was used in the data analysis for both descriptive and inferential statistics.The study concludes that the green design performance of buildings in Malaysia is generally moderate. The quality of clients and the design team attributes significantly affect the green design performance of buildings. The project size, the availability of design information and the complexity of engineering and services also moderately influence the green design performance of building projects.

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12

Name : **Norzalifa Bt Zainal Abidin**

Title : **The Application of Islamic Arts Decoration in Mosque Interior : A Case Study of the Traditional Mosque in Melaka**

Faculty : **Architecture, Planning & Surveying**

Supervisor : **YBhg. Datuk Associate Prof. Dr. Mizan Hitam** (MS)

This research discussed the concept of '*Tawhid*' as the doctrine in Islam; and the way Islam perceives Beauty in its decorative arts as a mean of contemplation and Remembering Allah. In order to understand these hidden functions and messages, the overall approach, roles, functions and typologies of decoration are explained. The uniqueness of Islamic Arts' characteristics, roles, meanings and principles are governed universally by the Islamic doctrine – '*Tawhid*' which expressed Oneness and Unity towards Contemplation to the One God – Allah. By looking at these aspects, one can truly assess whether the current usage of decorative motifs in mosque is in full success or not. A cross-reference of these usages is established with the true roles and functions of these decoration motifs as decoration in relation to Islamic Art as a whole. Successful applications of the interior decorative motifs can then be established and recommended for future applications. It is the intention of the study to be as an impetus for other broader and more critical analyses which can be made by others to fully comprehend the underlying concepts of the decorative motifs in the mosque interiors. A base reference study was made onto the oldest traditional mosque in the South East Asia region - *Masjid Agung Demak* in Central Java, Indonesia. Field studies were made to cover eight selected traditional mosques in Melaka: *Masjid Peringgit, Masjid Kampung Hulu, Masjid Tengkera, Masjid Kampung Keling, Masjid Kampung Duyong, Masjid Serkam Pantai, Masjid Alai* and *Masjid Al Azim*. These mosques were chosen based on their built age – on two separate eras – the old traditional mosques: *Masjid Peringgit, Masjid Kampung Keling, Masjid Kampung Hulu, Masjid Kampung Duyong, Masjid Tengkera, Masjid Serkam Pantai* and *Masjid Alai* have been built since the 18th and 19th Century and been treated as community mosques. These mosques are still in use, well maintained and conserved. The new traditional mosque, *Masjid Al Azim* is of the 20th Century, is a new and larger scale mosque, treated as the State Mosque in Melaka. Surveys were done to record and identify the decorative motifs in these mosques and to evaluate the users' awareness and the effectiveness of these decorations. The aesthetic criteria of the decoration elements which have profound impacts onto the users are also identified. Further more, a close examination and analyses regarding certain aspects of the physical characteristics of the decorative motifs are presented. Through the survey and observation study of these decorations, various physical and aesthetic factors were identified. These factors were then referred to formulate the general design criterion in relation to the application of decoration in mosque. By fully understanding the role of decoration, further improvements can be recommended to ensure better and effective usage of decoration particularly in mosques.

13

Name : **Roshartini Bt Omar**

Title : **Technology Transfer (Tt): Level of Absorbtive Capacity and Technological Capabilities in Mega Construction Projects**

Faculty : **Architecture, Planning & Surveying**

Supervisor : **Associate Prof. Dr. Roshana Takim** (MS)

Professor Sr Dr Hj Abdul Hadi Hj Nawawi (CS)

The concept of 'technology transfer' or TT projects emerges as an important business and managerial concern for many developing countries. TT in construction is seen as an effective mechanism to increase the flow of technological development by acquiring newer technology from abroad in response to a changing economic environment. The concept of TT in construction organisations could occur simultaneously, involving the flow of imported technology (i.e., knowledge, skills and tools) via construction projects. Thus, the aim of this research is to develop a conceptual framework of TT, level

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  (CS) = Co Supervisor

of absorptive capacity and technological capabilities in mega construction projects to enhance implementation of TT in Malaysian construction organisations. The empirical research was undertaken by means of an Initial Preliminary Survey among five people (academicians and practitioners) that were involved in TT research and projects, followed by Case Studies-Phase 1 (interviews and document sources) among the six (6) Category G7 Companies with experience in TT projects. In total 35 valid responses were received constituting a response rate of 48.6 %. The results were analysed using NVivo software version 8. In order to underpin the Case Studies-Phase 1, Case Studies-Phase 2 was conducted using semi-structured interviews with Human Resource Officers of the respective construction companies. The purpose is to measure the level of absorptive capacity and technological capabilities in TT projects.

The findings from the research were used to develop a conceptual framework for TT, level of absorptive capacity and technological capabilities in the Malaysian construction industry. The framework was validated by using a validation questionnaire survey. The findings revealed that the seven components of TT are: types of technology (i.e., knowledge, skills and tools); projects; organisations (i.e., public and private sectors); the level of absorptive capacity; the level of technological capabilities, benefits and barriers of TT projects. The results of the research could provide an insight into the Malaysian construction project organisations and will provide valuable guidelines, in particular to public or private sectors in Malaysia that are looking forward to participating in the global construction market.

14

Name : **Zaharah Bt Mohd Yusoff**

Title : **Assessment of Transportation Expenditure in Affordability Measurement of Rental Low-Cost Housing Schemes in Kuala Lumpur Federal Territory, Malaysia.**

Faculty : **Architecture, Planning & Surveying**

Supervisor : **Prof. Dr. Dasimah Omar** (MS)

Associate Prof. Dr. Kamaluddin Talib (CS)

Low-cost housing development schemes have given good opportunities for poor families to own or rent a house. Many programmes were undertaken by the government of Malaysia to house lower-income families since the colonial period before Malaysia's Independence in 1957. The emphasis on providing low-cost housing was put as a main agenda item in the First to Ninth Malaysia Plans (1966-2010). It was developed by joint-venture programmes between public and private agencies through policy enforcement. Lately, there are a growing number of researchers worldwide discussing another issue of living; that is the increase of transportation costs. This new phenomenon has caused people to re-evaluate what true affordability means. The earlier income-based method for identifying lower-income families is no longer practical in the current economic situation and an improved method is needed. In line with the issue, this research was conducted with the aim of investigating the low-cost housing residents' affordability level by the evaluation of transportation elements that focused

on mobility and accessibility. The research area was the low-cost rental housing schemes of the Kuala Lumpur Federal Territory (KLFT). Research questionnaire survey forms, distributed to 377 selected respondents from four low-cost housing areas, were designed to obtain information on the respondents' mobility activity. The Statistical Package of Social Science (SPSS) and GIS buffering analysis were applied. The bufferin ganalysis was to identify the existence of amenities in each area and the results collated as contribution factors to the overall transportation analysis. Finally, the affordability level of four low-cost housing schemes was calculated to find out the residents' affordability towards their living expenses. The research findings showed that the overall assessment of low-cost housing schemes had a high transportation expenditure which exceeded 20% of the average income. The measurement of affordability level was calculated through the combination of housing expenditure and transportation expenditure which should not exceed than 45% of the affordability index. The result of the affordability study showed that PPR Pudu Ulu (54.72%), PPR Kg. Muhibbah (62.67%) and PPR Sri Semarak (52.15%) had exceeded the affordability index and this proves that the lower-income earners in Malaysia's urban areas are under alarming pressure of living costs. This research managed to show that there is a need to measure the transportation expenditure specifically as an additional element in addition to the housing expenditure in defining a true affordability measure for residents in low-cost housing area.

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(CS) = Co Supervisor

15

Name : **Zul Zakiyuddin Bin Ahmad Rashid**
Title : **Malaysian Legal Provisions and Design Risks in Construction Works**
Faculty : **Architecture, Planning & Surveying**
Supervisor : **Associate Prof. Dr. Hamimah Adnan (MS)**

Construction project is shrouded with various aspects of risks, which includes risks related to design professionals and design works. In order to complete a construction project successfully, the parties involved must be able to manage the risks. Although the need and importance of risk management cannot be denied, the standard of risk management among the parties involved in a construction project in Malaysia differs from one company to another. This is due to various factors such as the company resources for risk management, types and size of the project. As such there is a need to standardize the basic practice of risk management among the parties involved, to secure the safety and proper performance of the project. This can be achieved through legal measures, where certain requirement on risk management can be imposed to ensure the least required practice of risk management is exercised. This research is meant to look at the risks associated with design professionals and design works under the traditional procurement route in Malaysia and the role of Malaysian law in corresponding to the practice of standard risk management by the parties involved. In achieving the objective, research instrument in form of questionnaire survey, in-depth interviews and expert interview were adopted. The questionnaire survey is meant to get the general perceptions from architects and engineers on the problem statement. Based on the replies, further in-depth data collection was conducted, in the form of semi-structured interview. Finally, the data were evaluated by experts, which concluded the triangulation approach. Triangulation approach adopted in this research will produce a robust and reliable data. From the analysis of the data, it was found that there are aspects of design works which lead to the occurrence of design related risks. Such risks emanated from the designers professional duty as well as from the structure of the traditional procurement system. In addition to this, with regards to the legal provisions on design risk management, several aspects of the law of contract, tort and statutory provisions have to be addressed to correspond to design risk management needs. While the structure available is ready for the law to be an efficient force in ensuring proper risk management practice among the designers, the lacking of effort to affect it undermined the crucial role of the law itself. The research also found out that there are certain aspects of the law that are not being fully understood by the respondents. This factor also leads to the occurrence of design related risks. Accordingly, based on the above, an outline on certain areas in connection to the laws and design risks that can be improved was prepared. The identification and recommendation of areas to be improved is hoped will provide those involved with the construction industry guidelines to develop framework for an efficient design risk management practice to be established.

16

Name : **Hanafi Bin A.Rahim**
Title : **GARCH Parameter Estimation using Least Absolute Median**
Faculty : **Computer & Mathematical Sciences**
Supervisor : **Prof. Dr. Mohammad Said Zainol (MS)**

The general autoregressive conditional heteroscedasticity, (GARCH) family has become more efficient in fitting financial data as it consists of the second order moment that measures the time-variant of the volatility data. However, GARCH may fail to fit some high frequency financial data with large jumps called outliers. In this research, GARCH parameters were estimated using least absolute median (LAM). The LAM estimator was developed using Bahadur representation and Taylor expansion to speed up its iteration process. This research managed to obtain the asymptotic normal distribution for LAM-ARCH and LAM-GARCH. This asymptotic distribution was used to develop test statistics to test the performance of estimated parameters. This asymptotic distribution is an extension of the special case of quantile regression to the GARCH model. Iteration processes are needed to obtain the parameters. This was performed using the modified idea of least median square regression. Simple tests like the box plot and average absolute error, (AAE) were also used to test its performance. The model developed was then validated through simulation analysis and hypothesis testing. Based on the simulation analysis, the LAM estimator produced stable parameters

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(CS) = Co Supervisor

in terms of less variability compared to other estimators considered in this research. Hypothesis testing showed that the parameters are well estimated. Throughout the research, estimation method in the form of a LAM-ARCH model with asymptotic normal distribution is developed. The LAM-GARCH model, an extension from LAM-ARCH with asymptotic normal distribution together with its procedure to assess the performance of the estimated parameters is achieved. An autocorrelation test to access the behaviour of the model based on its residuals and test statistics for assessing the performance of the methods developed. Applications to real data provide insights on the usability of the method developed using three data series. LAM can estimate good parameters of all the real series.

17

Name : **Mazni Bt Omar**

Title : **The Effectiveness of an Agile Software Methodology: Empirical Evidence on Humanistic Aspects**

Faculty : **Computer & Mathematical Sciences**

Supervisor : **Associate Prof. Dr. Sharifah Lailee Syed Abdullah (MS)**

Associate Prof. Dr Naimah Mohd Hussin (CS)

Agile methodology emerged in response to the recognition of the importance of humanistic aspects in software engineering (SE). However, there is lack of empirical evidence that supports its effectiveness in SE. The lack of empirical evidence demands more research in this field to generate more empirical data. Therefore, the first aim of this research is to investigate empirically the effect of agile methodology on the members of software development teams. To achieve this goal, a series of longitudinal empirical studies were carried out in both academic and industrial settings. For the academic setting, Universiti Utara Malaysia (UUM) was chosen because participants are representative sample enrolled in a project-based course that requires them to develop an application in a team. Three replicated experiments and two case studies were carried out. To generalize findings, an empirical inquiry in the form of a case study was carried out in a computer centre in Malaysia. The case study focused on four software development teams working on different applications in an organization. Both quantitative and qualitative analyses were used to triangulate and strengthen the empirical results. The humanistic aspect in SE that was addressed was the impact of an agile methodology on work-related well-being and positive affectivity of team members. The study findings indicate that, the agile methodology does not have a statistically significant effect on both aspects.

However, it does have a significant impact on software quality. To further understand the humanistic issues, a follow up study on the personality type composition was carried out. It was observed that the presence of certain personality types amongst team members did contribute to the success of a software development team. Understanding human potential in teams is crucial because having the right people in a team can impact team performance. However, to date, there is no consensus on the right composition of team members because team dynamism and its interrelated factors are complex to uncover. Therefore, findings from these empirical studies were further used to design a team performance prediction model (eTiPs). A knowledge discovery in databases (KDD) approach was used as a guide to establish the prediction model. Four predictor variables—prior academic achievement, personality types, team personality diversity, and software methodology—were used to train, test, and validate the prediction model. Three data mining techniques—a classical logistic regression, decision trees, and rough set—were compared to determine the best technique for identifying association patterns in the data and to achieve optimal classification accuracy. The rough set technique was proved to be the most suitable technique for designing the prediction model. The designed model was further cross-validated using an area under receiver operating characteristic (ROC) curve and new data sets. Results show that the eTiPs prediction model has the potential to become a useful tool for decision-makers. This research contributes by providing additional empirical evidence that addresses the humanistic aspects in software engineering. The outcome of this research is a team performance prediction model that can assist decision makers in determining the effective team composition.

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18

Name	: **Natrah Bt Abdullah @ Dolah**
Title	: **Effect of Cognitive Styles on Visual User Interface Design**
Faculty	: **Computer & Mathematical Sciences**
Supervisor	: **Dr. Wan Adilah Wan Adnan** (MS)
	Prof. Dr. Nor Laila Md Noor (CS)

A user interface design becomes more important since museums introduce online museum to exhibit museum collections. Designing the UI based on user differences and ensures that the interface is effective is important to assist users appreciate the displayed museum collections. The purpose of this study is to design and evaluate of user interface for museum website. This thesis applied a multi-method research; an approach of research that uses multiple methods over a series of studies to accumulate evidence for achieving reliable results. It employs four major phases: (1) Background Study, (2) Framework Development, and (3) Empirical Study, and (4) UI Model Development. Background study is conducted to identify issues and current trend on user interface design of museums website. In Framework Development phase, research components are identified and theoretical basis of UI design dimensions are proposed. To verify the framework and UI design dimension, a series of empirical studies is conducted. Three experiments are designed and data are captured with online museum visitors to measure user performance and interaction patterns; and questionnaires were used to measure user satisfaction and preferences. In order to capture more interaction pattern, eye movements are also recorded. Overall ninety respondents participated in three experiment studies; twenty-eight in Experiment One; fifty-three in Experiment Two; and nine in Experiment Three. The results of the questionnaires revealed a high level of satisfaction within proposed UI design and UI dimensions. The questionnaires also revealed that users were preferred with the proposed UI design and UI design dimensions for museum website. The experiments revealed that users performed better with the proposed dimensions and design. Eye movement data revealed that different group of user apply different interaction patterns on proposed UI dimensions. The study recommends that user interface design based on user differences within museum website provide more satisfaction, preferable and better performance during browsing on museum collections. It is recommended that user differences have an effect on UI design and could provide guidelines into HCI and museums literature.

19

Name	: **Siti Rahmah Bt Awang**
Title	: **Intelligence Classification and Fuzzy Optimisation Model of People With Epilepsy**
Faculty	: **Computer & Mathematical Sciences**
Supervisor	: **Associate Prof. Dr. Rasimah Aripin** (MS)

Epilepsy refers to disturbances in the nerves caused by excessive electrical activities taking place in the brain. One of the most challenging problems faced by people with epilepsy (PWE) is finding employment. The objective of this thesis is to identify intelligence profiles of epilepsy patients and to classify their intelligence patterns and characteristics based on a developed intelligence scale, Ability Test in Epilepsy (ATIE©). Three clustering approaches were applied: Principal Component Analysis (PCA), Hierarchical Clustering Analysis (HCA) and Two-Step Cluster Analysis. This study also explores the attitudes and perceptions of human resource personnel towards the epilepsy and unemployment of PWE. A fuzzy algorithm, Fuzzy Inverse ATIE (FIA) was created to estimate a fuzzy model that could indicate the best parameters of the eight intelligence skills based on the Howard Gardner's Multiple Intelligence. With that information, it could now be possible to improve the chance of employment for PWE. The eight intelligences or skills are musical, bodily/kinaesthetic, logical/mathematical, spatial, linguistic, interpersonal, intrapersonal and naturalist. ATIE was administered on 166 epilepsy patients who were out-patients at the Neurological Department's clinic, Hospital Kuala Lumpur. The respondents, consisted of both employed and unemployed were classified as either partial or generalized epileptic. The FIA algorithm, which was coded

* (MS) = Main Supervisor
  (CS) = Co Supervisor

in C Sharp (C#) programming language, was incorporated into a logistic regression model, which was then estimated. The findings showed that the majority of the patients were strong in interpersonal and intrapersonal intelligences. Verbal and interpersonal skills were found to be the most correlated with the other intelligences, and musical skill was the least. Hierarchical Clustering Analysis gave the most appropriate classifications with three clusters: *Foundation Cognitive*, *Agility*, and *Logical Thought* skills. The fuzzy model reveals that the probability of employment, $P(Y=1)$, is close to 1. The study contributes significantly to statistical applications in neurosciences, social sciences and epilepsy study in Malaysia.

20

Name : **Suriyati Bt Razali**
Title : **Community Based E-Museum Framework: Towards Sustainable Cultural Heritage Information System**
Faculty : **Computer & Mathematical Sciences**
Supervisor : **Prof. Dr. Nor Laila Md Noor** (MS)
Dr. Wan Adilah Wan Adnan (CS)

This research presents the work that conceptualizes a new phenomenon of sharing cultural knowledge through a model of an E-museum which is coined as the community based E-museum. This conceptualization is motivated by two main factors. The first factor is the growing need for museums to manage the digitization of their museum artifacts while trying to re ach out for more historical or cultural artifacts whose custodians are individuals or families who are reluctant to surrender their artifacts to museums. The second factor is the rapid growth of user generated content that thrives on the simplicity but powerful web technology which signifies the willingness of users to participate in the contribution of content in the online social media. To gain a better understanding of museums' functions and processes, an extensive literature review was done to trace the development of the new museology and trend of e-museums was made. This community based E-museum (ComE) model is conceptualized against a backdrop that illustrates the e-museum evolution against a technology trend that managed to engage users in active online participation in the virtual world. The ComE is conceptualized as an E-museum that empowers community members who are owners of cultural artifacts to share the artifacts with other e-museum visitors through the curatorship of digital forms of the artifacts while maintaining the custodianship of the artifact. Nevertheless, this empowerment does not overlook issues of artifact genuineness and authenticity and neither does it overlook potential abuses of authorship involved in the narration or description of the artifact. The research approach follows the soft design science approach to undertake the conceptualization and development of major constructs within the ComE model and the framework to develop instantiations of the ComE. The scope of the research is focused on the cultural artifact of the traditional Malay textile (TMT). The research is organized into three main phases following the soft design science methodology which are the awareness phase, the suggestion phase and the development and evaluation phase. During first phase of the research, the data collection consists of several techniques that include individual interviews with multi stakeholders of TMT artifacts, TMT artifact inspection and review on documentation of TMT artifacts. The interviews involved textile museum curator, TMT artifact owners and experts on TMT artifact knowledge. A CATWOE analysis was conducted to formulate a root definition of the ComE model. The second phase covered work that leads to the proposition of the conceptualized ComE model. In the third phase the ComE framework which incorporates the museum curatorship processes was developed and an instantiation of it was evaluated through expert verification. The main contribution of this work falls into three areas. The first is the theoretical contribution on the new typology of e-museum which gives a better understanding of the e-museum evolution and the new community based e-museum model that thrives on theories on museology and socio-technical systems. The second is on the methodological contribution that adds refinement to the soft design science approach which will be useful for future research that undertakes the soft design science approach. The third contribution is on the knowledge of constructs pertinent to the Community based E-museum model that exists from systematic qualitative findings of the understanding problem through the real world view within museum and TMT domain context.

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21

Name : **Zolidah Bt Kasiran**

Title : **Customer's Satisfaction Measurement using Cognitive and Emotion Judgment Survey: A Case Study of INTEC**

Faculty : **Computer & Mathematical Sciences**

Supervisor : **Prof. Dr. Saadiah Yahya (MS)**

Customer satisfaction is very important to organization in order to keep the customer loyal to the company. The research of customer satisfaction have been focusing on the cognitive judgment theory where the feedback collected from the customer was rely on the recalling the experiences. This method of cognitive judgment in measuring customer satisfaction have a problem that customers tend to rate customer satisfaction survey highly, as the cognitive judgment theory rely on remembering of the experience. The objective of this study is to propose a model to produce a clean input dataset for neural network classifier, to propose customer satisfaction model that combining the cognitive judgment and emotion judgment theories to balance the customer satisfaction rate. Another objective is to construct and conduct the satisfaction model based on the case study done at INTEC and to verify and confirm the reliability of the customer satisfaction model. The experiment was conducted by using paper-based survey to collect cognitive judgment feedback and facial expression recognition analysis for the emotion judgment feedback. The data were acquired during the student's registration to measure their satisfaction on the registration process using emotion judgment via facial expression and cognitive judgment using paper-based survey. The clean input datasets were run into neural network classifier and the classifier had produce output of facial expression classification in binary. The hypotheses was tested using statistical tools and it found that there is no relationship between emotion and cognitive judgment survey. The gap of the two type of measurements have been evaluated and it is found that emotion judgment via facial expression recognition survey could be used as a complement to conventional cognitive judgment using paper-based survey. The research concludes that more and thorough study of facial expression recognition model as customers' satisfaction measurement tools should be explored. The proposed customer's satisfaction model has added to the body of knowledge in quality service field.

22

Name : **Mumtaz Binti Mokhtar**

Title : **Malaysian Digital Painting: An Art Historical Study**

Faculty : **Art and Design**

Supervisor : **Prof. Dr. Muliyadi Mahamood (MS)**

Malaysian modern painting was established in the 1930s during British colonization. Since that period, artists applied pigments on paper and canvas, using media such as water color, oils, pastel and acrylic paint. With the advent of digital technology, local artists started using computers in their art-making in the 1980s and have become reputable since the Digital Collage exhibition in 1988. In the context of art, digital painting is an extension of the painting concept which refers to new forms involving various types of digital data including vector or raster image, text and sound. Digital painting is created through hardware and software in virtual and physical appearances. Similar to any form of art, digital painting tells about the product, the process and its nature. Although digital painting exists two decades ago, there is a lack of acceptance and understanding on the subjects. An art historical study will become a major reference for the development of Malaysian art. Consequently, this study aims to trace the chronology of the development of Malaysian digital painting. The stylistic and contextual issues including its formalistic format, media, themes and styles, and

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  (CS) = Co Supervisor

artists are also examined in this study. Using a mixed mode of research method, this study reviews related literature, observes hundreds artifacts and conducts interview sessions with prominent artists. Data for interviews were gained through a semi-structured interview format. The instrument for the semi-structured interviews was formed based on related literature and practices found in research materials. The exploration of the history of Malaysian digital painting demonstrates the growth of Malaysian digital painting, the artists, the artifacts, and other related background. Based on the timeline chart, Malaysian digital painting still continues and more young artists are involved in digital painting creations. As a result, the history of Malaysian digital painting can be summarized into several important eras namely Programming Era, Paint Program Era and Multimedia Era. Hopefully, this research will be a major reference for further study in related fields.

23

Name : **Mohd Noor Bin Mamat**
Title : **The Development of Hadhari Environmental Attitude Test Instrument for Malaysian University Students**
Faculty : **Education**
Supervisor : **Prof. Dr. Fattawi Bin Mokhtar (MS)**

Environmental crisis and ecological problems produced a global call to involve all residents of the Earth. Global warming, climate change, rise of the sea level, glacier decrease, food crisis, health hazards, deforestation and others are among the problems, affected by human attitude. For that, environmental attitude development becomes more serious as UNESCO declared that 2005-2014 as 'the decade of education for sustainable development'. Environmental attitude is best measured with affective outcomes; factual knowledge and behavior intention component to meet behavioral component. There is lack of study about the affective impacts of the environmental-related courses especially using a comprehensive instrument of environmental attitude. The objective of this research is to develop a valid and reliable Hadhari Environmental Attitude Test (HEAT) to assess the student's environmental attitude after attending the environmental ethics course. Initial study has been done to support the development of the instrument, validated by the experts in education and environmental studies. HEAT comprises of 60 items on environmental attitude within ten dimensions, with reference to Quranic and prophetic values and in parallel with global and local's concern. It is well tested and validated, with high reliability (r=0.94) using Rasch® measurement model. The test is also validated with Cronbach Alpha value of $\alpha=082$. This research is also to identify the environmental profile among Malaysian students, who completed the environmental ethics course at the tertiary level. Forty three (43) students of environmental ethics course at university level, which is equivalent to 1537 data sets, are identified and the test session is administered, before and after a semester. There is nearly no correlation between student's environmental knowledge and attitude (r=0.157), after the course as the result shows the mean before the course is 0.03*logits* and -0.02*logits* after the course; a difference of -0.01*logits* with low correlation value (p<0.01, r=0.427). However, the result shows a clear difference of student's performance using this alternative assessment for affective effects, with comparison to the conventional method which is merely on cognitive effects. The research found 23.3% students have excellent grade, 72.1% students have good grade and 4.6% students fail in their examination. However, HEAT found that no student has excellent grade (committed pro-environmental), 55.5% of them have good grade (not committed pro-environmental) and 44.2% of them attained below passing grade (not pro-environmental). In conclusion, this research leads to few recommendations of paradigm shift in designing contents, learning outcomes and assessment method to achieve the objective of affective education for holistic education and sustainable development.

* (MS) = Main Supervisor
(CS) = Co Supervisor

24

Name : **Mohd Shatari Bin Abd Ghafar**

Title : **The Dominance of Directors, Audit Committee Effectiveness and Accounting Conservatism: Malaysian Evidence**

Faculty : **Accountancy**

Supervisor : **Prof. Dr. Muhd Kamil Ibrahim** (MS)

Prof. Dato' Dr. Mustafa Mohd Zain (CS)

This study uses the alignment effect hypothesis from agency theory and the entrenchment hypothesis to examine the firms' financial reporting conservatism relative to the effectiveness of their audit committees and the dominance of directors. The study is also extended to determine the association of audit committee effectiveness and directors' dominance and their linkage to the firms' degree of accounting conservatism. The proxy for audit committee effectiveness in this study are audit committee independence, accounting financial expertise and diligence. Meanwhile, the proxies for directors' dominance are executive director's dominance, family director's dominance and audit committee shareholding. Using Khan and Watts's (2009) C_SCORE measures of accounting conservatism, the C_SCORE of 795 firms-year observation from Bursa Malaysia main board is calculated. The findings reveal that only professional accounting expertise and audit committee diligence are significant to explain the variations in the firms' financial reporting conservatism. The results also suggest that executive ownership and CEO duality are detrimental to firms' degree of accounting conservatism. Finally, it was found that the presence of professional financial accounting experts in the audit committees and audit committee diligence are able to strengthen the reporting conservatism in firms with high executive ownerships. The findings also suggest that an increase of professional accounting expertise in the audit committees and audit committee diligence are also able to moderate the negative association between Chief Executive Officer (CEO) duality and accounting conservatism. The findings from this thesis suggest the importance of having directors with professional accounting certification in the audit committees in order to provide efficient monitoring. The study also reveals that highly diligent audit committees play a huge part in encouraging conservative accounting. The findings also reveal some disturbing evidence. Contradictory to the general corporate governance principles, the association of audit committee independence is negative and insignificant. The implications from this findings, suggest that regulatory bodies should consider increasing the appointment of directors with professional accounting certifications in the audit committees. Besides that, it is also suggested that the committees should meet more frequently as by doing this they would have more time to monitor or review the financial reporting process. Furthermore, the roles and definition of "independence" of audit committees should be strengthened and revised.

25

Name : **Sofian Bin Shamsuddin**

Title : **The Effect of Corporate Entrepreneurship on the Perceived Financial Performance of Established Malaysian State Government-Linked Corporations**

Faculty : **Business Management**

Supervisor : **Prof. Dr. Ismail Ab. Wahab** (MS)

Associate Prof. Dr. Zainab Ahmad (CS)

Over recent years, much government efforts have been concentrated on enhance ng innovation and entrepreneurship. This stems from the view that organizations profit from the influences of corporate entrepreneurship and innovation. Thus the choice of whether to grow corporate entrepreneurship and how it may result in variation in performance is an eminent issue. Paying special attention to this trend provides the basis for this study. Using data from 92 out of 102 intrapreneur companies largely founded within the past fifteen years and across diverse industries such as construction, plantation, property, technology and trading/services, this study analyzes the effect of corporate entrepreneurship dimensions on the perceived financial performance of established Malaysian state government-linked corporations. In particular, the research attempts to: (1) determine the effect of corporate entrepreneurship (CE) dimensions on company performance, and (2) explore the moderating effects of resource availability, supportive organizational structure and rewards have on the relationship between CE dimensions and company performance. Survey questionnaires were used to collate the data and Structural Equation Modelling with AMOS version 19 were used to analyze the relationships. The findings of this research show that pro-activeness has a positive

* **(MS) = Main Supervisor**
  (CS) = Co Supervisor

and significant impact on financial performance of JCorp companies. Even with the indirect effect of moderating factors (resource availability, supportive organizational structure and rewards) all the hypotheses linked to pro-activeness were supported. This means that resource availability, supportive organizational structure and rewards do moderate the relationship between pro-activeness and financial performance. Secondly, risk-taking does not have a direct effect on financial performance of JCorp companies but the indirect effect of moderating factors influences the effect of risk-taking on financial performance. Resource availability, supportive organizational structure and rewards are shown to moderate the relationship between risk-taking and financial performance. Interestingly, both innovation and self-renewal were shown to be negatively related to financial performance and although all the moderating factors were positively related to these CE dimensions, they are not significant enough to support the hypotheses. In other words, the moderating factors do not moderate the relationship between innovation or self-renewal and financial performance. This study helps address the relationship between CE dimensions, internal moderating factors and financial performance. The findings are considered useful for decision makers in organisations that intend to practice corporate entrepreneurship as well as for researchers and academics alike.

26

Name	: **Abd Latif Bin Abdul Rahman**
Title	: **Acceptance and Continued use of Digital Libraries by Postgraduate Students in Malaysian Intensive Research Universities**
Faculty	: **Information Management**
Supervisor	: **Professor Dr Adnan Jamaludin** (MS)
	Associate Professor Dr Zamalia Mahmud (CS)

The digital library is regarded as a new information system product in libraries and information centres around the world. It is also regarded as one of the most innovative efforts taken by library and information professionals in their attempt to enhance the library and information services for their users. Library and information professionals are capitalizing on the flexibility and advantages of the digital library to offer new and sophisticated services to their library users. Currently, users are already relying on the availability of digital libraries for their information needs to support their daily tasks. In the context of the university environment, the digital library in the university is being utilized by students and academics almost constantly. In this context, librarians and information professionals who are responsible for the development of a digital library need to understand the intricacies of it so that the advantages and benefits can be exploited to better provide library and information services. One of the most important aspects of the digital library in the university environment is its acceptance and continued use by the university community, particularly by students. The success of the digital library depends on its acceptance and continued usage by users. Therefore, it is crucial to investigate and understand not only its acceptance and continued usage, but also how and why it is being accepted and continued used. With this knowledge, better library and information services can be offered to the users at large. Samples comprised 534 respondents from four Malaysian intensive research universities and were obtained through questionnaire. This study investigated factors that are expected to influence the willingness of postgraduate students to continued use the digital library based on modified UTAUT, SOUTAUT, NUTAUT and Delone and Mclean's Information Success Model. The modified model is comprised of constructs represented by several latent variables; namely Performance Expectancy (PE), effort expectancy (EE), information quality (IQ) and digital library services (DLS), and these are moderated by age, gender and experience in using digital library. Results show that performance expectancy, effort expectancy and information quality are positively related to the Continued Use of the Digital Library, while the digital library services variable is negatively related to the Continued Use of the Digital Library. There is no evidence that age and gender have any significant interactions with the relationship between Performance Expectancy and Continued Use of the Digital Library, while experience in using a digital library and age of user significantly interacts with the relationship between Effort Expectancy and Continued Use of the Digital Library. This provides evidence of a moderating effect of experience and age in the Continued Use of the Digital Library. It is expected that this research will provide new insights into

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* (MS) = Main Supervisor
(CS) = Co Supervisor

27

Name : **Ismail Bin Manuri**

Title : **Knowledge Management in the Malaysian Armed Forces: A Study on Perceptions and Applications In The Context of an Information and Communication Technology Environment**

Faculty : **Information Management**

Supervisor : **Prof. Dato' Dr. Raja Abdulah Raja Yaakob** (MS)

The development of modern warfare is reflected by the rising importance of having knowledge advantage over adversaries. Leadership, sense making, problem solving and decision-making are more complex and more demanding in military situations. Command and control is taking on new dimensions, and the role of military personnel is evolving into that of 'thinking soldier'. The "information superiority" becomes the determinant of the future war management and requires a drastic improvement in information management, assurance, exchanging and sharing of superior knowledge. The aim of the study is to examine the attitude of the MAF officers' towards Knowledge Management that include knowledge creation, Knowledge Management processes, Knowledge Management applications, and technology. Five hypotheses were developed in order to examine the degree of statistical significant difference in perceptions towards Knowledge Management. The results of the study showed that, the perceptions towards knowledge creation, Knowledge Management processes, Knowledge Management applications and technology by the MAF officers were not significantly different. However, there is a statistical significant difference in perceptions towards knowledge creation based on respondent's rank, academic background, and working experience. The perceptions towards technology were only significantly different based on the respondent's academic background. Further, the results showed that a positive correlation existed between Knowledge Management applications and Knowledge Management processes, and technology. There was also a positive relationship between technology and knowledge creation, and Knowledge Management processes. Further analysis on the Knowledge Management applications, the results demonstrated a relatively low Knowledge Management practices in the MAF due to lack of exposure and awareness among the MAF personnel.

* (MS) = Main Supervisor
  (CS) = Co Supervisor

Institute of Graduate Studies
Institut Pengajian Siswazah (IPSis)
Block 8, INTEKMA Convention Centre
Persiaran Raja Muda, Seksyen 7
40000 Shah Alam, Selangor
Malaysia

http://www.ipsis.uitm.edu.my
General line : 603 5522 5331   Fax : 603 5522 5335