

Institut Pengajian Siswazah

THE DOCTORAL RESEARCH ABSTRACTS

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FOREWORD

Congratulation to IGS on your continuous efforts to publish the 12th issue of the Doctoral Research Abstracts which highlights research in various disciplines from science and technology, business and administration to social sciences and humanities. This research abstract features the abstracts from 71 PhD doctorates who will receive their scrolls in this 87th UiTM momentous convocation ceremony.

To the 71 doctorates, you have most certainly done UiTM proud by journeying through the scholarly world with its endless challenges and obstacles, and by persevering right till the very end.

Graduands, your success in achieving the highest academic qualification has demonstrated that you have indeed engineered your destiny well. The action of registering for a PhD program was not by chance but by choice. It was a choice made to realise your self-actualization level that is the highest level in Maslow's Hierarchy of Needs, while at the same time unleashing your potential in scholarly research.

Again, congratulations to all PhD graduates. As you leave the university as alumni we hope a new relationship will be fostered between you and the faculty in soaring UiTM to greater heights. I wish you all the best in your future endeavor. Keep UiTM close to your heart and be our ambassador wherever you go.

> **Prof Emeritus Dato' Dr Hassan Said** *Vice Chancellor* Universiti Teknologi MARA

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TABLE OF **CONTENTS**

Foreword

2

Table of Contents

3 - 6

NO.	NAME	TITLE	PAGE
1.	FARAH AYUNI BINTI SAHAFEA @ SHAFIE	ENVIRONMENTALLY-EXTENDED INPUT-OUTPUT ANALYSIS IN ENVIRONMENTAL ASSESSMENT	7
2.	FILZANI ILLIA IBRAHIM	MULTI-DIMENSIONAL HUMAN INTERACTION IN OPEN SPACES FOR SHAH ALAM CITY, SELANGOR, MALAYSIA	/
3.	ISMAIL MA'AROF	ASSESSMENT OF THREEDIMENSIONAL MODEL GENERATED USING DIGITAL CLOSE-RANGE PHOTOGRAMMETRIC METHOD FOR HERITAGE DOCUMENTATION APPLICATIONS	8
4.	IZZADIN ALI AHMED AL-SHAEZ	MODELLING GROUNDWATER AQUIFER TO ESTIMATE WATER SUSTAINABILITY IN SANA'A BASIN	
5.	KHAIRIL HIZAR BIN MD KHUZAIMAH	A 4-QUADRANT FRAMEWORK ON STRATEGY, COMMUNITY, LEARNING AND INNOVATION FOR THE APPLICATION OF KNOWLEDGE MANAGEMENT IN PUBLIC SECTOR ORGANISATIONS IN CONSTRUCTION	9
6.	MANSOR BIN OTHMAN	RELATIONSHIP OF PHYSICAL ENVIRONMENT OF PUBLIC PRESCHOOL CLASSROOM ON CHILDREN'S SOCIAL INTERACTION BEHAVIOUR AND SPATIAL CHOICE	
7.	NAFISAH BINTI KHALID	DEVELOPMENT OF ALLOMETRIC MODEL FOR MIXED AND SHOREA TREE SPECIES THROUGH SYNERGISTIC ANALYSIS OF REMOTE SENSING DATA	
8.	NORAINAH ABDUL RAHMAN	THE PROVISION OF FACILITIES AND SERVICES FOR THE NEIGHBOURHOOD A CASE STUDY OF NEIGHBOURHOOD AREAS IN MANJUNG PERAK	10
9.	NURUL NAZYDDAH MAT NAZIR	THE INFLUENCE OF GREEN INFRASTRUCTURE ATTRIBUTES ON HOUSE PRICE	
10.	SHAHRIZA OSMAN	FINANCIAL COSTS OF URBAN SPRAWL: A CASE STUDY OF HOUSING DEVELOPMENT IN PENANG STATE	11
11.	ZAMNAH BINTI NUSI	SPATIAL ORGANIZATIONS OF URBAN MOSQUES IN KLANG VALLEY, MALAYSIA: CASE STUDIES	
12.	AMIRAH AMALINA AHMAD TARMIZI	ELECTRICAL AND BARRIER PROPERTIES OF MODIFIED POLYANILINE COATING FILMS AND ITS EFFECTS ON THE CORROSION PROTECTION OF MILD STEEL	12
13.	MAATI MUSBAH SALEH ELGHUOL	CYTOLOGICALAND MOLECULAR ANALYSIS OF ANTI-TUMOUR BIOACTIVITIES OF <i>Urginea maritima</i> (L.) BAKER AQUEOUS EXTRACT ON HUMAN MALIGNANT NEUROBLASTOMA WITH ITS NEUROPROTECTION ABILITY	
14.	NAZLIN BINTI ASARI	MODELLING AND MONITORING OF STAND VOLUME, ABOVE GROUND BIOMASS AND CARBON STOCKS OF OIL PALM (<i>Elaeis guineensis</i>) PLANTATIONS USING LANDSAT THEMATIC MAPPER IN MALAYSIA	13
15.	NIK NOOR IDAYU NIK IBRAHIM	THE CHARACTERIZATION OF GLASS FIBRE REINFORCED UNSATURATED POLYESTER FILLED WITH P84 POLYIMIDE / MULTI-WALL CARBON NANOTUBES (MWCNT) HYBRID COMPOSITES	14
16.	NOOR ZUHAIRA BINTI ABD AZIZ	CHARACTERIZATION AND RHEOLOGICAL PROPERTIES OF HYBRID FILLERS FILLED HIGH DENSITY POLYETHYLENE BIO- COMPOSITE	

NO.	NAME	TITLE	PAGE
17.	NOOR ZURAIDA BINTI JUSOH	SUITABILITY OF BAMBOO BRICK AS A LIGHTWEIGHT CONSTRUCTION MATERIAL	
18.	NORHIDAYAH BINTI ABDULLAH	PROPERTIES OF MILLED <i>ZINGIBER OFFICINALE</i> ROSC (GINGER) RHIZOME POWDER TO COARSE, FINE AND NANO SIZES AND ITS EFFECTS ON THE STORAGE STABILITY OF SPENT HEN CHICKEN	15
19.	NURULHUDA BINTI KAMARUDDIN	CHEMICAL STUDIES TOWARDS THE SYNTHESIS OF JANOLUSIMIDE, A MARINE NEUROTOXIN FROM Janolus cristatus	
20.	RAFIDAH BINTI RAZUAN	MICROSTRUCTURE, PHASE FORMATION AND HARDNESS INVESTIGATION OF ARGON ARC MELTED AI-Co-Cr-Fe-Ni AND AI- Cu-Cr-Fe-Ni HIGHENTROPY ALLOYS (HEA) WITH ELEMENTAL ADDITIONS	16
21.	ROSDIYANA BINTI HASHAM@ HISAM	DIELECTRIC, ELASTIC AND OPTICAL PROPERTIES OF $80TeO_2$. (20.x) MnO _{2-x} Fe ₂ O ₃ AND $30Li_2O_4MoO_3$.(66.x)TeO _{2-x} V ₂ O ₅ MIXED OXIDE TELLURITE GLASSES IN THE CONDUCTIVITY ANOMALY REGION	17
22.	HAMZAH ABDUL HAMID	TYPES OF COVARIATE AND DISTRIBUTION EFFECTS ON PARAMETER ESTIMATES AND GOODNESS-OF-FIT TEST USING CLUSTERING PARTITIONING STRATEGY FOR MULTINOMIAL LOGISTIC REGRESSION	
23	MOHAMAD ADAM BIN HAJI BUJANG	ENHANCEMENT OF SYSTEMATIC SAMPLING FOR CLINICAL SURVEY: SYSTEMATIC SAMPLING WITH CONSECUTIVE APPROACH	18
24	NOR HANIM BINTI ABD RAHMAN	IMPROVED HYBRID METHODS IN SOLVING SINGLE VARIABLE NONLINEAR ALGEBRAIC EQUATIONS	
25.	SABIROH MD SABRI	AN ICT-SUPPORTED INTERGENERATIONAL KNOWLEDGE TRANSFER FRAMEWORK FOR FAMILY FIRMS	
26.	SHARIFAH BINTI ALIMAN	MAQASID-BASED PROTECTION ASSESSMENT MODEL FOR USER-GENERATED CONTENT	19
27.	SURYAEFIZA KARJANTO	SHRINKAGE ESTIMATION OF COVARIANCE MATRIX IN HOTELLING'S <i>T</i> ² FOR DIFFERENTIALLY EXPRESSED GENE SETS	20
28.	WAN ZAKIYATUSSARIROH BINTI WAN HUSIN	DYNAMIC FORECASTING MODEL FOR SHORT SERIES AGE- SPECIFIC MORTALITY	20
29.	BASHARUDIN BIN ABDUL HADI	SHEAR STRENGTH TEST ON UNSATURATED SOIL USING NATURAL MICROSCOPIC SURFACE TENSION FORCE	
30.	KHAIRI KHALID	SWAT AND ANN MODEL HYDROLOGICAL ASSESSMENT USING MALAYSIA SOIL DATA	21
 31.	MOHAMAD EZAD HAFEZ BIN MOHD PAHRORAJI	COAL ASH FOAMED BRICKS STABILISED WITH HYDRATED LIME- ACTIVATED GGBS (HL-GGBS)	• • • • • • • • •
32.	INTAN RAHAYU BINTI IBRAHIM	POWER CONVERTER FOR DUAL-POWER PHOTOVOLTAIC-GRID ENERGY SYSTEM	22
33.	MASTURA ROSDI	A NEW HYBRID MATHEMATICAL MODEL FOR INTERFERENCE MANAGEMENT BY COMBINING OF FRACTIONAL FREQUENCY REUSE AND DYNAMIC POWER CONTROL METHODS IN FEMTOCELL NETWORKS	23
34.	MEISAM ESLAHI	COOPERATIVE NETWORK BEHAVIOR ANALYSIS MODEL FOR MOBILE HTTP BOTNET DETECTIONS	
35.	MOHD FIRDAUS MALEK	FABRICATION AND CHARACTERISATION OF NANOSTRUCTURED ZINC OXIDE THIN FILMS INCORPORATED WITH NANOROD ARRAY-BASED SOLAR CELLS	24
36.	NORASHIKIN BINTI M. THAMRIN	IREAL-TIME INTER-ROW TREE DETECTION AND TRACKING TECHNIQUES FOR UNMANNED VEHICLE-BASED ON SIMULTANEOUS LOCALIZATION AND MAPPING APPROACH	24

NO.	NAME	TITLE	PAGE
37.	NORFAIZA BINTI FUAD	DEVELOPMENT OF A 3D EEG FEATURE EXTRACTION FOR BRAIN BALANCED INDEX (BBI) USING ARTIFICIAL NEURAL NETWORK (ANN)	25
38.	NOR ZULAILY MOHAMAD	DEVELOPMENT OF NOVEL DISTANCE RELAY SCHEME TO PREVENT FALSE TRIPPING DURING POWER SWING	
39.	SYED ABDUL MUTALIB AL JUNID	DESIGN AND DEVELOPMENT OF HIGH PERFORMANCE SWA CELL DESIGN FOR LOCAL DNA SEQUENCE ALIGNMENT	
40.	MOHAMED ACKIEL MOHAMED	FATIGUE LIFE ENHANCEMENT FOR FRICTION STIR WELDED AA6061 BUTT JOINT THROUGH HIGH FREQUENCY MECHANICAL IMPACT (HFMI) OF PNEUMATIC IMPACT TREATMENT (PIT)	26
41.	NIK SALWANI BINTI MD AZMI	ELECTRIC POTENTIAL ASSISTED CRYSTALLIZATION OF LISOLEUCINE IN AQUEOUS PHASE: EXPERIMENTAL AND COMPUTATIONAL MODELLING APPROACH	27
42.	NURUL SUHADA AB RASID	FAST PYROLYSIS OF EMPTY FRUIT BUNCH AND PALM KERNEL SHELL FOR PRODUCTION OF BIO-OIL USING AUGER REACTOR	
43.	IZA NURZAWANI BINTI CHE ISA	PHYSIOLOGICAL EFFECTS OF PRENATAL ULTRASOUND EXPOSURE ON BONE-RELATED DEVELOPMENT OF YOUNG RABBITS	28
44.	RASHIDAH BINTI SHAHRUDDIN	p53 PROTEIN EXPRESSION AND RISK FACTORS IN BREAST CANCER – A RETROSPECTIVE STUDY	
45.	UMMI FARHANA BINTI HASHIM	PHYSIOLOGICAL AND MORPHOLOGICAL EFFECTS OF ULTRASOUND INTERVENTION DURING PREGNANCY ON NEWBORN RABBITS WITH PARATHYROID HORMONE DYSREGULATION	29
46.	AISHA MOHD DIN	CELLULAR RESPONSES OF NORMAL HUMAN OSTEOBLASTS TO MULTIPLE ENVIRONMENTAL STRESSORS <i>IN VITRO</i>	
47.	NOR IZWANI MOHAMED	INTERPATIENT VARIABILITY IN TAMOXIFEN RESPONE AMONG BREAST CANCER PATIENT: THE USE OF PHARMACOGENETICS AND METABOLOMICS IN CLOSING THE GAPS IN CLINICAL PRACTICE	30
48.	SALWA MOHAMMED RAWEH ABDULLAH AL-FAQEER	PHYTOCHEMICAL AND ANTIOXIDANT STUDIES OF MALAYSIAN MEDICINAL PLANTS SYZYGIUM POLYANTHUM AND OCTOMELES SUMATRANA	
49.	JUHANITA JIMAN	CRITICAL ANALYSIS OF MAT AS AN ICONIC CHARACTER AND ITS CULTURAL MANIFESTATION IN LAT THE KAMPUNG BOY ANIMATION	
50.	MUHAMMAD JAMEEL MOHAMED KAMIL	UNDERSTANDING DESIGNER DESIGN ACTIVITY; UNCONSCIOUS INTERACTION BETWEEN HUMAN COGNITION AND BEHAVIOUR IN EVERYDAY PRODUCT	31
51.	WILLIE ANAK JANDAR	TEACHING ENGLISH IN SECONDARY SCHOOLS IN SARAWAK, MALAYSIA: ESL TEACHER COGNITION PERSPECTIVES	
52.	ZUHAILI AKMAL ISMAIL	CRITIQUE SESSION IN ART & DESIGN STUDIO – A FRAMEWORK FOR ART EDUCATION	32
53.	HARMI TAAZIM MOHAMAD	THE COMMERCIALISATION OF NEWS AND EDITORIAL FREEDOM: A STUDY OF BULETIN UTAMA TV3	
54.	AMIYAMIN HAJI MOHAMAD YUSOP	PENGUKURAN DISLEKSIA AL-QURAN DALAM KALANGAN MURID	33
55.	MALISSA MARIA MAHMUD	TRANSFORMATIVE DRIVEN MECHANISM FRAMEWORK AS KEY SUCCESS INDICATORS FOR BLENDED LEARNING	
56.	NORAINI BINTI AHMAD BASRI	FACILITATING HIGHER ORDER THINKING SKILLS (HOTS) IN ESL READING THROUGH COMPUTER MEDIATED LEARNING TUTORIAL	34
••••			

NO.	NAME	TITLE	PAGE
57. 58.	MOHD ZAKI BIN AWANG CHEK	OPTIMIZING CONTRIBUTION RATE OF SOCSO'S INVALIDITY PENSION SCHEME (IPS): AN ACTUARIAL PRESENT VALUE (APV) MODELLING STRATEGIC RESOURCES, ENVIRONMENTAL MANAGEMENT	35
 59.	AZLUL KALILAH ZAGHLOL	ACCOUNTING (EMA) AND BUSINESS PERFORMANCE OF SABAH CONSTRUCTION INDUSTRY EXCHANGE RATE BEHAVIOUR AND MANAGEMENT IN MALAYSIA:	•••••
60.	HARTINI AB GHANI	EMPIRICAL STUDY ACROSS REGIMES TAKAFUL PARTICIPATION READINESS MODEL (TPRM): THE INFLUENCE OF TAKAFUL KNOWLEDGE, RELIGIOUS COMMITMENT AND MATERIALISM WITH THE MODERATING EFFECT OF SWITCHING COSTS	36
61.	HASNIZAWATI HASHIM	LEADER-MEMBER EXCHANGE, EMOTIONAL INTELLIGENCE AND DISABLED EMPLOYEES' JOB EMBEDDEDNESS: THE MEDIATING ROLE OF ORGANIZATIONAL CLIMATE	37
62.	MOHMAD NAJID RAMLI	PERSONALITY TRAITS, SURFACE TRAITS, ORGANISATIONAL CULTURE AND PERFORMANCE OUTCOMES OF THE CALL CENTRE AGENTS IN THE KLANG VALLEY	
63.	WAN NADIAH MOHD NADZRI	MODELLING FACTORS INFLUENCING BRAND EXPERIENCE AND ITS CONSEQUENCES ON MALAYSIA'S NATIONAL AUTOMOTIVE BRANDS	20
64. 	ZURAINI ALIAS	THE RELATIONSHIP BETWEEN SERVICESCAPE, EXPERIENTIAL VALUES, SELF-IMAGE CONGRUITY AND LOYALTY INTENTION OF CUSTOMERS TOWARDS DEPARTMENT STORES IN MALAYSIA VALUE CREATION IN SELECTED MALAYSIAN SMALL AND MEDIUM	
		ENTERPRISES (SMEs) FROM ACTIVITY, RESOURCE-BASED AND DYNAMIC CAPABILITY PERSPECTIVES EARNINGS MANAGEMENT AND CORPORATE TAX PLANNING AND	39
	MOHD RASHID	THEIR IMPACTS ON FIRM VALUE	
67.	RASYIDAH BINTI CHE ROSLI	TAX MALFEASANCE OF HIGH NET-WORTH INDIVIDUALS IN MALAYSIA: ARCHIVAL AUDITED DATA AND ELITE INTERVIEWS	
68.	ALWI BIN MOHD YUNUS	THE DEVELOPMENT OF A PRESERVATION FRAMEWORK FOR PRIMARY RESEARCH DATA AND RECORDS FOR RESEARCH IN DIGITAL FORMATS	40
69.	MOHD SHAHRUL NIZAM MOHD DANURI	ICT USAGE TO SUPPORT AGRICULTURE TRANSFORMATION TOWARDS AGRIBUSINESS AMONG SMALLHOLDER FARMERS	лı
70.	NORHAYATI HUSSIN	STRATEGIC INFORMATION MANAGEMENT (SIM) AMONG MANAGERS IN MALAYSIAN BUSINESS ENVIRONMENT	41
71.	RUDIAH BINTI MD HANAFIAH	A DECISION MAKING MODEL FOR ASSESING THE INFLUENCE OF STEAMING SPEED ON THE REVENUE PERFORMANCE OF TANKER ON TIME CHARTER	42

1.

ARCHITECTURE, PLANNING & SURVEYING



1

2

Name: FARAH AYUNI BINTI SAHAFEA @ SHAFIE

Title : ENVIRONMENTALLY-EXTENDED INPUT-OUTPUT ANALYSIS IN ENVIRONMENTAL ASSESSMENT

Supervisor : PROF. DR. DASIMAH OMAR (MS) PROF. DR. SUBRAMANIAM KARUPPANNAN (CS)

Sustainability has become the key goal in every aspect of the environment especially in the diverse urban systems. Sustainable practices require a controlled setting within an urban system where their practicality and efficacy could be assessed. The aim of the thesis is to establish an environmental assessment tool based on urban metabolism approach to assist decision-making during environmental and economic assessment. The outcome provides understanding on the means of integrating carbon footprint and monetary factor to oversee the expenditure of a nation in general, or a household or an individual in particular, in relation to global warming potential. This study applied a retrospective cross sectional study to provide a form of environmental assessment in developing economic-environmental input-output model for greenhouse gases emission monitoring and climate change adaptation. Methodologically, the potential impact from economic sectors' contribution on greenhouse gas emissions which eventually leads to global warming and climate change was quantitatively assessed. Firstly, the contribution of greenhouse gas emission from each economic activity was examined. Secondly, the association of greenhouse gas emissions with gross output value from each economic activity was assessed to ascertain the greenhouse gas intensity. Finally, a preliminary environmental-economic input-output tool were developed for potential global warming forecasting assessment and improving the surveillance system of each target economic sector concerning climate change. The input-output analysis method development found that Barcelona with 14 economic sectors has carbon dioxide emission to be 24.44 kg CO2- eq./cap/day. The method adaptation to Malaysia resulted with greenhouse gas emission of all 120 economic activities with 4.87 kg CO2eq./cap/day. Greenhouse gases from waste management was not captured in the input-output matrices. The waste management section was managed but the introduction to Material Flow Analysis approach which resulted with 4.5 kg/capita/ day of solid waste for Klang Valley. The economic input-output model of a nation or region is an analytical tool that describes the structure of one nation or region's economy. A derived matrix from the economic input-output table is expanded to express global warming potential which describes its total global warming impact relative to carbon dioxide emission over a set period of time. The estimation of carbon footprint from monetary fluxes is vital in the environmental health impact assessment as sustainable urban planning and sustainable economy are complimentary of one another. This study contributes to quantitatively analyse the physical input-output relationships among the socioeconomic components with the findings on the distribution of environmental impacts, thereby providing scientific model support to guide restructuring of metabolic system especially urban metabolic system. The use of publicly available data to assemble the matrix representation enables comprehensive assessment of the environmental impacts of a product or service with effective cost, in a relatively fast and high-technology manner.



Name : FILZANI ILLIA IBRAHIM

Title : MULTI-DIMENSIONAL HUMAN INTERACTION IN OPEN SPACES FOR SHAH ALAM CITY, SELANGOR, MALAYSIA

Supervisor : PROF. DR. DASIMAH OMAR (MS) DATIN DR. NIK HANZTA @ NIK HANITA NIK MOHAMAD (CS)

Due to rapid urban development, open spaces have changed drastically over the decades and generations have been struggling with its consequences. There are various studies on how open spaces provide positive reaction to human. Apparently, in relation to open spaces, Malaysia has received very little attention from researchers. Given this scenario, this study investigates the human interaction experienced in the open spaces and how it relates to the city sustainability. The aim of this research is to evaluate the multi-dimensional human interaction experienced in the open spaces and develop the ranking of human interaction in relation to the typological of open spaces. The analysis in this study addresses human-human interaction and human-nature interaction in five selected open spaces of Shah Alam, Selangor, Malaysia namely Section 2 Urban Park, Section 7 Local Park, Section 18 Neighbourhood Park, Section 8 Playing Field, and Section 4 Playground. This research adopted mixed methodology after taking into consideration the nature of the research topic, structure and composition of the population, the type of information sought and the availability of the resource. In this research, a mixed methodology is employed using a combination of questionnaire surveys, semi-structured interviews, multiple case studies and behaviour mapping. For the questionnaire survey, the stratified random sampling

was used where 861 sample were distributed with a response rate of 95% confidence level. After the sample size had been determined, the samples were then stratified based on the percentage of areas of the study areas. As for the expert interviews, this research applied a semistructured interview. For the method of data analysis, this research is based on the convergence of data obtained from both quantitative and qualitative sources. For the quantitative data, the statistical test selected for the analyses are descriptive analysis, chi-square analysis, and regression analysis. The findings show that all four research domains namely socio-demographic domain, the human-human interactions in open spaces domain, the human-nature interactions in open spaces domain and perceived benefits domain significantly influence the human interactions in the Shah Alam open spaces area. The findings of this study also show the sub domains that reflect human-human and human-nature interaction namely contact with nature domain, aesthetic preference domain, recreation and play domain, social interaction domain, citizen participation domain and sense of community domain. The domain are then link to the hierarchy of open spaces which in tandem with the multi-dimensional human interaction of open spaces.

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

Name : ISMAIL MA'AROF

Title

: ASSESSMENT OF THREEDIMENSIONAL MODEL GENERATED USING DIGITAL CLOSE-RANGE PHOTOGRAMMETRIC METHOD FOR HERITAGE DOCUMENTATION APPLICATIONS

Supervisor : ASSOC. PROF. SR. DR. ABD MANAN SAMAD (MS)

Lately, there were a number of photogrammetric techniques developed and utilized in documenting heritage and historical monuments. Reality image based modelling technique has been frequently used to obtain an accurate measurement of the heritage building, monuments and archaeological site studies. This is in line with the current rapid changes in the development of technology. The subject, which is the heritage and historical monument, is chosen to improve the documentation process. Perhaps with this research, it will give a new drive or tools of improvement for heritage monument documentation projects in Malaysia. It is hoped that the preservation and conservation activities would be developed for the benefit of our future generation. With the enhancement and advancement of instrument being utilized and used during the historical monument documentation, it has been shown that a great number of research and studies have been done by previous researchers. This research aims to assess the 3D reconstruction model obtained from a low-cost, low-specification digital camera, in order to resolve current limitations and gaps for developing 3D models of heritage monument remains using monoscopic close-range photogrammetry image based data. Lower specification for this research is defined as having a resolution of less the state-of-the art digital camera (10-24 Megapixels). The main objective of this research is to carry out a wider investigation into current approaches used in digital documentation of heritage monuments remains. Secondly, to provide a solution for the state-of-the-art image modeling by using low cost, low specification

image sensor when collecting data for 3D heritage building remains. The development of a suitable semi-automatic approach to process the data obtained from the low cost, low specification image sensor by adapting current methods and combining them with novel methods. Finally, to analyse the concept by means of empirical evaluation that leads to the justification of the 3D constructed Malaysian heritage monuments. There are various applications of photogrammetry techniques being used in documenting the heritage monument. Each of it has its own strength and weaknesses. So as the photogrammetrist, one could choose any of the techniques and at the same time improve the ability of the techniques. This approach has successfully reconstructed the structure of façade of the monuments. The time taken to produce the resulting model is almost economical with ease of use, compared to existing techniques to generate the reconstruction for documentation purposes. The produced model is also acceptable in term of measurement accuracy requirement from a regular 3D CAD drawing and can be used to assist professionals and experts in related fields. This research makes significant contributions, which includes a literature review as well as several contributions made by the hardware and the well-known commercial software itself. The review developed here consists of existing techniques in producing 3D models of building façade or structures using image based, as well as applications that could benefit from this research's model, with advances technology on the current practice.

Name: IZZADIN ALI AHMED AL-SHAEZ



Title : MODELLING GROUNDWATER AQUIFER TO ESTIMATE WATER SUSTAINABILITY IN SANA'A BASIN

Supervisor : PROF. DR. DASIMAH OMAR (MS) DR. SITI MAZWIN KAMARUDDIN (CS)

Escalating water scarcity threatens global sustainable development. Water scarce regions will increase worldwide during the current century, as the water demand rate is more than twice the population growth rate. Yemen has one of the fast growing population rates in the world and is facing high water stress. Sana'a city, in particular, is experiencing a critical water shortage due to industrialisation, urbanisation and fast population growth rate. The water table at Sana'a aquifer, which is a groundwater-dependent city, has dropped significantly since 1972, as new technology was introduced to extract groundwater. Some studies estimated that Sana'a city would be the first metropolitan area to run dry during the coming few decades due to unsustainable groundwater pumping, as many wells will be depleted. This dissertation's main aim is to evaluate the impact of climate change on groundwater resource in the Sana'a basin aquifer. To achieve the objectives of the study, firstly, the total groundwater recharge amount and spatial distribution were estimated using chloride mass balance. Selected wells and locations were chosen to collect groundwater and rainfall samples. In total, 22 sites spread all over the basin were chosen and the samples were collected during the two rain seasons from March-May and July-August in the year 2014. Likewise, 22 wells covering all the basin area were chosen to take groundwater samples for the chloride concentration test. The samples were taken during the rain season from March-May and July-August in 2014. After that, a chloride content analysis was carried out in the laboratory. The samples were collected and transported according to the standard procedure under the chemistry laboratory specified conditions. The results indicate that the overall recharge rate is almost 6.3% of the annual rainfall. Secondly, the Decile method was used to forecast rainfall variability, and thirdly, a groundwater flow model, using Visual MODFLOW, was developed. A close agreement was achieved between the simulated and observed heads for the calibration stress periods. Then the developed model is used to simulate the hydrogeological dynamics response under the following future scenarios: 1) Business as Usual conditions; 2) Dry weather conditions (decile method); 3) Wet weather conditions (decile method); 4) Median weather conditions (decile method); 5) Alternate wet and dry weather conditions; Business as Usual conditions with groundwater augmentation of 20%; 7) Business as Usual conditions with groundwater augmentation of 40%. The output of all simulated scenarios indicates that the Sana'a basin aquifer storage will decrease under various weather conditions with the passing of time. In all simulated scenarios, the largest change in groundwater storage was during the period 2046-2050, with a significant groundwater extraction for the Dry Weather Condition scenario. It is estimated that this period is the peak on groundwater extraction. The aquifer yield will decline under all weather conditions as exhaustion of reserves occur. However, Scenario 6 shows the minimal over-exploited areas while over-exploited areas disappeared in scenario 7 which shows that it is the sustainable scenario that could sustain the groundwater for the coming generations. This study demonstrates that climate change will render fresh groundwater resources unuseful for mankind, but integrating future climate change and population growth impacts into the water management planning is a necessity in order to proceed towards a resilient groundwater management system.



Name : KHAIRIL HIZAR BIN MD KHUZAIMAH

Title : A 4-QUADRANT FRAMEWORK ON STRATEGY, COMMUNITY, LEARNING AND INNOVATION FOR THE APPLICATION OF KNOWLEDGE MANAGEMENT IN PUBLIC SECTOR ORGANISATIONS IN CONSTRUCTION

Supervisor : ASSOC. PROF. SR. DR. PADZIL HASSAN (MS)

ASSOC. PROF. DR. ROSHANA TAKIM (CS)

Recognising the pivotal role played by knowledge management in today's challenging environment, many public organisations have begun to embrace the discipline as part of their key strategic management tools in pursuit of attaining high performance and organisational excellence. Nevertheless, despite the emerging interest from various public organisations, coupled with concerted efforts by the government to encourage the application of knowledge management in the public sector, the uptake is still relatively low and most concernedly, the success rate is very minimal. Research reveals that this is largely attributed to the inherent characteristics that are highly unique to public organisations which are extremely rigid and hierarchical in structure and further aggravated by their bureaucratic-laden procedures. As such, the process of formally managing knowledge can be a very challenging endeavour for the public sector. The research aims to develop a knowledge management framework to aid effective knowledge management implementation in Malaysian's public sector organisations involved in construction towards providing outstanding services to their stakeholders in terms of project delivery and project management services. In operationalising the research process, an embedded mixed method research design was adopted, spread into three main phases. The first phase consisted of four main activities; literature review, pilot interview, the establishment of research aim and the development of the research objectives while the second phase involved six main activities including the development of the conceptual framework, identification and establishment of research methodology, data collection 1 (quantitative - self-administered online questionnaire survey), data analysis 1 (quantitative), data collection 2 (qualitative - semi-structured interview) and data analysis 2 (qualitative). As for the final phase of the research, it comprised of summary of the findings and the preparation of the final research report. Findings from the research reveal that knowledge management is quintessentially multifaceted, encompassing various key organisational elements which can be categorised into six primary categories; Strategy and Governance, Community, Learning, Innovation, Information Technology and Common Shared Values. Following this, a conceptual knowledge management framework which dynamically integrates all the critical organisational elements was developed, deliberately intended to serve as a sound basis for public sector organisations involved in construction in implementing effective knowledge management initiatives. These findings add to a growing body of literature on knowledge management in public sector. In addition, the proposed framework offers a viable solution for public sector organisations involved in construction in better managing their organisational and technical knowledge systematically.

Name : MANSOR BIN OTHMAN

Institute of Graduate Studies Title : RELATIONSHIP OF PHYSICAL ENVIRONMENT OF PUBLIC PRESCHOOL CLASSROOM ON CHILDREN'S SOCIAL INTERACTION BEHAVIOUR AND SPATIAL CHOICE

Supervisor : PROF. DR. MOHAMED YUSOFF ABBAS (MS) PROF. DR. PUTRI ZABARIAH M.A.RAHMAN (CS)

A strong emphasis is put on preschool education programme by the Malaysian Ministry of Education (MOE). However, it leans more towards the non-physical rather than the physical aspects of preschools. There is a scarcity of local reference on children's environment-behaviour studies, notably on the physical environment of preschool classroom and spatial behaviour. Therefore, this research aimed to investigate this relationship. The objectives of this study were to identify the current state of the physical environment of public preschool classrooms (through the teachers' perceptions) and to establish the types of social interaction behaviour that the children engaged in (during free play) in their classrooms as located both in urban and non-urban areas. Their spatial choices were also observed. The preschool classrooms were spatially categorised into highly, moderately and poorly defined through the experts' opinions survey. This study used the mixed method approach of questionnaire surveys and unobtrusive, non-participating observation and behavioural mapping methods. The questionnaire was adopted from Moore's (1994, 2008) Children's Physical Environment Rating Scale (CPERS) which was administered to 330 preschool teachers who attended a series of MOE workshops. The observations found that there exists five types of social interaction behaviour and spatial choices that 494 children aged 5 to 6 years old engaged in during free-play periods in their classrooms in 20 public urban and non-urban preschools in the state of Selangor. The spatialdefinition of classrooms in both locations was acquired through a directly distributed questionnaire survey to 40 interior architects. The scope of the

research deduced for this study contained three issues: Firstly, choice of government funded preschools was due to accessibility, consistency in classrooms' size and number of children, quality of the teachers' academic background and standardized status of socio-economic group. Secondly, choice of free-play engaged during snack-time or recess time was due to absence of their teachers' instructions and that the children would depict their behaviour in a more honest way. Finally, the study was done in preschools located in both urban and non-urban areas so as to get a comparative picture. The findings revealed that the teachers were highly aware of the importance and influences of the environment on the behaviour of children. In addition, the spatial definition of the classrooms were found to be a mixture of well-defined, moderatelydefined and poorly-defined. Nevertheless, the opined majority from the experts were moderately-defined. Inappropriate behaviours occurred most in poorly-defined classrooms, whereas appropriate and interactive behaviours occurred most in well-defined classrooms. The spatial choices of children within their classrooms in both locations revealed similar patterns whereby both gender preferred large and open spaces when they played in big groups. The findings from this research would assist designers in understanding the influence of the physical environment on the social interaction behaviour of children and thus would significantly contribute to increased benefits towards interior architects when designing preschools classrooms.

Name : NAFISAH BINTI KHALID

Title : DEVELOPMENT OF ALLOMETRIC MODEL FOR MIXED AND SHOREA TREE SPECIES THROUGH SYNERGISTIC ANALYSIS OF REMOTE SENSING DATA

Supervisor : ASSOC. PROF. DR. JUAZER RIZAL ABDUL HAMID (MS) ASSOC. PROF. DR. ZULKIFLEE ABD LATIF (CS)

There are currently 153 species of Shorea listed in the International Union for Conservation of Nature and Natural Resources (IUCN) Red list 2013 where Shorea leprocula (Meranti tembaga), Shorea pauciflora king (Meranti nemesu) and Shorea resinosa (Meranti belang) that are found in the Ampang Forest Reserve are listed as endangered species. Due to the current list, mapping and monitoring the forest inventories of this species is necessary to provide the regular report for Reducing Emissions from Deforestation and Degradation (REDD) program especially concerning the accurate estimation of total aboveground biomass in calculating the carbon stock. However, uncertainties in tropical forest remain high because it is costly and laborious to measure the tree variables accurately in relation to quantify the aboveground biomass. Thus, recent remote sensing technology that allows for accurate operational and managerial inventories in a cost effective and timely manner is constantly in demand. In this study, the pan-sharpening Worldview-2 imagery is used to extract the tree crown parameters using object-based image analysis. Three image segmentation methods have examined which are image filtering, combination of image filtering with inverse watershed and multiresolution with local extrema image segmentation. The segmentation result is classified using rule-based image classification method. The results showed that multi-resolution with local extrema produces the most accurate result with 100% of success rate in detecting and delineating the tree crown. The overall classification accuracy using is good with 86.11%. In addition, the results from synergism of WorldView-2 imagery and LiDAR data showed that the RMSEz for tree height was 2.763m and above the tolerance. The finding from the proposed allometric models using tree parameters measured from field showed that the coefficient of determination (R2) ranging from 0.905 to 0.980, indicating strong correlation amongst the examined variables. Finally, the total aboveground biomass (TAGB) estimated for entire training and test area was found to approximately 3000 tonnes for each site. The proposed allometric models for Shorea and mixed tree species were proved to be applicable for this study area and fulfil the research objectives. The study has demonstrated that high resolution remote sensing datasets in the likes of Worldview-2 and LiDAR are viable substitution in complementing and increasing the efficiency of remote sensing technology for forest application.

Name : NORAINAH ABDUL RAHMAN

Title : THE PROVISION OF FACILITIES AND SERVICES FOR THE NEIGHBOURHOOD A CASE STUDY OF NEIGHBOURHOOD AREAS IN MANJUNG PERAK

Supervisor : PROF. DR. DASIMAH OMAR (MS) PROF. DR. ABDUL GHANI SALLEH (CS)

Neighbourhood is a place where the community is attached with the land use and amenities. The facilities and services are important aspect to the residents in their neighbourhood. The neighbourhood facilities and services are based on the planning guidelines were adopted by local governments. The issue that is often being questioned is the provision that can meet the residents' requirements and needs. The aim of this study is to establish facilities and services evaluation approach. The study has developed a satisfaction model incorporated with physical and social factors to establish the evaluation approach. Empirical research has shown the importance of residents' evaluating their neighbourhood. The physical factors are adequacy, amenity condition, distance, accessibility and maintenance. The social factors are feeling convenient, feeling safe and feeling comfort. The research design employed the quantitative approach with qualitative data. The quantitative approach was used to collect primary data from the residents through a questionnaire survey. The qualitative data was used to collect both primary and secondary data. The primary data is from the open-ended questions in the questionnaire survey and the site inventory survey. The secondary data is from the local government and agencies related. Three selected neighbourhoods in Manjung Perak Malaysia are in Seri Manjung, Sitiawan and Lumut. The evaluation was to measure the level of satisfaction among the residents on the existing facilities and services in their neighbourhood. The guidelines used by the local government were also appraised to compare the compliance of facilities and services provided with the planning guidelines. There are three key findings of the research. The first shows

that all level of satisfaction of different socio demographic (M=3.33) and socio economic (M=3.55) are at the moderate level. The second key finding demonstrates the physical factors all satisfaction at moderate level but by rank it show that the highest to the lowest rank are accessibility (M=3.54), adequacy (M=3.51), amenity condition (M=3.48), distance (M=3.48) and maintenance (M=3.46) of facilities and services. While for social factors, all satisfaction are at the moderate level but by rank are feeling convenient (M=3.61), feeling safe (M=3.60) and feeling comfort (M=3.60). Comparing with the guidelines the adequacy is not fulfilled, amenity condition and maintenance are at moderate condition, and distance and accessibility are fulfilled. The third key finding illustrates a weak correlation below R=0.510** both ways the physical factors with social factor (R=0.425) and the social factors with the physical factors (R=0.427). Even though it is a weak correlation but it can be ranked with strongest and weakest correlation. For physical factors with social factors is felling comfort, feeling convenient and feeling safe. For social factors with physical factors are maintenance (R=0.479), amenity condition (R=0.458), adequacy (R=0.453), distance (R=0.387) and accessibility (R=0.359). As a conclusion the residents' satisfaction is very important in provision of neighbourhood facilities and services. The physical and social factors are significant to meet the residents' needs and requirements. This will reflect the policy implication in terms of future neighbourhood developments.





Name : NURUL NAZYDDAH MAT NAZIR

Title : THE INFLUENCE OF GREEN INFRASTRUCTURE ATTRIBUTES ON HOUSE PRICE

Supervisor : DR. NORIAH OTHMAN (MS) PROF. SR. DR. HJ. ABDUL HADI HJ. NAWAWI (CS)

Today, environmental considerations have become crucial in each and every development plan and project. It is a vital approach in the 21st century. Due to the current environmental crisis, one vital approach is often emphasized to maintain and preserve the surrounding environment and this approach is referred to as the 'Green Infrastructure Approach'. Green Infrastructure is commonly associated with the concept of sustainable development. It differs from grey infrastructure in that it emphasizes the network of green space in a particular area. Generally, an environment offers a variety of activities and benefits which are mostly unmeasurable. Hence, the Hedonic Pricing Model is one of the methods that is often exploited to reflect the environmental values of a surrounding area. This study looks at green infrastructure elements and how they affect housing prices. The Hedonic Pricing Model is used to calculate the value of environmental features or elements that affect housing price. However, it is limited in that it only measures the environmental benefits impacting the prices of houses and merely estimates people's willingness to pay for these benefits. If people are unaware of their environment, the value is not reflected. This study allows the researcher to look into the following objectives: (a) to gauge the existing green infrastructure components in the study area; (b) to identify public preferences towards green infrastructure(s) in a housing area with the botanical garden being the main green infrastructure component in the study area and (c) to determine the new market equation of a house by adding the green infrastructure attributes using the Multiple Regression Hedonic Pricing Model (HPM). This study employed a mixedmode analysis which incorporated quantitative and qualitative methods and was conducted in Labuan, Malaysia with the Labuan Botanical Garden becoming the major green infrastructure component. The survey questionnaires were distributed to 386 respondents living in the housing

area within 1800 meters from the Labuan Botanical Garden. The radius was determined by using the Geographic Information System (GIS). The researcher also conducted valuation techniques, which are based on the principles of people's willingness to pay for environmental gains and their acceptance of compensation for the environmental losses incurred. Interviews and observations were also conducted in the study to examine community preferences towards their housing area as well as the green infrastructure components made available to them. 61.3% of the respondents gave positive feedback and 85% of the respondents commented of being aware of the green infrastructure attributes in their housing area. The findings reveal that ethnic views (Malay, Chinese, ethnic Sabahans and foreigners) on satisfaction towards house and green infrastructure have provided valuable feedback in this research. The various ethnics in Labuan have preferences cited towards their desired houses. The accessibility attributes, namely 'accessible to botanical garden and park', showcase that these main green infrastructure elements are highly preferred by the community in Labuan. This is followed by visual quality attributes, location and amenities attributes and amenities attributes. Hedonic Pricing Model reveal an increase of 35.6 percent in the double storey semidetached house, a 47.6 percent increase in the bungalow house, a 30.1 percent increase in single storey house and a 29.6 percent increase in the double storey terrace house. To sum up, this study provides insightful information to potential research students, local authorities, developers and future house purchasers on the influence or existence of green infrastructure components on the value of a particular housing unit.



10

Name : SHAHRIZA OSMAN

Title : FINANCIAL COSTS OF URBAN SPRAWL: A CASE STUDY OF HOUSING DEVELOPMENT IN PENANG STATE

Supervisor : PROF. SR. DR. HJ. ABDUL HADI HJ. NAWAWI (MS) ASSOC. PROF. DR. JAMALUNLAILI ABDULLAH (CS)

Penang State experienced rapid urban development for the past three decades. Urban sprawl is a global phenomenon and is characterised by increase in population growth in urban areas, migration, change in built-up areas and spatial form. Urban sprawl creates economic, social and environmental costs such as environmental degradation due to more intensive land and car use as well as economic challenges brought about by increased distance to jobs, goods and service markets. Infrastructure costs seem to increase in new sprawling development than compact development. It becoming more difficult to pay for the additional costs incurred by urban sprawl. The purpose of this study is to examine the development of urban sprawl and to quantify financial costs. This paper adopts a case study approach. Mathematical and statistical analysis are applied on actual, adjusted, additional and hypothetical data. The descriptive statistics include central tendency applications, cross

tabulation analysis and inferential statistics analysis which include the General linear Model (GLM). The results indicate that all the five districts in Penang State are sprawling. The results cross tabulation analysis revealed that development in city center is costly due to high land cost. The estimation techniques (GLM) are analysis of varianceone- way ANOVA, Pos Hoc analysis and T- Test. The results indicate that there is significant cost variations on Penang Island as compared to Seberang Perai. The most significant infrastructure cost is sewerage costs. Housing development farther from city center is cheaper. The additional infrastructure costs are significant to location of housing projects. It is hope that the study can contribute valuable information to the enhancement of sustainable urban development in Penang State.

Name : ZAMNAH BINTI NUSI

Title : SPATIAL ORGANIZATIONS OF URBAN MOSQUES IN KLANG VALLEY, MALAYSIA: CASE STUDIES

literature which are set as the objectives to identify the problems

related to the overspill of spaces by studies on the community and the

management of the mosques; their activities and facilities provided;

the spatial organizations provided as per guidelines from the Al

Quran and Sunnahs; and the type of spatial organizations developed.

The on-site observation and participation approach with case studies

and data content analysis were conducted on four urban mosques in

the Klang Valley city centres with different groups of communities.

Singapore MBF mosques were used as the preferred models. Lickert

Scale convenient user survey on 400 respondents was conducted as

supplementary evidences. The findings revealed that the mosques

were designed without proper guidelines from the Islamic Religious

Councils or Departments, the Authorities of mosque developments in

the country; neither the designers properly referred to the guidelines

from the *Al Quran* and *Sunnahs*; the Local Building Authorities did not impose related Building By Laws pertaining to the public assembly

building; and there were no local demography surveys executed before

the mosques were planned and built. This research provides important

factors related to the spatial organization of urban mosques for the

Supervisor : ASSOC. PROF. DR. ANUAR TALIB (MS) ASSOC. PROF. DR. RAHMAH ABD RASHID (CS)

Klang Valley is the most populated region in Malaysia so the development of the urban mosques in the region has grown rapidly as to serve the Muslim communities and at the same time to reciprocate with the increase of the Muslim population in the region. Observations on the urban mosques in the city centres like Kuala Lumpur and its peripherals especially during the Friday congregations noted to be overflow every time. They are mostly multi-leveled structures due to the limited plot of the urbanism characteristics. To date there is no study recorded on the spatial organizations and activities of urban mosques in Malaysia. The research problems are to investigate whether such urban mosques spatial organizations are designed according to the guidelines from the Al Quran and Sunnahs; equipped with ancillary spaces for services and activities; which needs proper management of the utilization of the spaces and the maintenance of the buildings. The design of the spaces at the mosques is bounded by the spatial organization which needs to be observed by the managements and the designers of the mosques. At the same time, the local communities' religious and social needs are to be addressed accordingly in order to build better Muslim communities. The aim of this study is to establish urban mosques design and development guidelines with three main theoretical frameworks identified from the

FACULTY OF Applied sciences

12



Name: AMIRAH AMALINA AHMAD TARMIZI

Title : ELECTRICAL AND BARRIER PROPERTIES OF MODIFIED POLYANILINE COATING FILMS AND ITS EFFECTS ON THE CORROSION PROTECTION OF MILD STEEL

Authorities to consider as guidelines.

Supervisor : PROF. DR. MOHAMAD KAMAL HJ. HARUN (MS) PROF. DR. SAIFOLLAH ABDULLAH (CS) PROF. DR. MUHD ZU AZHAN YAHYA (CS)

The study investigated the coating properties of polyaniline (PANI), polyaniline with nano silica (PANInSi) and polyaniline with 3-amino silane modified nano silica (PANI 3-APS modified nano silica). Investigation were carried out on the effects of nano silica and amino-silane modified nano silica fillers on the structure, morphology and its influence on the electrical and ionic barrier properties of polyaniline. Fourier Transform Infrared (FTIR) showed the successful formation of PANI, PANI nSi and PANI 3-APS modified nano silica. Correlation between concentration of acid and fillers weight ratio with conductivity were studied. The electrical conductivity of all samples was determined using the bulk resistance value obtained from the Nyquist plot in the frequency range of 0.1 Hz to 100 MHz. PANI prepared in 0.1 M oxalic acid shows the highest room temperature electrical conductivity value of, 2.52 x 10⁻⁶ S cm⁻¹. The highest electrical conductivity of PANI nSi was 2.4 x10⁻⁴ S cm-1 for PANI containing 20%w/w nano silica fillers. For PANI 3-APS modified nano silica, PANI added with 20%w/w of 3-APS modified nano silica fillers exhibit the highest conductivity values which were 4.0 x10-6 S cm-1. PANI, PANI nSi and PANI 3-APS modified nano silica with the optimum condition was selected for further characterization. The study also calculated the conductivity of all selected samples in wet condition. The transference numbers determined the conductivity behaviour of all chosen samples in dry and wet conditions. The transference numbers were calculated using Wagner's polarization method. The transference numbers determined in dry condition revealed that all samples behave as electronic conductor, however, when exposed to wet condition they

exhibit as mixed conductor (electronic and ionic). PANI nSi shows the highest conductivity in dry and wet condition. The higher conductivity value is due to the ion-transporting abilities in PANI nSi. Addition of fillers had changed the morphology of polyaniline. Results from X-ray diffraction (XRD) and field emission scanning electron microscopy (FESEM) support these findings. Thermal gravimetric analysis (TGA) reveals that PANI nSi was more stable compared to PANI and PANI 3-APS modified nano silica. Potential differences studies were further conducted to determine the barrier properties of PANI, PANI nSi and PANI 3-APS modified nano silica. PANI nSi shows the highest potential differences values which indicates the high possibility of the film to resist ions. The resistant measurement results also show that PANI nSi has the highest resistant values. pH measurement indicates that acid leached out from PANI, PANI nSi and PANI 3-APS modified nano silica. The determination of dielectric values of PANI, PANI nSi and PANI 3-APS modified nano silica assisted in understanding the properties of the coatings. Dielectric values at mid frequencies show that the addition of nano silica filler had maintained the dielectric values of PANI nSi. Dielectric results suggest that water diffusions and cations movement through the film had caused acid to leave the film. Potentiodynamic polarization experiment of coated and uncoated mild steel was conducted in 0.5 M hydrochloric acid and 0.5 M sulphuric acid solution further revealed that PANI nSi displays the best corrosion protection in both acidic media. The corrosion inhibition efficiency of PANI nSi is 81.6% in 0.5 M H₂SO₄ and 98.8% in 0.5 M HCl.



13

Name : MAATI MUSBAH SALEH ELGHUOL

Title : CYTOLOGICAL AND MOLECULAR ANALYSIS OF ANTI-TUMOUR BIOACTIVITIES OF *Urginea maritima* (L.) BAKER AQUEOUS EXTRACT ON HUMAN MALIGNANT NEUROBLASTOMA WITH ITS NEUROPROTECTION ABILITY

Supervisor : ASSOC. PROF. DR. MOHAMED SAIFULAMAN MOHAMED SAID (MS) DR. KHALILAH ABDUL KHALIL (CS)

This study was conducted with the hypothesis that the phytochemical closely related to Libyan medicinal herb, Urginea maritima (L.) Baker constituents within water-based extract would own appropriately powerful properties that contribute to intrinsic regulation specific antitumour activities in human malignant SH-SY5Y neuroblastoma cells. The purpose of the present study was to explore the characterisation and identification of the major phytochemical of the U. maritima aqueous extract. Additionally, the study also aimed to evaluate their effectiveness on the cellular and molecular mechanism associated with the main anti-tumour criteria. Through utilising several in-vitro techniques on both the experimental cell line models involving (2× 10⁴ to 1× 10⁶ cells/ml) with the quality of \geq 90% viability of SH-SY5Y neuroblastoma and RA differentiated (neuronmodel) cells. Evaluation of the impact of the active extract ingredients was conducted based on morphological observation, biochemical, cellular function and gene expression profile, and the analysis was carried out for its estimation within different concentrations and durations. Neuroblastoma is a well-known extra-cranial solid tumour and one of the most deadly malignancies in childhood. Indeed, neuroblastoma with highrisk stages is extremely heterogeneous and very aggressive metastases. Although the most intensive multimodal therapies are available, but the key for the successful medical intervention of malignant neuroblastoma is still a challenging task. In this regard, the present investigation data for the first time clearly emphasise the significantly specific anti-tumour activities including viability and proliferation inhibition at a time-dose dependent manner with an estimated IC50 value at 10µg/ml, 1µg/ml and 100ng/ml after an incubation at 24, 48 and 72hrs respectively, with less neurotoxicity

among the neuron model cells. Efficient apoptosis-causing and the induction of a more pronounced G1 phase arrest. More importantly, the investigation highly supported the ability of novel biological activities of this natural product, as it elucidated that the extract in-vitro could directly induce a neuronal differentiation mechanism. Based on the gene expression profiling was performed using the Human Affymetrix microarray module evaluating the biological significance of the U. maritima experiments. Following this Gene Ontology (GO) analysis and the major significant pathway through a Database (D.A.V.I.D) was decided. Further, the most promising results were also verified using RT-PCR. The expression profile results established extensive detail on the gene expression that encoded groups of proteins attributed to death receptors interrelated to intrinsic apoptosis pathway involving bad, bid, bbc3, and also elevated caspase-9 for treating malignant SH-SY5Y neuroblastoma population, which are in accordance with our previous findings and confirmed the research hypothesis. Furthermore, the studied extract strengthens cellular machinery correlated with neurogenesis, differentiation and development, bio action due to stimulation of wnt signal pathways with overexpression of numerous wnt ligands including wnt3A, wnt7A, wnt7B and wnt11. Collectively, these novel findings reveal that the active constituents of this unusual natural product, medicinal herb U. maritima exhibited dual effects on the neuron cells. Indeed, this preferential ability through diverse bioactivities provides an interesting basis for widespread medical application and a promising therapeutic candidate against neurological diseases, more specifically against malignant neuroblastoma disorders.

Name : NAZLIN BINTI ASARI

Title : MODELLING AND MONITORING OF STAND VOLUME, ABOVE GROUND BIOMASS AND CARBON STOCKS OF OIL PALM (*Elaeis guineensis*) PLANTATIONS USING LANDSAT THEMATIC MAPPER IN MALAYSIA

Supervisor : PROF. DR. MOHD NAZIP SURATMAN (MS) ASSOC. PROF. DR. JASMEE JAAFAR (CS)

Oil palm (Elaeis guineensis) plantations play important roles in the economics and sources of income to Malaysia. Accurate and reliable information on forecasts of resource availability and contribution of oil palm plantations on global carbon cycle are needed for its management efforts and planning. The need for effective inventories and monitoring methods has prompted this research into supplementing the ground field survey with the information from satellite remote sensing for developing methods for oil palm plantation inventory. For monitoring purposes, the effective procedures were developed using three dates of Landsat Thematic Mapper (TM) imagery. Field-measured above ground biomass (AGB), stand volume and carbon stocks values from 230.8 ha of oil palm plantations were compared with individual Landsat TM bands and nine vegetation indices. The potential models selected were obtained using stepwise and backward elimination method where R^2 , adjusted R^2 , Standard Error of Estimate (SE_E), Root Mean Squared Error (RMSE) and C_p were examined in model development and validation. For stand volume, AGB and carbon stocks estimation, it was found that the most promising model provides moderately good prediction of about 62% of

the variability of the stand volume, AGB and carbon stocks with RMSE values of 14.31 m3/ha, 3.68 tonnes/ha and 1.66 tonnes/ha, respectively. In conclusion, Landsat TM offers the low cost of stand volume, AGB and carbon stock estimates and mapping of oil palm plantations with moderate accuracy in Malaysia. The combination use of a time series of Landsat TM data, post classification change detection and Geographic Information System (GIS) have provided useful tools and techniques to produce land cover/use change matrices and oil palm area change statistics which necessary in providing in-depth understanding on the general processes of changes, the factor that drives the changes in land cover/use types, and thus contributes to the good management and sustainable oil palm resources. In addition, the information from this thesis may provide useful tool for resource planners and oil palm related agencies in making resource forecasts, and assist in the development of management plan for the tree crop. The information is also useful in helping to assess the important indicators of sustainability and the way in which the resource availability vary over time.

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13

* (MS) = Main Supervisor

Name : NIK NOOR IDAYU NIK IBRAHIM

Title : THE CHARACTERIZATION OF GLASS FIBRE REINFORCED UNSATURATED POLYESTER FILLED WITH P84 POLYIMIDE / MULTI-WALL CARBON NANOTUBES (MWCNT) HYBRID COMPOSITES

Supervisor : DR. AHMAD ZAFIR ROMLI (MS) DR. SITI NUR LIYANA MAMAUOD (CS)

This study was carried out with an aim to improve the strength and thermal stability of the glass fibre reinforced unsaturated polyester composites by incorporating the P84 Polyimide powder and Multi-wall Carbon Nanotubes (MWCNT) as filler. Research methodology for this study was divided into four main stages. First stage is the preliminary study on the effect of the masterbatch technique on the basic properties of unsaturated polyester. Masterbatch technique is the mixing of powder P84 Polyimide with liquid MEKP prior to be incorporated into the polyester resin, where a mixture that contain both filler and curing agent was produced. This mixture were prepared in bulk, stored in a closed container and only taken out when needed. The results showed that the masterbatch technique does not affect the gel time but does increased the Tg. The second stage was the preparation of the matrixfilled system as a function of different preparation techniques where two matrix systems were studied. First was the unsaturated polyester filled with masterbatch P84 Polyimide system and the second was the unsaturated polyester filled with P84 Polyimide system. The difference between the systems was the preparation technique. The first system was prepared by incorporating both filler and curing agent (masterbatch P84 Polyimide) simultaneously into the polyester resin. The second system was prepared by incorporating filler and curing agent in separate steps. The incorporation of P84 Polyimide into the unsaturated polyester

through the masterbatch technique resulted in the increment in tensile strength with the increased amount of filler loading. Third stage was the treatment of glass fibre with 3-Aminopropylethxysilane. The treatment was considered successful in attaching the silanol species on the surface of glass fibre where the molecular vibration of amino organofunctional group; C-N and N-H, was detected in FTIR spectrum. The fourth stage was the fabrication of glass fibre reinforced unsaturated polyester filled with P84 Polyimide/MWCNT hybrid composite and the composites were analysed based on the physical, mechanical, and thermal properties and also the morphological observation of the fractured samples. In a nutshell, the addition of P84 Polyimide at lower loading into the unsaturated polyester matrix system improved the strength of the composite. However, at higher filler loading, the strength dropped and worsens with the increasing number of glass fibre laminates. On the other hand, the incorporation of MWCNT caused the reclining in strength due to the incomplete broken down of coiled MWCNT. Nevertheless, the hybridization of MWCNT with P84 Polyimide able to raise back the strength. Thus, most of the mechanical properties showed by the hybrid composites were in between the unfilled composites and single filler composites. Through the morphological observation, the difference in texture and failure modes between single filler and hybrid filler composites were observed.



Name: NOOR ZUHAIRA BINTI ABD AZIZ

Title : CHARACTERIZATION AND RHEOLOGICAL PROPERTIES OF HYBRID FILLERS FILLED HIGH DENSITY POLYETHYLENE BIO-COMPOSITE

Supervisor : ASSOC. PROF. DR. RAHMAH MOHAMED (MS)

As the world tries to minimise possible harmful destruction of our environment and move towards GO GREEN Agenda, hybrid fillers have been widely used as alternative reinforcing filler for thermoplastic polymer composite. One of the most characteristic features of hybrid composite lies in its balanced performance of strength, as well as other properties, which include manufacturing cost. In this research, different fillers were used to obtain optimal hybrid composite composition from kenaf, rice husk (RH) and calcium carbonate (CaCO₃). Different varying compositions up to 30 wt% of mixed kenaf and rice husk with CaCO3 were compounded with 40-70 wt% of high density polyethylene (HDPE) using twin screw extruded at 50rpm, to produce two different hybrid composites, HDPE/kenaf/CaCO3 and HDPE/rice husk/CaCO3. Properties of hybrid composites were compared between particulate CaCO3/kenaf fibrous form and CaCO₃/rice husk particulate form. Hybrid composites were tested for physical, mechanical, thermal, burning rate and rheological behaviour. From test results, addition of filler had decreased melt flow index (MFI) up to 72% and increased density of hybrid composites up to 19%. In general, addition of both natural fibres, either kenaf or rice husk with CaCO₃ decreased the tensile strength, elongation, and impact.

However, addition of 20 wt% rice husk in fixed 30 wt% CaCO3 showed an increment of about 10% in its impact strength. Increment of filler subsequently increased flexural strength, flexural modulus and Young Modulus properties of both hybrid composite systems. Water absorption properties were increased with addition of filler, while kenaf hybrid composite system exhibited higher water uptake, which is 6.47% in 80 days. For thermal properties, hybrid composite showed good thermal stability with addition of kenaf, rice husk and CaCO3 fillers. HDPE/ kenaf/CaCO3 exhibited lower burning rate compared to similar filler loading of HDPE/rice husk/CaCO3 hybrid composite. Viscosity of hybrid composites was increased due to addition of fillers. Rice husk/ CaCO3 particulate had lower viscosity compared to kenaf fibrous/ CaCO₃ particulate hybrid composite system. From observations of Rule of Mixture (ROM) and Rule of Hybrid Mixture (RoHM), it was found that, there were lower and upper bound of hybrid composites which depended on compositions of their fillers. Meanwhile, observations from field emission scanning electron microscope (FESEM) revealed bonding between filler and matrix from impact fracture.



Name: NOOR ZURAIDA BINTI JUSOH

Title : SUITABILITY OF BAMBOO BRICK AS A LIGHTWEIGHT CONSTRUCTION MATERIAL

Supervisor : ASSOC. PROF. DR. MANSUR AHMAD (MS) PROF. DR. AZMI IBRAHIM (CS)

The increasing issues of pollution create awareness that leads to the close down of some mining sand quarries. The usage of river sand as an alternative resources also contributed to pollution. Consumption of sand must be reduced in order to stop its negative impact on environment. Bamboo is the alternative raw material in construction that is used for bricks and concrete. Bamboo is one of the fastest growing plants, abundant and low cost material. Many studies were done on bamboo especially on mechanical and physical properties of Semantan bamboo (Gigantochloa scortechinii). However, there is no study on the properties of Akar bamboo (Dendrocalamus pendulus). Therefore, one of the objectives of this thesis was to evaluate the properties of Akar bamboo and as well as Semantan bamboo as a lightweight construction materials. The basic properties of bamboo evaluated were compressive strength, specific gravity, water absorption and dimensional stability. Bamboo skin can significantly increase compressive strength and significantly reduce water absorption and dimensional stability of bamboo. The presence of nodes in bamboo significantly reduce the compressive strength. In this study, waterproof coating was used in bamboo brick samples. The usage of waterproof coating has significantly reduced water absorption and dimensional changes of bamboo. The waterproofing agent like Axel Deram however not only act as water barrier but can provide good bonding strength when bamboo was embedded into cement mortar. Further study

of bamboo as lightweight construction material is thermal conductivity. Thermal conductivity of laminated bamboo is similar to solid wood. For unreinforced brick, the properties evaluated were curing time, watercement ratio and size of aggregates. These properties influence the compressive strength and water absorption. The suitable water to cement ratio that can be used is 0.6 since water absorption of sand is quite high with value of 7%. The minimum curing time for brick to obtain its full strength is at 28 days. Particle size of sand for better strength of cement brick must not be smaller than 5mm. A prototype of bamboo brick was manufactured and tested for compressive strength, water absorption and thermal conductivity. The reinforcement of bamboo into cement brick has reduced the weight of construction material to 1418 - 1663 kg/m³ which was lower than 1800 kg/m³ for lightweight category. The compressive strength of bamboo brick was higher for bamboo in parallel direction towards bamboo fibre. The compressive strength of bamboo was significantly higher in parallel direction to grain compare to compressive strength in perpendicular direction to grain. Akar bamboo and Semantan bamboo have the potential as a lightweight construction material with compressive strength of 20.37 N/mm² and 11.63 N/mm² which are acceptable for structural application. Thermal conductivity of bamboo brick was significantly lower about 12.81% than thermal conductivity of cement brick.

17



Name : NORHIDAYAH BINTI ABDULLAH

Title : PROPERTIES OF MILLED *ZINGIBER OFFICINALE* ROSC (GINGER) RHIZOME POWDER TO COARSE, FINE AND NANO SIZES AND ITS EFFECTS ON THE STORAGE STABILITY OF SPENT HEN CHICKEN

Supervisor : PROF. DR. NORIHAM ABDULLAH (MS) PROF. ENGR. DR. MOHAMAD RUSOP MAHMOOD (CS)

Z. officinale Rosc. (ginger) has been globally used and known to possess beneficial health properties due to the presence of various bioactive compounds. However, the poor absorption of these bioactive compounds is due to low water solubility, large particle size and complex chemical structure had restricted its bioactivity. The nanotechnology process has been reported as an advanced technology recently applied in food materials to increase the water solubility and improve bioactivity of the active ingredients. However, study on nanoparticle herbs is lacking, hence this study was conducted with the aimed to investigate the effect of nanotechnology process on physicochemical properties of nanoparticle Z. officinale rhizome powder. A study on the effect of this powder as a marinating agent on the storage stability of spent hen meat was also conducted. Physicochemical changes were determined using laser diffraction technique, Field Emission Scanning Electron Microscope (FESEM), The Fourier Transmittance IR (FTIR) and X-ray diffraction (XRD). Antioxidant content was estimated by Total Phenolic Content (TPC) and Total Flavonoid Content (TFC) while antioxidant activity was performed via ABTS Cation Decolorisation Assay (ABTS), DPPH Radical Scavenging Activity (DPPH) and Ferric Reducing Antioxidant Power (FRAP) assays. Phenolic acids composition was identified through SPE-HPLC analysis. Analyses of pH, colour, shear force, Peroxide Value (PV), Thiobarbituric Acid (TBA), Anisidine Value (AV), Totox Value, volatile compounds identification by GCMS-SPME method and microbiological study were conducted to determine the storage quality of chilled spent hen meat treated with synthetic antioxidant, BHA:BHT

combination (positive control), coarse particle, fine particle and nanoparticle Z. officinale. The results were compared to that of spent hen meat without any treatment (negative control). Sensory analysis was also conducted to verify consumers' acceptability. Milling at 550 rpm for 4 hours in dry milling were found to be the appropriate milling parameters to prepare nanoparticle Z. officinale rhizome with mean particle size of 223.8 nm. The TPC and TFC were in the range of 3.97 to 12.83 mgGAE/g dry weight and 14.80 - 22.35 mgQE/g dry weight respectively. Nanoparticle Z. officinale showed significantly high ABTS scavenging (38.08%), FRAP value (50.52%) and 34.04% better in the DPPH free radical inhibition as compared to the coarse particle Z. officinale rhizome powder. Nanoparticle Z. officinale significantly inhibited bacterial growth better than the coarse and fine particle Z. officinale rhizome powder. Application of nanoparticle Z. officinale rhizome in spent hen meat improved physicochemical properties and oxidative stability as comparable to sample marinated with BHA:BHT. Significantly low concentration of volatile compounds were detected in the nanoparticle Z. officinale rhizome marinated sample compared to other treated samples. Spent hen marinated with nanoparticle Z. officinale rhizome was the most preferred sample as depicted by significantly high sensorial mean scores (6.86 - 7.60) rated by the panelists. Hence it is suggested that nanoparticle Z. officinale rhizome has the potential to be used as functional ingredient that can improved the storage stability of meat and meat product.

Name : NURULHUDA BINTI KAMARUDDIN

Title : CHEMICAL STUDIES TOWARDS THE SYNTHESIS OF JANOLUSIMIDE, A MARINE NEUROTOXIN FROM *Janolus cristatus*

Supervisor : PROF. DR. AHMAD SAZALI HAMZAH (MS) ASSOC. PROF. DR. ZURINA SHAAMERI (CS)

Janolusimide 19 was chosen to be the synthetic target molecule due to having a unique tripeptide structure besides showing a neurotoxin activity. Our synthetic approach towards the synthesis of janolusimide involved the construction of a core lactam system derived from L-valine using EDC.HCl followed by dimethylation using four different conditions. Dimethylation at C-3 position of 133 affords (5S)-3,3dimethyl-5-isopropylpyrrolidine-2,4-dione 26 in 72% yield using TBAF as a phase transfer catalyst. In this dimethylation step, a characteristic of ambident anion also can be observed. Multiple positions of alkylation had occurred due to enolate's ambident character of which C,O-alkylated and O-alkylated side products were observed. While the effort to synthesize the dipeptide chain was carried out using aldol reaction, N-alkylation of 26 and N-acylation of a template, 2-pyrrolidinone 139 and lactam 26 with several electrophiles. Four general protocols (Method A-D) to N-acylate 2-pyrrolidinone and lactam 26 were examined. These methods can be used as an alternative method to perform N-acylation of other lactam

analogues. From these steps, two main precursors 144 and 147 towards the synthesis of janolusimide were afforded. In order to carry out monoalkylation of β-keto amide 143, monomethylation to our template 140 was performed to optimize the reaction conditions. Mono-alkylation of β -keto amide 143 was carried out using several electrophiles such as methyl iodide, benzyl bromide, isopropyl iodide and allyl bromide afforded compounds 147, 148, 149 and 150 in 85, 64, 50 and 76% yields respectively. Chemical exploration of the lactam 133 through electrophilic substitution at C-3 afforded unique compounds 151 and 152 derived from unusual bond migration. In addition, the study of ester hydrolysis of compound 143 had proven the sensitivity of amide bond towards acid and base. Meanwhile, reduction of N-acylated lactams 144 and 147 via NaBH4 affording reduced lactam adduct 155 due to the amide hydrolysis. Besides, reduction of keto compound 147 mediated by sodium triacetoxyborohydride produced the diastereomeric mixture of reduced products 156 in 14% yield.

20

Name : RAFIDAH BINTI RAZUAN

Title : MICROSTRUCTURE, PHASE FORMATION AND HARDNESS INVESTIGATION OF ARGON ARC MELTED AI-Co-Cr-Fe-Ni AND AI-Cu-Cr-Fe-Ni HIGHENTROPY ALLOYS (HEA) WITH ELEMENTAL ADDITIONS

Supervisor : DR. MAHESH KUMAR TALARI (MS) PROF. DR. MOHAMAD KAMAL HJ. HARUN (CS)

Traditional alloying is one of the methods to enhance the performance of pure metals by adding other metals or non-metals. However, as multiple alloying elements in an alloy may lead to the formation of many intermetallic compounds with complex microstructures and poor mechanical properties, new types of metallic alloys called High Entropy Alloy (HEA) with at least 5 elements with equimolar ratios were developed. This thesis reports the microstructural studies, mechanical properties and thermal properties of AlCuCrFeNiTixNby; (x and y=0.5, 1.0, 1.5), AlCoCrFeNiZrx; (x= 0.2, 0.4, 0.6, 0.8, 1.0) and AlCoCrFeNiMoxNby; (x and y=0.1, 0.2, 0.3) HEAs that have been prepared using Ar arc melting technique. Effect of adding elements with large atomic radius, nano precipitate formation and high melting point on the phase formation, microstructural development and mechanical properties of HEAs prepared in this study were investigated in detail. Thermodynamic calculations and structural parameters for HEA phase formation criteria were carried out and correlated with the experimental results of the HEAs prepared in this study. Microstructural studies using scanning electron microscope (SEM) and XRD showed that Ti addition promoted secondary BCC2 phase. Results also showed that Nb promoted FCC phase as well acted as FCC stabilizer. Samples with both Nb and Ti addition showed FCC1 and FCC2 structure with Nb rich FCC dendritic phase as dominant phase. AlCoCrFeNiZrx (x= 0.2, 0.4, 0.6, 0.8, 1.0) HEAs consist of mixed FCC and BCC solid solution phase regions and there are no intermetallic phases found. Addition of Zr in the HEA did not result in a preferential solidification of either BCC or FCC phase since both phases present at all compositions until x=1.0% Zr. The BCC solid solution phase was observed in XRD patterns of both Nb and Mo added AlCoCrFeNi HEAs.

SEM-BSE micrographs of Mo added AlCoCrFeNi HEAs revealed spinodal decomposition of the high temperature solid solution. Nb added HEAs showed Nb rich eutectic mixture at interdendritic regions. Though, individual Nb and Ti additions to AlCuCrFeNi HEAs had resulted in increase in hardness, combined additions had resulted in highest hardness of 797 HV. AlCoCrFeNi HEA with 0.2% Zr had displayed high hardness value compared to the base HEA. The hardness of Mo added HEAs were highest among all the HEAs prepared, which could be attributed to the spinodally decomposed microstructure. The values of Hmix that were calculated from the EDX data were within -22 and 7 kJ/mol for all AlCuCrFeNiTixNby, AlCoCrFeNiZrx and AlCoCrFeNiMoxNby HEAs, satisfying the requirements to obtain simple phases as evidenced by XRD data. Atomic size difference (δ) that was calculated from the EDX data for all of the phases for AlCuCrFeNiTixNby showed $\delta \le 8.5$ satisfying the conditions for all the samples to have simple solid solution phases. $\Delta Smix$ for AlCoCrFeNiZrx HEAs were bigger than 11 J/ (K mol). For AlCoCrFeNiMoxNby HEAs, addition of Nb had resulted in overall increase in melting temperature of AlCuCrFeNi HEAs as observed from DSC results. Addition of Zr in AlCoCrFeNi HEA increased the melting point of the HEA as evidenced by DSC data. All the AlCoCrFeNi HEAs with Mo and Nb addition had displayed higher melting temperature values compared to AlCoCrFeNi HEA and this higher melting temperature values could be attributed to high melting points of Mo and Nb compared to other elements in the HEA.





21

Name : ROSDIYANA BINTI HASHAM@HISAM

Title : DIELECTRIC, ELASTIC AND OPTICAL PROPERTIES OF 80TeO₂-(20-*x*) MnO₂-*x*Fe₂O₃ AND 30Li₂O-4MoO₃-(66-*x*)TeO₂-*x*V₂O₅ MIXED OXIDE TELLURITE GLASSES IN THE CONDUCTIVITY ANOMALY REGION

Supervisor : PROF. DR. AHMAD KAMAL HAYATI BIN YAHYA (MS) PROF. DR. RI HANUM YAHAYA SUBBAN (CS) ASSOC. PROF. DR. HALIMAH BINTI MOHAMED KAMALI (CS)

In this study, two series of mixed oxide tellurite based glasses with composition 80TeO_2 -(20-x)MnO₂-xFe₂O₃ (x = 5 mol% to 20 mol%) and $30Li_2O-4MoO_3-(66-x)TeO_2-xV_2O_5$ (x = 0.2-1.2 mol%) were prepared using melt-quenching method to investigate their dielectric, AC conductivity, elastic and optical properties. For the 80TeO2-(20-x)MnO2xFe₂O₃ glass samples, the dielectric constant showed strong variation with Fe_2O_3 at a frequency ≥ 10 kHz, where ε' decreased to a minimum value at x = 10 mol% before increasing for x > 10%. The decrease in ε' may be attributed to some form of hindrance effect on heavy dipoles caused by the mixed transition-ion effect (MTE). Meanwhile, variation of AC conductivity with Fe₂O₃ showed non-linear increase for $x \le 10 \text{ mol}\%$ before dropping to a minimum at 15 mol% Fe₂O₃. This result is attributed to Anderson localization because of the disorder in the glass system. On the other hand, DC conductivity for the same glass system showed a strong increase for $x \le 10 \text{ mol}\%$ Fe₂O₃ before reaching a saddle-like behavior between 10 mol $\% \le x \le 15$ mol%, followed by a large increase for x > 15 mol%. Independent longitudinal modulus (CL), shear modulus (µ) and bulk modulus (Ke) showed increased values for $x \le 10$ mol% with an anomalous drop at $x = 15 \text{ mol}\% \text{ Fe}_2\text{O}_3$, followed by a large increase at x > 15 mol%. The anomalous region between 10 mol% $\le x \le 15$ mol% coincided with DC conductivity saddle-like region and is suggested to be related to the MTE. Meanwhile, in the same region, optical band gap (E_{opt}) exhibited a maxima, whereas refractive index showed a minima, thereby indicating a variation in polarizability due to changes in concentration of bridging and non-bridging oxygens. For the 30Li₂O-4MoO₃-(66-x) TeO₂-xV₂O₅ glasses, the variation of AC conductivity with V₂O₅ showed a non-linear increase for $x \le 0.6 \mod \%$ before decreasing to a minimum at 0.8 mol% V_2O_5 . The decrease in σAC is attributed to some forms of blocking effect on Li+ ions caused by the mixed ionic-electronic (MIE) effect. Meanwhile, dielectric constant showed a general increase for x ≤ 0.6 before an anomalous decrease at $x = 0.8 \text{ mol}\% \text{ V}_2\text{O}_5$, which was followed by a large increase at x > 0.8 mol%. The decrease at x = 0.8mol% coincided with the σAC drop at the same location. This decrease was also suggested to be related to the MIE that induced a blocking effect, which caused the restricted dipole movement. Meanwhile, DC conductivity showed initial weak increase for $x \le 0.6 \text{ mol}\% \text{ V}_2\text{O}_5$ before decreasing sharply at x = 0.8 mol% followed by a large increase for x > 0.8 mol%. Independent longitudinal modulus (CL), shear modulus (µ) and related elastic modulus also exhibited non-linear behavior where their values decreased to a minimum at x = 0.8 mol% before increasing beyond x = 0.8 mol% with the addition of V₂O₅. The decrease in elastic modulus for $x \le 0.8$ mol% indicated a decrease in stiffness and rigidity of the glasses due to increase in non-bridging oxygen (NBO) contributed by TeO3 and MoO3 which weakened the glass network. Subsequently, a large increase at x > 0.8 mol% is suggested to be due the increase in BO contributed by VO₅ together with the formation of strong covalent V-O bond. The anomalous region at x = 0.8 mol% which coincided with the DC conductivity minimum region is suggested to be related to the (MIE) effect. Meanwhile, in the same region, optical band gap (E_{opt}) and refractive index (n) exhibited an off-trend behavior indicating variation in polarizability due to changes in concentration of bridging and nonbridging oxygen.

FACULTY OF COMPUTER & MATHEMATICAL SCIENCES



22

Name : HAMZAH ABDUL HAMID

Title : TYPES OF COVARIATE AND DISTRIBUTION EFFECTS ON PARAMETER ESTIMATES AND GOODNESS-OF-FIT TEST USING CLUSTERING PARTITIONING STRATEGY FOR MULTINOMIAL LOGISTIC REGRESSION

Supervisor : PROF. DR. YAP BEE WAH (MS) PROF. DR. MOHD TAHIR ISMAIL (CS) ASSOC. PROF. DR. XIAN-JIN XIE (CS)

This thesis presents a simulation study on parameter estimation for binary and multinomial logistic regression, and the extension of the clustering partitioning strategy for goodness-of-fit test to multinomial logistic regression model. The motivation behind this study is influenced by two main factors. Firstly, parameter estimation is often sensitive to sample size and types of data. Simulation studies are useful to assess and confirm the effects of parameter estimation for binary and multinomial logistic regression under various conditions. The first phase of this study covers the effect of different types of covariate, distributions and sample size on parameter estimation for binary and multinomial logistic regression model. Data were simulated for different sample sizes, types of covariate (continuous, count, categorical) and distributions (normal or skewed for continuous variable). The simulation results show that the effect of skewed and categorical covariate reduces as sample size increases. The parameter estimates for normal distribution covariate apparently are less affected by sample size. For multinomial logistic regression model with a single covariate, a sample size of at least 300 is required to obtain unbiased estimates when the covariate is positively skewed or is a categorical covariate. A much larger sample size is required when covariates are

negatively skewed. In Phase 2, we investigate the goodness-of-fit (GoF) tests for multinomial logistic regression. Goodness-of-fit tests are important to assess if the model fits the data. We investigated the Type I error and power of two goodness-of-fit tests for multinomial logistic regression via a simulation study. The GoF test using partitioning strategy (clustering) in the covariate space, $\chi^2_{P^*G}$ was compared with another test, Cg which was based on grouping of predicted probabilities. The power of both tests was investigated when quadratic term or interaction term were omitted from the model. The proposed test $\chi^2_{P^*G}$ shows good Type I error and ample power except for multinomial models with highly skewed covariate distribution. Additionally, the proposed test $\chi^2_{P^*G}$ has good power in detecting omission of continuous interaction term. Further simulation results showd that partitioning strategy using Hierarchical Clustering with Canberra distance, $\chi_{P^*G}^2$ performs better than $\chi_{P^*G}^2$ (Hiearchical clustering with Euclidean distance) and $\chi^2_{P^*G}$ (Partitioning using k-medoids). The application on a real dataset confirmed the simulation results. The simulation and analyses were carried out using R, an open-source programming language for statistical computing and graphics.

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

Name: MOHAMAD ADAM BIN HAJI BUJANG

Title : ENHANCEMENT OF SYSTEMATIC SAMPLING FOR CLINICAL SURVEY: SYSTEMATIC SAMPLING WITH CONSECUTIVE APPROACH

Supervisor : ASSOC. PROF. DATIN DR. PUZZIAWATI AB GHANI (MS)

Survey is a one of the common primary data collection approaches in research in various fields including the clinical field. Findings from clinical surveys are important because recommendations from the findings will have a direct impact towards public's health. Data collection process in clinical survey usually involves an ordered sampling frame and has become very challenging for clinical researchers, who need to handle multiple tasks in their clinical service whereby the clinical service is their top priority. Therefore, due to time constraints, the general practice of data collection in clinical survey is to adopt non-probability sampling such as consecutive sampling. The consequence of this kind of practice would produce results that can be invalid since the results could be influenced by sampling bias. In order to reduce sampling bias and to obtain more precise results is to promote the use of probability sampling technique in a clinical survey. The motivation behind this study is to introduce a modification on systematic sampling. The existing approach in selecting sample based on systematic sampling is to take only one unit sample in each interval selection. So far, none of the researchers have attempted to investigate the possibility of selecting more than one unit sample in each interval selection with respect to modified systematic sampling. Therefore, the purpose of this study is to explore the possibility of recruiting more than one unit sample in each interval selection with respect to modified systematic sampling. The main objective of this study is to develop a newly modified systematic sampling that allows more than one unit sample to be collected in each interval, and to prove such selection is able to derive an unbiased estimator for the population mean. Comparisons in terms of sampling efficiency and consistency

of the estimator were made between the newly modified systematic sampling and systematic sampling based on simulation analysis and real-life datasets. This study has successfully developed the terms and condition for selection of the newly modified systematic sampling and most importantly, the estimator that is derived from this sampling technique has been proved to be unbiased, efficient and also consistent. This modified systematic sampling is named as "Systematic Sampling with Consecutive Approach" or in short SSC. Preliminary evaluation for relative efficiency from two simulated datasets have produced relative efficiency between 1.26 and 2.06 which indicates SSC is more efficient. Testing relative efficiency on focusing data with normal distribution showed that SSC is more efficient with 12 out of 15 different datasets with relative efficiency ranges from 1.030 to 19.563. Simulation analysis with iteration of 1000 times was conducted from 25 different populations has also showed SSC is more efficient with 20 out of 25 different data. Other evidences were derived from testing 2 published datasets and 2 real-life clinical datasets. Results shown SSC is more efficient for at least 1 from published dataset and 1 from real life dataset. Besides efficiency, SSC is also consistent where the sample statistic is similar to the parameter when testing from small to large sample size. This newly modified systematic sampling in indeed an innovation in sampling by the virtue of combining two sampling techniques, consecutive sampling and systematic sampling. The main contribution through the outcome of this study is to enable clinical researchers to utilize SSC to ensure the acquisition of valid results in clinical survey in an ordered sampling frame. .

Name : NOR HANIM BINTI ABD RAHMAN

Title : IMPROVED HYBRID METHODS IN SOLVING SINGLE VARIABLE NONLINEAR ALGEBRAIC EQUATIONS

Supervisor : DR. MOHD AGOS SALIM NASIR (MS) DR. KHAIRIL ISKANDAR OTHMAN (CS)

Nonlinear problem is one of the most frequently occurring problems in scientific works especially in science and engineering applications. Amongst the most popular schemes are the Newton's method and homotopy perturbation method. However, the duration to converge are heavily depends on how close the guess value is to the real root/s and the rate of convergence for Newton's method is only order-2 and its efficiency index is only $\sqrt{\sim} \approx 1.41421$. Secondly, some of the methods utilized successive approximation procedure to ensure every step of computing will converge to the desired root and one of the most common problems is the improper initial values for the iterative methods. Thus, this particular research aims to develop an improved numerical solution for solving nonlinear equations by using hybrid concept and higher order correctional terms. Higher order successive approximations are applied and evaluated to ensure it converges to the desired root/s more effectively. Two sets of schemes of hybrid algorithms, the Higher Order Taylor-Perturbation method (HTP) and Higher Order Homotopy Taylor Perturbation method (HHTP) with higher order correctional terms up to 6th order are derived and evaluated. The theoretical and numerical results used to verify the stability, consistency and convergence of the schemes. Numerical examples and comparison studies are used to illustrate and to support the efficiency of the suggested method. Furthermore, a new definition of computational order of convergence are defined and analyzed. Next, in order to jumpstart the process of iteration, an improved way to choose the initial- value is also discussed and evaluated numerically. As a result of hybriding several methods, both improved algorithms of HTP and HHTP established faster, more reliable and better outputs, in comparison to other classical methods. The computational tools such as Maple 14 and Mathematica 7.0 are used for this research.

Name : SABIROH MD SABRI

RI

DOCTORAL RESEARCH ABSTRACTS

THE

Title : AN ICT-SUPPORTED INTERGENERATIONAL KNOWLEDGE TRANSFER FRAMEWORK FOR FAMILY FIRMS

Supervisor : ASSOC. PROF. DR. HARYANI HARON (MS) ASSOC. PROF. DR. NURSURIATI JAMIL (CS)

In recent years, the world's aging phenomenon has led to the increase number of retirements in organisations. When people leave their organisations, they also take with them their experience, skills and knowledge, hence leaving the organisation to suffer loss of intellectual knowledge, and certainly caused the business's sustainability and continuity to be in danger. This phenomenon has inevitably affected family firms because their survival depends on tacit knowledge possessed by the founder as the source of its competitive advantage. Therefore, to ensure its sustainability, family firms must guarantee that their knowledge is preserved and being transferred to the successor of the business. Many researchers proposed knowledge transfer models which mostly focused on knowledge transfer methods, strategies, and processes to mitigate knowledge transfer barriers, create an optimal knowledge transfer domain for large organisations and inter-organisational knowledge transfer. However, the methods and strategies proposed were found to be ineffective for family firms, thus caused the success of knowledge transfer in family firm to be very low. This research is motivated to provide a platform for family firm to transfer their knowledge from the older generation to the younger generation with the consideration of family firm uniqueness. The qualitative approach was adopted in understanding the characteristics of family business, strategies, and mechanisms used in transferring their knowledge. A case study approach with multiple unit of analysis was use

as the strategy of inquiry where data was collected using interview and observation. Data was analysed using content analysis using inductive and deductive approach. The results reveals the unique intergenerational knowledge transfer process, which are the recalling and assembly of knowledge, and the components found in the intergenerational knowledge transfer process which consist of information source, recipient, communication channel, knowledge content, knowledge transfer mechanisms, motivation to source and knowledge recall process. Three issues that hinders the knowledge transfer were also discovered, which are difficulties in recalling knowledge, knowledge loss during transfer and rigid knowledge transfer environment. This research produced an ICT-supported intergenerational knowledge transfer framework which integrate the knowledge transfer process, components, issues and technologies. The use of multimedia technology, collaboration technology together with mobile and wireless technology reinforce the framework in demonstrating the comprehensiveness of all the aspects in intergenerational knowledge transfer and uniqueness because it deals with two generations in transferring the knowledge. The development of this framework is crucial to assist family business in ensuring their knowledge received by their successor and subsequently ensure the existence of their family business in the future.



26

Name : SHARIFAH BINTI ALIMAN

Title : MAQASID-BASED PROTECTION ASSESSMENT MODEL FOR USER-GENERATED CONTENT

Supervisor : DR. NASIROH OMAR (MS) ASSOC. PROF. DR. SYED AHMAD SHEIKH AL-JUNID (CS)

Social media applications allow users to not only generate their own content (user-generated content(UGC)) but also to share with other social media users. Due to the dynamics and real-time publications of social media, many social media users lack the ability to think deeply or to acknowledge the negative impacts of their content that could harm on themselves or others in similar situations. The purpose of this research is to investigate how social media users protect themselves and others whilst using various social media. Literature shows that the disseminated food-based UGC without a filtering phase as this may contain disinformation and misinformation that can lead to such risks as false rumours, deception, panic situations, loss of credibility and a loss of reputation. In contrast to Western humanistic theories, Islamic principles offers an integral spiritual facet on protection measures that may serve as a form of self-awareness and self-assessment instrument for social media users and their online activities. Thus, this study proposes a new protection assessment model based on the Maqasid Al-Shariah framework. The model accentuates the essentials (called darurriyat in Arabic) dimensions of Maqasid Al-Shariah, which embraces the protection of faith, life, intellect, property and posterity. The study will design a Maqasid-based protection assessment model (named the MQPA model) that will be used for personal food blogs because blogs are still a prime social media issue in Malaysia. Islamic educators and

psychometrics experts have reviewed the proposed MQPA model. The MQPA model instrument has been employed as an online survey tool to gain insights from convenient sample of social media users, i.e. food bloggers. After the data was collected, it underwent the Rasch analysis. The results show that the protection of life, intellect and property are utmost noticeable traits whilst the protection of posterity and faith are the least. Meanwhile, safety brand personality and motivation usage are contradicting in which the safety brand personality is the easiest influential factor on a social media users' decision about the food products and services under discussion. The protection profiling from the validated MQPA model portrays fresh recognition of the Maqasidbased protection behaviour element of the model. Moreover, this research has proven that the MQPA model is fit to be developed as a web-based visualization application. The MQPA prototype successfully displays the graphical frequency distribution of protection measures based on the Maqasid Al Shariah that vividly visualizes the Shariah friendliness of food-based UGC. The friendliness of the Maqasid-based protection model is an innovative way of self-safeguarding for social media users, especially Muslim users, to assist in thoughtful behaviour whilst dealing with vibrant and instant dissemination.

Name : SURYAEFIZA KARJANTO

Title : SHRINKAGE ESTIMATION OF COVARIANCE MATRIX IN HOTELLING'S *T*² FOR DIFFERENTIALLY EXPRESSED GENE SETS

Supervisor : DR. NORAZAN MOHAMED RAMLI (MS) ASSOC. PROF. DR. NOR AZURA MD GHANI (CS)

The microarray technology performs simultaneous analysis of thousands of genes in a massively parallel manner in one experiment, hence providing valuable knowledge on gene interaction and function. The understanding of microarray data has led to the development of new methods in statistics such as detection of differentially expressed genes. The microarray analysis was first employed for individual or single gene, but recently it has been applied to a gene set or a group of the gene. The relationship between genes in gene set is analysed using Hotelling's T² as a multivariate test statistic. However, the test cannot be applied when the number of samples is larger than the number of variables which is uncommon in the microarray. Since the microarray dataset typically consists of tens of thousands of genes from just dozens of samples due to various constraints, the sample covariance matrix is not positive definite and singular, thus it cannot be inverted. Thus, in this study, we proposed shrinkage approaches to estimating the covariance matrix in Hotelling's T² particularly to cater high dimensionality problem in microarray data. The Hotelling's T² statistic was combined with the shrinkage approach as an alternative estimation to estimate the covariance matrix in detect significant gene sets. The proposed shrinkage estimation approach is about taking a weighted average of the sample covariance matrix and a structured matrix or shrinkage target as shrinkage of the sample covariance matrix towards a target matrix of the same dimensions while the shrinkage intensity is the weight that the shrinkage target receives. Three shrinkage covariance methods were proposed in this study and are referred as ShrinkA, ShrinkB and ShrinkC. The ShrinkA is the simplest approach with both the non-diagonal element of shrinkage target and the sum of asymptotic covariances of the entries of the shrinkage

target are assumed as zero. The shrinkage target of ShrinkB is assumed as the square root of the multiplication of variance of two groups for non-diagonal element and has a same element on diagonal with other approaches. The ShrinkC approach is quite similar to ShrinkB except with the addition of average sample correlation. The analysis of the three proposed shrinkage methods was compared with the Regularized Covariance Matrix Approach and Kong's Principal Component Analysis. The performances of the proposed methods were assessed using three conditions of simulated data sets. Firstly, the performance of the proposed methods were assessed when no difference (separation) exists between two groups (null hypotheses), followed by the second one which measures the performance when there is a difference (separation) between groups (alternative hypotheses) and finally, for paired comparison. Method validation was also done using real microarray data sets such as diabetes and leukemia. In many conditions whether simulation or real data studies the ShrinkA method performed slightly better than the ShrinkC and RCMAT methods. In contrast, both the ShrinkB and KPCA performed relatively poorly in this analysis. The robust trimmed mean is integrated into the shrinkage matrix to reduce the influence of outliers and consequently increases its efficiency. The performance of the proposed method is measured using several simulation designs. The results are expected to outperform existing techniques in many tested conditions tested. The study contributes to an establishment of modified multivariate approach to differential gene expression analysis and expected to be applied in other areas with similar data characteristics.

Name : WAN ZAKIYATUSSARIROH BINTI WAN HUSIN



Title : DYNAMIC FORECASTING MODEL FOR SHORT SERIES AGE-SPECIFIC MORTALITY

Supervisor : DR. NORAZAN MOHAMED RAMLI (MS)

This thesis presents results of a research in developing a model to forecast mortality using a combination of existing demographic and time series models, specifically proposing a common factor model for forecasting Malaysia mortality using the available mortality data set. This research has been motivated by three (3) factors. Firstly, the need for a mortality forecasting model "tailored" to Malaysia data set which has been borne out of the scarcity of studies in forecasting Malaysia mortality, crucial to government pensions and social security as well as to practitioners in related fields. Secondly, over the last decades, different models for forecasting mortality have been used to produce mortality projections for different countries. However, no "universal" model, applicable to all countries, has been developed, more so for short-series historical mortality data. Hence, there is a need to develop and apply an appropriate model to produce good forecasts of Malaysia mortality. Thirdly, while undertaking a literature review to gain insights into current mortality forecasting models, it became apparent that a gap existed between the current models used for forecasting and projecting Malaysia mortality and the current practice of incorporating state-space methodology in mortality forecasting models, specifically in modelling high-dimensional short series mortality data. Hence, the research gap has to be narrowed. The first objective of this research is to establish a comprehensive literature review on modeling and forecasting mortality data. The second objective is to assess the feasibility of applying the benchmark Lee-Carter (LC) model and its variants and extensions to Malaysia age-specific mortality data. The third objective is to develop the LC model within a state space framework (LC-SS model) as a common

factor model with single and multiple common trends for forecasting Malaysia age-specific mortality. The fourth objective is to evaluate and validate the performance of the LC-SS model while the fifth objective is to generate Malaysia age-specific mortality forecasts. The first stage of the research assessed the feasibility of applying the benchmark LC model together with its variants and extensions which included the Hyndman-Ullah (HU) model to Malaysia age-specific mortality data (i.e., the age-specific death rate – ASDR). In the second stage, three variants of LC models in state space framework (LC-SS model) were proposed using algorithm for a large number of series with a short time period. These are the LC-SS model with multiple common trends (LC-DFA model), the LC-SS model with single common trends; LC-SSequal and LC-SSunequal models. The performance of these models were evaluated using time series cross validation. Results indicated that the LC-SS models were able to fit and forecast Malaysia mortality well, with the LC-DFA model outperforming the LC-SSequal and LC-SSunequal models. This study has shown that it is feasible to improve the benchmark LC model by incorporating a state space model to provide good forecasts for short non-stationary age-specific Malaysia mortality. Results of this research also revealed that Malaysia ASDR is expected to decline in the future with the increase in life expectancy. These results contribute useful insights into mortality patterns using age-specific base model in modelling and forecasting Malaysia mortality. The feasibility of developing causal forecasting models for Malaysia ASDR using socioeconomic explanatory data could next be explored, along with the development of appropriate model evaluation techniques.

FACULTY OF CIVIL ENGINEERING



Name : BASHARUDIN BIN ABDUL HADI

Title : SHEAR STRENGTH TEST ON UNSATURATED SOIL USING NATURAL MICROSCOPIC SURFACE TENSION FORCE

Supervisor : ASSOC. PROF. DR. MOHD JAMALUDIN MD NOOR (MS) ASSOC. PROF. DR. IR. BAHARDIN BIN BAHAROM (CS)

The shallow infiltration influence slope failure is a complex soil mechanical behavior according to geotechnical engineers. This is because it is very difficult to obtain factor of safety less than unity according to conventional slope stability method for the shallow type of slope failure. The process involves the propagation of wetting front into the unsaturated soil zone. This involved the mechanics of saturated and unsaturated soil. The soils shear strength tests for saturated soils is well established and straight forward however the strength tests for unsaturated soils involves a very complex procedure. The procedure includes equalization, consolidation and shearing stages. The equalization process is a slow and tedious process where pore air and pore water pressure subjected to the partially saturated specimen are maintained and wait for the slow movement of the specimen water to travel through the ceramic disk attached at the base of the specimen until the flow ceased. The main aim of this thesis is to establish a simpler method of testing when the test makes use of natural microscopic surface tension force that exist in the unsaturated soil specimen. The study is to verify that this method produce the same stress-strain behavior as compared to the conventional axis-translation method using double walled triaxial cell. The study incorporates the state–of-the-art knowledge on the landslide behavior applying the curvi-linear failure shear strength behavior incorporating the effect of infiltration and soaking which is normally neglected in slope stability analysis. This approach allows the understanding of the occurrence of shallow infiltration induced landslide. By this understanding the potential slope failure can be reliably identified and mishaps can be prevented to salvage life and properties.

30



Name : KHAIRI KHALID

Title : SWAT AND ANN MODEL HYDROLOGICAL ASSESSMENT USING MALAYSIA SOIL DATA

Supervisor : ASSOC. PROF. DR. MOHD FOZI ALI (MS) ASSOC. PROF. DR. WARDAH TAHIR (CS) DR. NASEHIR KHAN E.M YAHYA (CS)

Flood is a primary hazard affecting Malaysia, often responsible for loss of lives and a severe threat to infrastructure and environment. Activities in flood plain and catchment such as land clearing for other developments effort may increase the magnitude of a flood. The problem of flood management cannot be solved simply by providing more construction of dams and reservoirs. The adoption of a strategic approach is needed for planning and managing that flood management in any watershed. The evolution of distributed watershed models has been established for more accurate representation of the hydrological system by considering the spatial variability of model parameters and inputs. The research aims to evaluate the performance and hydrological response of the Soil Water Assessment Tool (SWAT) process-based model in tropical river basin using Malaysia soil data. This study was specific to the upper part of Langat River Basin (UPLRB) in the context of Greater Kuala Lumpur Plan in the southern region. The research also provides a streamflow prediction using the Artificial Neural Network (ANN) method as another tool for assessment. ArcSWAT2009.93.b, which is embedded in ArcGIS10, has been selected for this study, and the model requires comprehensive data on topography, soils, land use and daily weather data within a watershed. SWAT-CUP, which links SUFI-2 algorithm to SWAT models, has been utilized in the study for the calibration of SWAT models. There were two sets of algorithms in developing the UPLRB ANN model and every algorithm set consisted of model inputs data preparation, neural network

script and neural network error checking measures. All the processes for ANN model were conducted in MATLAB software. The study found that five SWAT input parameters were required to show the most stable and sensitive outcome using both local and global sensitivities analysis techniques, inclusive of CN2.mgt, GW Delay.gw, SLOPE.hru, SOL_AWC.sol and SOL_K.sol. SWAT model performed better during the validation period compared to the calibration period in simulating streamflow at UPLRB. The runoff values were low at the upstream, and the evaluated value was increased from upstream sub-basin towards downstream sub-basin of the river basin with the exception of sub-basin 4 and sub-basin 10. The grand average of the surface runoff output for the period of the study ranged from 18.621 mm to 113.293 mm. The month of November experienced the highest monthly runoffs for all three different settings. The study also successfully produced two distinct sets of Neural Network Scripts to predict streamflow at UPLRB. Both models produced good results in predicting streamflow, and the existing AWC soil data in the ANN model did not significantly change the value of the simulation output. A comparison between the simulated streamflow by ANN model and SWAT model proved that the coupling of the outputs improved the results of the streamflow, mostly at the peak value of the monthly streamflow. It is hoped that the study can contribute to the improvement of integrated river basin management in tropical river basins.

Name: MOHAMAD EZAD HAFEZ BIN MOHD PAHRORAJI

Title

Ie : COAL ASH FOAMED BRICKS STABILISED WITH HYDRATED LIME-ACTIVATED GGBS (HL-GGBS)

Supervisor : PROF. DR. HAMIDAH MOHD SAMAN (MS) ASSOC. PROF. DR. MOHAMAD NIDZAM RAHMAT (CS) ASSOC. PROF. IR. DR. KARTINI KAMARUDDIN (CS)

Coal-fired thermal power plant produces million tonnes of coal ash as an industrial by-product and is significant to be used as raw material for fabrication of bricks. Coal ash could potentially substitute the traditional materials i.e. clay and sand that were used to produce fired clay and cement sand bricks. Clay and sand were continuously extracted from depleting and dwindling non-renewable natural resources that could gradually degrade the environment in the long run. Meanwhile, lime and Portland cement are popular binding materials that could eventually damage and pollute the environment if continually used without control. Alternatively, ground granulated blastfurnace slag (GGBS), an industrial by-product could be used as substitution. However, GGBS requires activation in an alkaline environment for self-cementitious acceleration. For now, the reliable source of alkali is lime or Portland cement. Most researchers have used either fly ash or bottom ash as raw material and either lime or Portland cement as binder. There is also less evidence in effort to lightweight the bricks that were using industrial by-products as raw materials. Therefore, the combination of fly ash and bottom ash as raw material with hydrated lime-activated GGBS (HL-GGBS) as binder and the incorporation of foam need to be investigated. In the present study, coal ash was used as raw material, HL-GGBS system was used as

binder and foam was used to reduce weight for the fabrication of coal ash foamed bricks. Portland cement-activated GGBS (PC-GGBS) system was established for comparison to HL-GGBS system. The amount of water was constant at 30% of total weight of dry materials. Pre-foam foaming method was applied. The ratio of foaming agent to water was 1:30. Steel moulds size of 215 mm x 102.5 mm x 65 mm were used and the bricks were dried for forty eight (48) hours before demould and wrapped with cling film for several layers prior to air curing. The determination of compressive strength, density, flexural strength, water absorption, salt attack resistance, thermal conductivity, sound transmission loss and sound absorption were carried out. Traditional fired clay bricks and cement sand bricks were procured and underwent similar testing for comparison. It was discovered that the use of HL-GGBS and PC-GGBS system as binder increase the strength of the bricks compared to the use of hydrated lime and Portland cement alone. However, the addition of foam has resulted in decrease of compressive and flexural strength, lower density, weak salt attack resistance, high water absorption, low value in sound transmission loss and thermal conductivity but provide insignificant effect to sound absorption.

FACULTY OF ELECTRICAL ENGINEERING





Name: INTAN RAHAYU BINTI IBRAHIM

Title : POWER CONVERTER FOR DUAL-POWER PHOTOVOLTAIC-GRID ENERGY SYSTEM

Supervisor : ASSOC. PROF. DR. AHMAD MALIKI OMAR (MS) ASSOC. PROF. IR. DR. ZAKARIA HUSSAIN (CS)

High frequency switching activities of power electronic devices in the power converter produce switching losses, harmonic distortions and raise high voltage and magnetic stresses in the power converter circuit, consequently affecting the efficiency and quality of output of the converter. In this research study, a new power converter utilizing low fundamental frequency switching technique is being proposed to resolve harmonics distortion issues. This research aims to develop switching and control technique for power converter in dualpower photovoltaic-grid energy system. 21-level cascaded H-bridge multilevel inverter is developed by cascading five of 5-level H-bridges with five separate PV sources. 5-level H-bridge produces high level of output "stepped" voltage with reduced number of power switches. The optimized switching strategy of proposed MhyPSO technique successfully reduced the THD level to 3.94% in the simulation circuit and 6.7% in the hardware circuit. Each of 5-level H-bridges is equipped with the individual boost regulator embedded with MPPT and battery management system. The operation and the synchronization of the power converter system is digitally controlled to ensure the system works at the maximum captured power and produces fixed

240V, 50Hz power supply in variation of environmental conditions. The supervisory controller administers the transition of supply and mode of operation, meanwhile, the converter controller commands electronic switches in power converter components. It is verified in the simulation works, the boost regulator circuit is capable of tracking maximum power point and boosting the PV module voltage to 72V. The simulation analysis of the battery management circuit verified that the algorithm implemented is succeeded in detecting PV current, evaluating charging mode and regulating charging current. The switchover circuit and supervisory controller is capable of monitoring the PV current and trigger the transition of power supply whenever PV current is below or above the pre-set condition. The transition delay recorded during the transition of power supply are 2.2ms and 4ms for transition of supply power from PV to grid and grid to PV respectively. All simulation works are verified with the experimental findings and it is concluded that all the research objectives have been achieved.

Name : MASTURA ROSDI

Title : A NEW HYBRID MATHEMATICAL MODEL FOR INTERFERENCE MANAGEMENT BY COMBINING OF FRACTIONAL FREQUENCY REUSE AND DYNAMIC POWER CONTROL METHODS IN FEMTOCELL NETWORKS

Supervisor : ASSOC. PROF. DR. AZITA LAILY YUSOF (MS) ASSOC. PROF. DR. MOHD TARMIZI ALI (CS)

The increase in capacity and system data rate may lead to capacity problems and hence become one of the crucial issues in any Mobile Communication Networks. Although the Long Term Evolution (LTE) is called the 4th Generation of the Mobile Cellular Communication Network, it can no longer solve the problem regarding the capacity of the cell. In order to cope with the increase in demand for stable and high data rates among mobile users, femtocell or Home Evolve Node B (HeNB) has been developed to improve indoor capacity and coverage. Deploying femtocells in macrocell are one of the efficient ways to improve the performance of mobile services in high traffic congested areas. Femtocell is a small and lightweight base station that aims for indoor usage such as at home or in an enterprise and provide better user experiences to users. However, femtocell deployments caused interference between femtocells itself and also to the existing macrocells. This thesis studied the two combining interference methods in LTE Heterogeneous Networks (HetNets) in order to reduce interference in HetNets which are the Fractional Frequency Reuse (FFR) and Dynamic Power Control (DPC) methods. The FFR

method highlights the significance of two parameters which are the fraction of radius in center region (rth) as well as the fraction of the system bandwidth (β) allocated for the center area while the DPC method highlights the importance of the parameter Path Loss (PL) compensation factor (α). This thesis proposed a new hybrid mathematical model for interference management by identifying the effect of rth, β and α on the improvements value of capacity, throughput as well as the Signal to Interference plus Noise ratio (SINR). The proposed rth, β and α value were then used in simulation model by using the MATLAB software to analyze the number of handovers occurred for the proposed method and comparing its performance improvement with the conventional method. The simulation results showed that the proposed method give higher values of the macrocell and femtocell SINR by 135.71% and 50.54% respectively. It showed that there was a significant reduction the inter-cell interference in LTE HetNets by offloading the macrocells traffic to the femtocells and higher load balancing performance can be achieved and hence reducing the number of handovers.

THE

DOCTORAL RESEARCH ABSTRACTS



Name : MEISAM ESLAHI

Title : COOPERATIVE NETWORK BEHAVIOR ANALYSIS MODEL FOR MOBILE HTTP BOTNET DETECTION

Supervisor : ASSOC. PROF. DR. HABIBAH HASHIM (MS) PROF. DR. NOORITAWATI MD TAHIR (CS)

Recently, BYOD or Bring Your Own Device has become one of the most popular methods for enterprises to provide mobility and flexibility in workplaces. The emergence of new technologies and features of mobile devices makes them integral part of every aspect of daily business activities. On the other hand, mobile devices are not well protected compared to computers and their users pay less attention to security updates and solutions, therefore, these new capabilities (e.g. high internet speed and processing power) have motivated the attackers to migrate to mobile infrastructures. Thus, mobile security has become a crucial issue in BYOD or Bring Your Own Device as the employees use their own mobile devices to access an organization data and systems. The mobile attacks and threats come in different forms, such as viruses and worms. However, Mobile Botnets or MoBots are more dangerous as they pose serious threats to mobile devices and communication networks. Bot and Botnets are sophisticated form of organized cyber-crime, which infect different targets (e.g. computers or mobile devices) without attracting the users' attention, which subsequently communicates with each other by using a Command and Control (C&C) mechanism. The main intention of Botnets is to steal the private and personal information (e.g. Zeus and Zitmo) or sensitive information of organizations (e.g. Flame and Stuxnet), thus, several techniques such as encryption and use of standard protocols (e.g. HTTP and Port 80) employed by Botmasters to develop foolproof C&C mechanism which are difficult to detect. For instance,

the AnserverBot, DroidDream, Geinimi, and DroidKungFu are the real world examples of mobile Botnets that use HTTP protocol to hide their activities amongst normal web traffic and stealthily communicate with C&C servers. In fact, Botmasters configure the Bots with regular interval to periodically visit a certain websites contains their updated instructions. Although the periodic behavior of HTTP Bots has been significantly used as a detection measure, most of current studies can detect Bots with fixed interval only. This research proposed a decision tree based model to identify the level of periodicity of HTTP and WEB activities in order to classify them into several categories such as Non-periodic, Periodic, Weak Periodic, Uniform Periodic and Strong periodic. Based on the literature this is the first reported use of classification to categorize the periodic C&C traffic. The results show that the proposed model is able to classify the communication patterns with 95% accuracy and very low rate of false positive of 1.2 % only. However, the level of periodicity alone is not a sufficient factor to detect mobile HTTP Botnets as there are numbers of normal applications such Gmail session, auto refresh pages, and etc. that may pose the same periodic pattern as Botnets. Thus, in addition to this model, a cooperative model using feed forward neural network is also proposed to look for any evidence of mobile Botnet activities. The proposed cooperative detection model is significantly able to detect the mobile HTTP Botnets with 97.8 % of accuracy and 0.5% false positive only.

33

Name : MOHD FIRDAUS MALEK

Title : FABRICATION AND CHARACTERISATION OF NANOSTRUCTURED ZINC OXIDE THIN FILMS INCORPORATED WITH NANOROD ARRAY-BASED SOLAR CELLS

Supervisor : DR. MOHAMAD HAFIZ MAMAT (MS) PROF. ENGR. DR. RUSOP MAHMOOD (CS)

In this research, several types of solar cells have been successfully fabricated using zinc oxide-based nanoparticles (ZnO NPs) and ZnObased nanorod arrays (ZnO NRAs). Both of ZnO NPs and ZnO NRAs were synthesised via novel dual sonication sol-gel immersion process. In this work, ZnO NRAs were grown on a seed layer by ultrasonic-assisted immersion technique while the seed layer, which consists of ZnO NPs were deposited by ultrasonic-assisted sol-gel dip-coating technique. The main points for this thesis are not only to successfully realise the controllable growth of ZnO NPs and ZnO NRAs but also investigate the structural, optical and electrical properties in detail by means of X-ray diffraction, field emission scanning electron microscopy, transmission electron microscope, energy dispersive X-ray spectroscopy, ultravioletvisible-infrared spectrophotometry and two-probe current-voltage measurement system. There are several processing parameters such as dopant concentration, annealing temperature, growth time and various types of dopants which can be controlled were being optimised. The optimised growth parameters were applied to fabricate several solar cell devices which were dye sensitised solar cells (DSSCs), hybrid solar cells (HSCs), perovskite solar cells (PSCs) and inverted organic solar cells (IOSCs). The DSSCs with intrinsic ZnO NRAs immersed for 60 min demonstrated the highest conversion efficiency (η) of 3.268 %, a fill factor (FF) of 0.515, an open circuit voltage (Voc) of 0.633 V and a short circuit current density (J_{sc}) of 10.032 mA/cm2 which due to higher dye loading in longer ZnO NRAs. On the other hand, the ZAO NRAs-based DSSCs

which was immersed for 50 min prevailed preeminent performance for both immersion time and different dopant studies. The optimised of above-mentioned parameters leads to an efficiency (η) of 4.366 %, a fill factor (FF) of 0.482 an open circuit voltage (Voc) of 0.592 V and a short circuit current density (Jsc) of 15.305 mA/cm². Besides, ZnObased NRAs have been also successfully fabricated for both of HSCs and PSCs fabrication. For HSCs, MEH-PPV polymer has been essayed in HSC based on the various impurities within the ZnO NRAs and the best results have been obtained using ZAO NRAs ($J_{sc} = 1.365 \text{ mA/cm2}$, $V_{oc} = 0.709$ V, FF = 0.673 and $\eta = 0.651$ %). Apart from that, the PSCs with FTO/ZAO NPs/ZAO NRAs-50 min photoelectrode shows a better performance (J_{sc} = 8.028 mA/cm², V_{oc} = 0.534 V, FF = 0.517 and η = 2.215 %) compared to ZAO NRAs-30 min which might be due to higher infiltration of perovskite material. Finally, the ITO/ZnO/P3HT:PCBM/ Au solar cells has been fabricated and the performance of the devide were successfully studied by varying the ZnO buffer layer thicknesses. The fabricated device of the IOSC yields the power conversion energy of 0.043 % using the optimum ZnO buffer layer thickness of 107.0 nm. This optimisation process not only provides the effective way to fabricate the solar cell devices, but also obtains some beneficial results in aspects of their properties, which builds theoretical and experimental foundation for much better understanding fundamental physics and broader applications of ZnO and related structures.

Name: NORASHIKIN BINTI M. THAMRIN



Title : REAL-TIME INTER-ROW TREE DETECTION AND TRACKING TECHNIQUES FOR UNMANNED VEHICLE-BASED ON SIMULTANEOUS LOCALIZATION AND MAPPING APPROACH

Supervisor : DR. NOR HASHIM MOHD ARSHAD (MS) ASSOC. PROF. DR. RAMLI ADNAN (CS) DR. ROSIDAH SAM (CS)

In this work, an inter-row tree detection and tracking techniques based on Simultaneous Localization and Mapping (SLAM) method is developed specifically for a well-structured agricultural field where the trees are planted uniformly with certain distance that leaves it with number of inter-row spaces. The existing rows has created opportunities for an autonomous vehicle to navigate in between the trees to perform the plantation activities such as scouting, monitoring, rowing, pesticide spraying and others. Unfortunately, the complicated conditions in the farm impair this solution. Such conditions like large canopy of leaves covered the top of the farm has led difficulty on the Global Positioning System (GPS) signal to penetrate the field and set a stable communication with the autonomous vehicle. In addition, a dark environment is created around the farm which could worsen the usage of image as artificial lighting must be added to distinguish the landmarks from the background. Therefore, a new approach to detect the landmarks and navigate in the farm based on the lightweight sensors and less computation effort is proposed. In this method, the tree detection and diameter estimation techniques implement the modified tree-triangle diameter technique by using innovative technique based on infrared sensors. Then, in substituting the GPS signal

problems during the navigation and localization problems, a curvebased navigation approach is formulated. The path is planned based on the third-polynomial Bezier curve by projecting series of waypoints to create a solid path from one point to another. Then, the trajectory plan is derived for the autonomous vehicle to follow these waypoints during the navigation. At the same time, the mapping technique implements the memory utilization method in order to ease the localization process as well as landmarks mapping in the visual map which is oriented in twodimensional coordinate format. These functions are created, formulated and tested thoroughly in the embedded microcontroller development board platform by using dsPIC30F6014A chip on the omnidirectional vehicle platform. A positive result was found in tree diameter estimation, navigation techniques and landmark mapping with the average error of 0.61 cm, 4.0 cm and 8.9 cm, respectively. These results are compared with the previous research work from other researchers and showed remarkable and promising results to be implemented in the agriculture field with further enhancement and recommendation.



Title: DEVELOPMENT OF A 3D EEG FEATURE EXTRACTION FOR BRAIN
BALANCED INDEX (BBI) USING ARTIFICIAL NEURAL NETWORK (ANN)

Supervisor : PROF. DR. MOHD NASIR TAIB (MS) DR. ROZITA JAILANI (CS)

The thesis presents the development of a new three-dimensional (3D) EEG feature extraction for brain balanced index (BBI) using artificial neural network (ANN). There were five (5) indexes stated for BBI, index 1 (unbalanced condition), index 2 (less balanced), index 3 (moderately balanced), index 4 (balanced) and index 5 (highly balanced). There are four (4) sub-bands of frequency for EEG signals; δ band (0.2-3) Hz), θ band (3- 8 Hz), α band (8-12 Hz) and β band (12-30 Hz). These sub-bands can be used to analyze human brain activities. This research involved 96 healthy subjects for EEG data collection. The EEG 3D signals are produced through signal processing and image processing techniques. The development of 3D involved preprocessing of raw EEG signals and construction of 2D EEG images or spectrograms. EEG signals are pre-processed using artifact removal and band pass filter technique. The resultant images for 2D EEG image are constructed via Short Time Fourier Transform (STFT). Power spectral density (PSD) values are extracted as features. Some techniques for data analysis like Shapiro-Wilk for data distribution analysis and Pearson correlation for data correlation analysis have been implemented. These features are analyzed to signify the pattern for brain balanced index. There are five

(5) patterns found using mean relative power (MRP), difference mean relative power (DMRP), left-right slope (LR_Slope), mean relative power (MRP) ratio and difference mean relative power (DMRP) techniques. The results indicated that the proposed maximum PSD from the 3D EEG signal are able to distinguish the different levels of the brain balanced index. There are two classifiers involved for classification; k-Nearest Neighbor (k-NN) and Artificial Neural Network (ANN). The PSD values are chosen as input features to the classifier. There are 768 samples of data as inputs to classifiers. The number of training and testing ratio is assessed at 80% (615 samples) to 20% (153 samples) to find the best model based on percentage of accuracy, sensitivity, specificity as well as mean squared error (MSE). The ANN model produces overall classification accuracy of 88.89%, sensitivity within range 87.50% to 92.31% and specificity within range 94.92% to 98.82%. The classification accuracy using k-NN classifier is 84.96%. The sensitivity was obtained within range 83.33% to 88.88% and specificity within range 93.02% to 97.35%. The ANN model produces higher accuracy compared to k-NN.

Name : NOR ZULAILY MOHAMAD

Title : DEVELOPMENT OF NOVEL DISTANCE RELAY SCHEME TO PREVENT FALSE TRIPPING DURING POWER SWING

Supervisor : ASSOC. PROF. IR. DR. AHMAD FARID ABIDIN @ BHARUN (MS) PROF. IR. DR. ISMAIL MUSIRIN (CS) MRS. WAN NORAISHAH WAN ABDUL MUNIM (CS)

Contingencies in a power system such as a sudden change of load, a power system fault, or a trip of large generation unit, may cause instability issue in which eventually may lead to the power swing phenomenon. During a power swing, the distance relay is prone to operate falsely and, as a result, this false operation has often contributed to major power outages. Therefore, there is a need for development of a comprehensive protection scheme to improve sensitivity of the distance relay operation during power swing. The objectives of the research are to develop new intelligent schemes for preventing false relay operation during power swing. The initial work carried out in this study focuses on developing a new detection scheme that able to detect a fault that occurs during power swing. Another new detection scheme is also developed in this study for identifying the type of power swing. These two detection schemes are conceptually based on S-Transform feature extraction of the distance relay input signal. Moreover, a new adaptive distance protection algorithm is also developed to block the false tripping operation during power swing and unblock the operation if a fault occurs during power swing. The proposed adaptive algorithm has been developed by employing the combination of both detection schemes, as well as based on an adaptive setting of Under Impedance Fault Detector (UIFD) tripping characteristics to dynamically adjust

its tripping region during power swing and stop the adjustment if a fault occurs during power swing. To illustrate the effectiveness of the proposed schemes, the simulations were carried out on the selected IEEE 9 bus system, IEEE 14 bus system, IEEE 39 bus system and IEEE 39 bus system connected with Distributed Generation (DG) using the PSCAD[™]/EMTDC[™] and MATLAB® software. Test results of the detection schemes show that the proposed S-Transform based scheme can effectively detect various type of fault during power swing, and differentiate between stable power swing and unstable power swing, unlike the existing detection schemes which are based on wavelet transform. In addition, the test results show that the proposed detection schemes are able to operate correctly even with the presence of DG in the test system. Test results of adaptive setting of UIFD tripping characteristics show that the combination use of fault detection scheme and power swing detection scheme are proven to effectively block the operation of distance relay during power swing and adjust the relay setting accordingly in response to false relay operation. Such intelligent schemes are useful for improving the sensitivity of the distance relay operation, along with preventing false relay operation during power swing.

38

Name : SYED ABDUL MUTALIB AL JUNID

Title : DESIGN AND DEVELOPMENT OF HIGH PERFORMANCE SWA CELL DESIGN FOR LOCAL DNA SEQUENCE ALIGNMENT

Supervisor : PROF. DR. NOORITAWATI MD TAHIR (MS)

DNA sequence alignment is expected to help in revealing important information related to the human body, disease, genetic and other biological upon discovery of the sequence alignment. Moreover, there have been intensive efforts in improving the performance of the sequence alignment process via hardware-based acceleration using the Field Programmable Gate Array (FPGA). This implementation is becoming popular due to the flexibility of the acceleration design, the ability to reduce the execution cycle, parallel computational solutions, and the ability to increase the performance of alignment at the same time. The performance of the DNA sequence alignment system strongly depends on the algorithm, design architecture and accelerator performance. This study proposed three new DNA sequence alignment accelerator system cell design and architecture based on the Smith-Waterman Algorithm (SWA) named as the new Optimized SWA Linear Gap Penalty (OSL), Optimized SWA Affine Gap Penalty (OSA), and Optimized Recursive Variable Expansion SWA Linear Gap Penalty (ORSL). The OSL, OSA and ORSL proposed a new optimized two bit data representation format for DNA sequence characters, which is previously designed based on the eight bit ASCII 2 characters format. Moreover, the OSL, OSA and ORSL cell designs reduce the complexity of the DNA sequence alignment by rescheduling the process of alignment via a new parallel arrangement of the processing or computational element. On top of that, minimal stages of computation cycle were proposed and introduced in OSL cell design, with a reduction of 25% compared to the previous SWA linear gap penalty design. Next, the new OSL, OSA and ORSL also proposed

FACULTY OF MECHANICAL ENGINEERING



Name : MOHAMED ACKIEL MOHAMED

Title : FATIGUE LIFE ENHANCEMENT FOR FRICTION STIR WELDED AA6061 BUTT JOINT THROUGH HIGH FREQUENCY MECHANICAL IMPACT (HFMI) OF PNEUMATIC IMPACT TREATMENT (PIT)

Supervisor : ASSOC. PROF. DR. ING. YUPITER HARANGAN PRASADA MANURUNG (MS) PROF. IR. DR. MOHAMED NOR BERHAN (CS)

The welding and joining industry in the past few decades has witnessed a huge growth in pursuit of process optimization and design minimization due to the continued escalation of prices. A relatively typical new welding process that requires wide attention in process optimization for an ideal low defect joint and life cycle improvement is friction stir welding due to its advantage of having minimal parameters to be controlled during the process. However, despite its many advantages tensile residual stress in friction stir welded joints remains to be a significant concern due to its extensive clamping and stirring process causing a lower fatigue resistance particularly in structures subjected to fluctuating loads triggering a need for improvement by utilizing modern post-weld treatment processes. Aiming to apply the HFMI method of pneumatic impact treatment (PIT) to enhance the fatigue performance of a 6 mm thick AA6061-T651 FSW butt joint, this research consisted of three main phases. The initial phase focused on the optimization of the rotational and traverse speed based on multiple mechanical properties and quality features, which emphasized on the tensile strength, hardness and the weld quality class using the Multiobjective Taguchi Method (MTM). Furthermore, the first order model for predicting the mechanical properties and weld quality class was derived by applying Response Surface Methodology (RSM). The second phase dealt with determining the best governing process parameters of HFMI

technique using a similar optimization approach for varied parameters centered on indenter diameter, air pressure and impact frequency. In the final phase, the nominal stress approach was employed to determine the fatigue class (FAT) enhancement values as well as S-N curves of HFMI/PIT treated, post weld heat treated (PHWT), as-welded and inservice HFMI/PIT treated FSW AA6061 joints. Subsequent sub-surface hardness measurements and static test evaluation with microstructure analysis was conducted to gain a better understanding of the fatigue behavior for each condition. Further analyses and measurements of the longitudinal and transverse residual stress for FSW AA6061 joints using the hole-drilling method with electronic speckle pattern interferometry (ESPI) for various conditions was conducted to establish the vicissitudes of residual stress with each as-welded and post weld treatment. It was found that the PIT treatment imparted significant amount of compressive residual stress to the FSW joint resulting in an enhanced fatigue life of FSW PIT treated condition. The FSW in-service PIT treated joints achieved marginally higher fatigue strength than the as-welded conditions although being pre-fatigued, thus giving a whole new meaning to asset integrity and management for in-service FSW aluminum alloy joints and structures.

40

a new optimized systolic array-based architecture for optimizing and accelerating the performance of the SWA cell design. In this study, the As Soon As Possible (ASAP) optimization has been adopted in the OSA, OSL and ORSL cell designs, which resulted in reducing the stages of the computational cycle. Moreover, the minimal size of the two bit data representation characters format used in the design has resulted in minimizing the temporary memory requirement in the cell design up to 75%. The proposed OSL, OSA and ORSL design code was developed, simulated and implemented using commercial design software, the Altera Quartus II version 12.1 and the NIOS II IDE. The design was targeted to the Altera FPGA platforms, specifically the Altera DE2-115. The performance of the system was characterized by referring to the logic function of the design or known as Logic Element (LE) and Cell Update (CU). The performance of OSL was improved as compared to the previous design with 3.2 GCUPS for single PE and 25.6 GCUPS for a complete architecture. While, the OSA was improved by 9.22% as compared to the previous design with 32.0 GCUPS. The ORSL has shown superior results compared to Recursive Variable Expansion (RVE) and Extended Recursive Variable Expansion (ERVE) techniques with 6.4 GCUPS. Again, the size is slightly bigger since the main target of the proposed design is to improve the design performance. Result attained has proven that, the proposed system produces better performance and design over previous work in accelerating the SWA DNA sequence alignment.

FACULTY OF CHEMICAL ENGINEERING



Name : NIK SALWANI BINTI MD AZMI



Title : ELECTRIC POTENTIAL ASSISTED CRYSTALLIZATION OF LISOLEUCINE IN AQUEOUS PHASE: EXPERIMENTAL AND COMPUTATIONAL MODELLING APPROACH

Supervisor : DR. NORNIZAR ANUAR (MS) DR. NOOR FITRAH ABU BAKAR (CS)

Crystallization is a major technological process for particle formations. It is important and widely used in the production of pharmaceutical drugs since most drugs particles are produced in crystalline form. L-isoleucine is one of the drugs that exist in crystalline form and it can be produced through crystallization process. However, even slight changes in the crystallization condition can drastically alter crystals properties. Control of the process in order to control the physicochemical properties (solubility, morphology, polymorphism) is crucial to produce the right type of crystal. To overcome this problem, electric potential was applied with the intention to control the process. Hence it has become the main objective of this study to determine the effect of electric potential on solubility and mestastable zone width (MSZW) of L-isoleucine crystallization. Solubility of L-isoleucine experiment was conducted using three different methods; (1) Solubility Method A: Gravimetric method, (2) Solubility Method B: Isothermal dissolution and (3) Solubility Method C: Dissolution with controlled heating rate, while polythermal and isothermal method was adopted for the crystallization process. The results showed that all three methods gave significant difference in solubility data. The inconsistency of the solubility data led to the determination of conductivity of the solution where the presence of aggregation was proven to be present based on the critical aggregation concentration (CAC). Solubility data was also correlated to two different existing mathematical models; modified Wilson model and modified Wilson coupled with Pazuki-Rohani model, in order to assess the suitability of the model to be used for L-isoleucine. Based on the result, modified Wilson coupled with Pazuki-Rohani model was the most suitable model to explain the solubility behaviour of L-isoleucine, with and without the presence of electric potential due to the lower value of

root mean square error (RMSE). Polythermal crystallization experiment revealed that the MSZW of the system with the presence of electric potential decreased compared to the MSZW without the presence of electric potential. Nucleation rate was proven to increase when electric potential was applied to the solution. Isothermal crystallization was also investigated with the presence of electric potential. The induction time reduced when the concentration increases and when the electric potential was applied to the solution, meaning that the electric potential promoted the nucleation process so that it can be achieved faster. The nucleation rate was calculated and it was found that for low supersaturation system, the nucleation rate was higher when electric potential was applied to the solution compared to the solution system without the presence of electric potential. Characterization of L-isoleucine product crystal recovered at the end of the experiment using x-ray powder diffraction (XRPD) revealed that mixture of Form A and Form B existed in the solution for polythermal crystallization method while only Form B polymorph existed in the solution for isothermal crystallization. Meanwhile, differential spectroscopy calorimetry (DSC) showed that only Form A existed in the solution for both methods. No proton transfer was observed to occur based on the characterization using Fourier transform infrared (FTIR) as no -COOH functional group was observed in the spectrum. Molecular dynamic simulation was also conducted to find the nucleation rate and compared with the experimental isothermal crystallization data. The simulated nucleation rate was found to be in a degree higher than the experimental data. The critical number of molecules and critical radius was also found to be in a good agreement with the experiment data.



42

Name : NURUL SUHADA AB RASID

Title: FAST PYROLYSIS OF EMPTY FRUIT BUNCH AND PALM KERNEL SHELL
FOR PRODUCTION OF BIO-OIL USING AUGER REACTOR

Supervisor : PROF. DR. MOHAMMAD ASADULLAH (MS) DR. SYED SHATIR ASHGRAR (CS) MR. AMIN AZDARPOUR (CS)

Pyrolysis has received a lot of interest as it can convert biomass into gas, liquid (bio-oil) and solid products. Bio-oil can be utilized as a feedstock for various chemicals as well as fuels production, and heat and power generations. The purpose of this research is to optimize the process conditions for bio-oil production from oil palm empty fruit bunch (EFB) and palm kernel shell (PKS) in an auger reactor and to elucidate the detailed characteristics of bio-oil. The maximum bio-oil yield for EFB was 64.54 wt% at temperature of 500 °C, nitrogen flow rate of 2 L/min and mass feeding of 8 kg/hr, while the maximum of 64.38 wt% of bio-oil yield was obtained at temperature of 550 °C, nitrogen flow rate of 3 L/min and 8 kg/hr for PKS. The highest higher heating value obtained for both EFB and PKS bio-oil was 27.28 kJ/mol and 26.68 kJ/ mol, respectively, for bio-oil produced at 550 °C. The moisture content observed to be reduced with increasing pyrolysis temperature. Both of the GC-MS and FT-IR spectra indicated that phenol is a major component and the oxygenated species is the major component in both EFB and PKS bio-oil and most of compound infused to the organic phase at high temperature. The UV-Fluorescence absorption, which indicates the aromatic content, was also the highest for 550° C bio-oil for both EFB and PKS. The result also shows that the PKS has higher aromatic content compared to EFB. The activation energy obtained for EFB at isothermal condition was 99.78 kJ/mol, while 112.43 kJ/mol for PKS. Besides that, the frequency factor for EFB is found to be 1.02×10^6 s⁻¹, while 1.44×10^6 s⁻¹ for PKS. The activation energy obtained at third lump are 140.63 kJ/mol for EFB, while 246.07 kJ/mol for PKS. For isothermal condition it was lower than non-isothermal condition since the amount of energy needed for pyrolysis reaction to occur at high temperature and high heating rate are lower than slower heating rates due to the transport effect.

FACULTY OF HEALTH SCIENCE

43

Name: IZA NURZAWANI BINTI CHE ISA

Title : PHYSIOLOGICAL EFFECTS OF PRENATAL ULTRASOUND EXPOSURE ON BONE-RELATED DEVELOPMENT OF YOUNG RABBITS

Supervisor : ASSOC. PROF. DR. SULAIMAN MD DOM (MS) DR. HAIRIL RASHMIZAL ABD RAZAK (CS)

Prenatal ultrasound examination is routinely carried out on most pregnant women since it is considered to be safe. The procedure is however often exploited for social and business interest rather than for medical diagnosis. Despite this procedure having an excellent safety record, ultrasound imaging tends to evoke temperature increase due to heat absorption from prolonged ultrasound beams and leads to intrauterine hyperthermia. This ex-vivo experimental study was conducted to examine bone-related physiological changes of young rabbits exposed prenatally to ultrasound. Oryctolagus cuniculus were time-mated and assigned into control and experimental groups. The control group was allowed to have a full term delivery without any exposure to ultrasound. Each pregnant doe in the experimental group received a single exposure to ultrasound during the applicable gestational stage of the group to which it was assigned. The exposure lasted 30 min, 60 min, and 90 min at 1st, 2nd and 3rd stage, accordingly. For each exposure, the working frequency used was 5.76 MHz, and the mechanical (MI) and thermal indices (TI) recorded were 1.0 and 0.2, respectively. The calculated spatial peak-pulse average intensity (ISPPA), spatial peak temporal average intensity (ISPTA), and acoustic output power (P) were 1055 Wcm-2, 7.21 mWcm-2, and 20.20 mW, respectively. Once delivered, the offspring were used for data analysis. The 1 and 5 months subjects exposed prenatally to ultrasound at 2nd and 3rd stage for 90 min showed significant reduction (p<0.05) in body length, femoral width and femoral length. Red blood cell and haemoglobin were found to reduced significantly (p<0.05) in 1 month subjects at 1st and 2nd stage for all exposure duration, but no significant changes (p<0.05)

noted in 5 months subjects. The exposure has also significantly affected (p<0.05) the parathyroid activity in 1 month subjects especially at 3rd stage for all exposure duration which cause a disturbance in the serum calcium level. The studied animal of 1 and 5 months age has shown poor bone status as described by significantly reduced (p<0.05) in trabecular bone volume (BV/TV), trabecular thickness (Tb.Th) and trabecular number (Tb.N) after exposure at all gestational stages. Significant increased (p<0.05) in porosity and tissue mineral density were found in both 1 and 5 months subjects after exposure at all gestational stages. Osteocytes loss were found higher (p<0.05) in experimental groups of both 1 and 5 months subjects especially after 60 and 90 min of exposure in 2nd and 3rd stages as compared to control. The infrared microspectroscopic analysis demonstrated that the exposure increases tissue mineralisation without changing the stoichiometry of the bone as almost no significant changes (p<0.05) noted in mineral-to-matrix ratio (M/M), mineral crystallinity (XST) and collagen maturity (XLR) in 5 months subjects. However, in 1 month subjects, significant reduction (p<0.05) were found in diaphyseal M/M, XST and XLR after 90 min of exposure. The present study describing the detrimental effects following prenatal ultrasound exposure indicates that distinct skeletal alterations take place in young rabbits. The bony properties observed in the study showed significant impact on the bone quality. It is anticipated that this new knowledge may result in a precautionary measure in obstetric ultrasound scanning.

Name : RASHIDAH BINTI SHAHRUDDIN



Title : p53 PROTEIN EXPRESSION AND RISK FACTORS IN BREAST CANCER – A RETROSPECTIVE STUDY

Supervisor : DR. WAN MAZLINA MD SAAD (MS) DR. HAIRIL RASHMIZAL ABDUL RAZAK (CS)

Numerous studies showed that overexpression of p53 protein may be involved in a variety of human malignancies including breast cancer. In breast cancer patients, a mutated p53 gene that encodes the p53 protein is associated with a higher risk of carcinogenesis and this study examine the potential role of p53 status in breast cancer tissues, specifically its association to established risk factors race, age, age at menarche, hormonal factors and cancer grade. The immunohistochemistry (IHC) technique was used to detect overexpression characteristics of p53 protein and the immunohistochemical results were compared with established risk factors. Analysis conducted on 111 breast tissues showed 40% (44/111) positive p53 (+) protein and 60% (67/111) nonexpression p53 (-) respectively. Malay occupied nearly half the number of respondents for overexpressed and nonexpression of p53 (+,-) protein (n=53, 48%) followed by Chinese (n=30, 27%) and Indian (n=28, 25%) with no significant difference (p> 0.05). Overexpression of p53 (+) protein occurred in 37% (41/111) of the premenopausal age group above 40 years old and 3% (3/111) in the age group less than 40 years old (p> 0.05). The probability of p53 (+) protein being overexpressed in the age group less than 40 years old is 0.66 RR 0.665(CI :0.246-1.796) times less likely compared to age group above 41 years old. More than half of the women 66.7% (74/111) experienced menarche at age <13 years old. The odds OR 4.509(C.I 1.746-11.644) of overexpressing p53 (+) protein are 4.5 times more likely in menarcheal age group <13 years old compared to >13 years old. Overexpression of p53 (+) are 4.4 times more likely (OR4.363, C.I 1.44-6.848) when both hormonal receptors are positive [ER (+) PR (+)]. Women diagnosed with grade 3 breast tumours are likely to overexpressed p53(+) protein 2.8 times more (OR 2.799 C.I 1.728-11.014) than women diagnosed with breast tumour grade 1 and 2 which explained the elevated number of high risks women with poor prognosis. In conclusion, secular trend influence by early life physiological events in breast development at menarcheal age may presumably had implications in breast cancer incidence with the increased risk associated with p53(+) protein within this age group. Increased risk in coexpression [ER (+) PR(+) p53(+)] including higher grade tumours and p53(+)characterized a subgroup of patients with clinical implication. Inclusion of p53 in routine diagnostic evaluation and primary assessment may provide additional information or early evidence of predictive and prognostic significance in diagnosis, and may ultimately influence the therapeutic algorithm of premenopausal women with breast cancer.

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45

Name: UMMI FARHANA BINTI HASHIM

Title : PHYSIOLOGICAL AND MORPHOLOGICAL EFFECTS OF ULTRASOUND INTERVENTION DURING PREGNANCY ON NEWBORN RABBITS WITH PARATHYROID HORMONE DYSREGULATION

TV), trabecular number (Tb.N), cortical area (Ct.Ar), diaphysis mineral-to-

matrix ration (M/M), diaphysis proteoglycan content (PGC), osteochondral

junction M/M, osteochondral junction PGC. A significant increase (p<0.05)

in trabecular separation (Tb.Sp), cortical thickness (Ct.Th), cortical porosity

(Ct.Po), bone mineral density (BMD), tissue mineral density (TMD) and

hypertrophic zone (HZ) length were noted in positive control group newborn.

Compared to positive control groups, parathyroid ultrasound intervention in

2nd gestational stage had significant improved (p<0.05) newborn PTH, SCa, BW, BPD, FL, FDD, BV/TV, Tb.N, Tb.Sp, Ct.Ar, Ct.Th, Ct.Po, BMD, TMD,

osteochondral junction M/M, PGC and HZ length. In compared to normal condition, maternal HyPT caused a significant reduction (p<0.05) in negative

control group newborn SCa, BW, CRL, BPD, FL, FDD, BV/TV, Tb.N, Ct.Ar,

Ct.Th, TMD, diaphysis M/M, C/M, PGC and osteochondral junction M/M,

C/M, PGC. A significant increase (p<0.05) in the newborn PTH, Tb.Sp,

Ct.Po, and BMD were documented in negative control group newborn.

Compared to negative control groups, obstetric ultrasound intervention in 2nd

gestational stage had significant improved (p<0.05) newborn PTH, SCa, BW,

FL, FDD, BV/TV, Tb.Sp, Ct.Ar, Ct.Th, Ct.Po, BMD, TMD, diaphysis M/M,

C/M, PGC, and osteochondral junction M/M, C/M, PGC. Outcome of present

study postulated the effects of ultrasound intervention during pregnancy over

newborn development in maternal parathyroid dysregulation. It is anticipated

that this experimental data on newborn rabbit following ultrasound

intervention can assist into further insights to the possible favourable effect

of ultrasound during pregnancy, a phase which has not been explored fairly

Supervisor : ASSOC. PROF. DR. SULAIMAN MD DOM (MS) DR. HAMZAH FANSURI HASSAN (CS)

Ultrasound bioeffect definition is usually used in the pejorative manner, implying that it is unwarranted, and lead to harmful effects. However in reality, these bioeffects when applied in the correct manner and condition propagates beneficial effects in several medical conditions. Present ex-vivo experimental studies were undertaken to examine the effects of ultrasound intervention during pregnancy over newborn rabbits' hormonal, biochemical, physical, and bone development in maternal hyperparathyroidism (HPT) and hypoparathyroidism (HyPT) with and without ultrasound intervention. There were two different maternal conditions which were HPT and HyPT that compared to normal condition. The HPT consisted of a positive control group devoid of any ultrasound intervention and three experimental groups that received parathyroid ultrasound intervention once at different durations and gestational stages. Similarly, in HyPT also comprise of a negative control group devoid of any ultrasound intervention and three experimental groups that received obstetric ultrasound intervention once at different durations and gestational stages. The intervention were given once during pregnancy in the experimental groups for 30 min, 60 min, and 90 min at the 1st (embryonic day (ED) 6), 2nd (ED 17) and 3rd (ED 28) gestational stage accordingly, using Philips HD3 2D B-mode system. Acoustic output parameters were kept constant. Total 136 newborns (control, n=12; HPT, n=62; HyPT, n=62) were euthanized and analysed. In compared to normal condition, maternal HPT caused a significant reduction (p<0.05) in positive control group newborn parathyroid hormone (PTH), serum calcium (SCa), body weight (BW) crownto-rump length (CRL), bi-parietal diameter (BPD), femoral length (FL), femoral diaphysis diameter (FDD), trabecular bone volume fraction (BV/

FACULTY OF **Medicine**



Name: AISHA MOHD DIN

Title : CELLULAR RESPONSES OF NORMAL HUMAN OSTEOBLASTS TO MULTIPLE ENVIRONMENTAL STRESSORS IN VITRO

to its extremity.

Supervisor : ASSOC. PROF. DR. GABRIELE RUTH ANISAH FROEMMING (MS) PROF. DR. NOR ASHIKIN MOHAMED NOOR KHAN (CS) DR. SHARANIZA AB RAHIM (CS)

Cells respond to environmental stress via the activation of various survival pathways and may possibly end with the initiation of cell death in order to eliminate damaged cells. The ability of cells to mount an adaptive or destructive response depends on the type and duration of the stress. The response to continuous orbital fluid shear stress (OFSS), moderate hypothermia (35°C) and moderate hyperthermia (39°) in this study demonstrated an anabolic effect on Normal Human Osteoblast (NHOst) cells where the cell metabolism, differentiation and proliferation was either promoted or retained. The anabolic effect correlated with an inhibition of osteoclast activity by reducing the RANKL/OPG ratio. In response to 3 days of OFSS, increase in NHOst mitochondrial metabolism and proliferation simultaneously prevented apoptosis. Meanwhile the increase in alkaline phosphatase (ALP) activity and osteocalcin (OCN) after recovery from OFSS suggested that NHOst function was promoted. The possible mechanism for the transduction of these anabolic signals might have been generated through the actin fibres of the cell's cytoskeleton. On the other hand, when NHOst were exposed to temperature stress for 1 h (acute), 12 h & 24 h (short) and 72 h (prolonged), cells responded by expressing heat or cold shock proteins according to hypo- and hyperthermia severity and exposure duration. Exposure to acute 1 h temperature stress lead to an overall reduction in NHOst metabolism, mRNA and protein expression. Overexpression

of Rbm3 and Hsp70 promoted NHOst viability and proliferation in response to short and prolonged moderate hypo- and hyperthermia but not in severe exposure. Up regulation of Rbm3 was involved in the adaptation of NHOst survival while Cirbp was to inhibit NHOst survival. Despite NHOst were progressing in the cell cycle in response to moderate hypothermia, the percentage of NHOst undergoing apoptosis was slightly higher compared to NHOst under severe hypothermia. Both moderate and severe hypothermia showed apoptosis was activated via a caspase 3-independent pathway. Insignificant up regulation of caspase 8 and 9 under moderate hypothermia led to the activation of caspase 3, suggesting both extrinsic and intrinsic pathway was activated. Detachment of NHOst from the culture substratum in response to severe hyperthermia suggests that anoikis as a form of apoptosis was induced. The expression of ALP and OCN was dependent on the expression of Runx2. Meanwhile the overexpression of osterix showed that response to moderate hyperthermia in particular suggests that NHOst have the capability to mature. Prolonged exposure to moderate hypothermia promoted mineral deposition required for bone mineralization as the calcium nodules were slightly larger compared to control. In conclusion, continues exposure to OFSS and short term moderate hypo- and hyperthermia promote if not retains bone functionality in vitro.

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





Name : NOR IZWANI MOHAMED

Title : INTERPATIENT VARIABILITY IN TAMOXIFEN RESPONE AMONG BREAST CANCER PATIENT: THE USE OF PHARMACOGENETICS AND METABOLOMICS IN CLOSING THE GAPS IN CLINICAL PRACTICE

Supervisor : DATO' PROF. DR. MOHD ZAKI SALLEH (MS) PROF. DR. TEH LAY KEK (CS) DR. ROSMADI MOHD YUSOFF (CS)

Tamoxifen has been widely used as the standard adjuvant therapy for breast cancer patients with oestrogen receptor-positive status, especially in the highrisk pre- and postmenopausal women. However, 30 to 50% of ER-positive breast cancer patients do not respond to tamoxifen therapy. Major challenges to effective tamoxifen therapy include drug resistance, and adverse events. Thus, this study aims to investigate the impact of pharmacogenomics and metabolomics in monitoring the efficacy of tamoxifen treatment in BRCA patients. A total of 95 tamoxifen-treated patients, and 11 untreated breast cancer patients from three major Malaysian ethnic groups (Malay, Chinese and Indian) were recruited. However, only 84 tamoxifen-treated patients with completed clinical data were included for clinical association analysis. Blood and plasma samples were collected to obtain DNA, RNA, and metabolites, and clinical data of the patients were also collected. Investigations proceed with the genotyping of CYP2D6 and ABCB1 using multiplex allele specific PCR (ASPCR) approach. Patients carrying CYP2D6 *10/*10 and heterozygous null allele (IM) showed higher risks of developing recurrence and metastasis (OR, 13.14; 95% CI, 1.57 - 109.94; P = 0.004) compared to patients with CYP2D6*1/*1 and *1/*10 genotypes. Patients with homozygous CC genotypes of C3435T had shown to have shorter recurrence time. Patients who were CYP2D6 IM and homozygous CC genotype of C3435T had statistically significant higher risks of recurrence (P = 0.002). Similarly, median time to recurrence in these patients was only 12 months (95%CI = 0.79 - 23.2) compared to those without this combination, which was 48 months (95%CI = 14.7 - 81.2). Patients with

CYP2D6 IM and homozygous CC genotype of ABCB1 C3435T have shorter times to recurrence. The expression of oestrogen receptor- α and oestrogen receptor-β from the samples were quantitated using Real-time PCR. Absolute quantification of ERs reveals that the over-expression of ER- α in peripheral blood has positive correlation with the expression of ER- α in breast cancer tissue. The developed method would be useful as it is less invasive, and can be used to monitor a patient's progress towards disease and drug therapy. Furthermore, the patients were also subjected to denaturing high performance liquid chromatography (dHPLC) analysis to navigate the entire exon region of $ER-\alpha$. There were a total of 3 variants sites detected and further analysis on ER- α SNPs revealed that CC genotype of C325G causes an increased risk of recurrence (P = 0.027). Global metabolic profiling was performed by Quadrupole Time-of-Flight (Q-TOF) in conjunction with multivariate data analysis and pathway analysis. A total of eight groups of compound were detected to have potentials to be developed into biomarkers. Pathway analysis showed that steroid hormone biosynthesis, aminoacyl-tRNA biosynthesis, tryptophan metabolism, fatty acid metabolism, and sphingolipid metabolism were affected in BRCA patients. This pilot study demonstrates that the integration of pharmacogenomics and metabolomics into conventional therapeutic drug monitoring could enhance the characterization of prognosis as well as the patients' response towards therapy. This would allow more personalized treatment to patients, thus allowing better chances of success in individual therapy.



Name : SALWA MOHAMMED RAWEH ABDULLAH AL-FAQEER Title : PHYTOCHEMICAL AND ANTIOXIDANT STUDIES OF MALAYSIAN MEDICINAL PLANTS SYZYGIUM POLYANTHUM AND OCTOMELES SUMATRANA

Supervisor : PROF. DR. JEAN FREDERIC WEBER @ FAIZAL WEBER (MS) PROF. DR. AISHAH ADAM (CS) DR. MIZATON HAZIZUL HASAN (CS) DR. HUMERA NAZ (CS)

The leaves of S. polyanthum (Myrtaceae) and barks of O. sumatrana (Datiscaceae) were investigated for their chemical constituents, antioxidant and cytoprotective activities. Their aqueous extracts were first subjected to acidic hydrolysis and the organic layers were dissolved in water and partitioned using hexane, ethyl acetate (EtOAc) and n-butanol (BuOH). Six compounds (betulinic acid, ellagic acid, kaempferol, myricetin, quercetin, and β -sitosterol) were isolated and identified from the EtOAc and BuOH extracts of S. polyanthum and four compounds (quercetin, kaempferol, rutin, bryonolic acid) were purified from the n-butanol extract of O. sumatrana by means of MPLC and HPLC. The structures of the above compounds were determined by comparing their NMR and LCMS-TOF data with reported values. The structure of bryonolic acid was further confirmed by X-ray crystallography. Eleven essential oil components (α -caryophyllene, β -caryophyllene, caryophyllene oxide, 1,8-cineole, β -elemene, eugenol, eugenol acetate, isoeugenol, α -pinene, β- pinene, terpinen-4-ol) were identified from S. polyanthum and four fatty acid derivatives (linoleic acid, methyl linoleate, myristic acid, palmitic acid) and three steroids [5,6-dihydroegosterol, ergosta-5,8(14)-dien-3 β -ol, ergosta-5-en-3β-ol] were determined from O. sumatrana by GC-MS analysis of their hexane extracts. The nhexane, EtOAc and BuOH extracts were subjected to DPPH, FRAP and cytoprotective activities. The EtOAc and BuOH extracts of both plants showed potent DPPH activity with the EC50 values of 159.12 \pm 0.11µg/mL and 186.40 \pm 0.58 µg/mL in S. polyanthum and 125.3 \pm 0.17 µg/ mL and $136.4 \pm 0.17 \,\mu\text{g/mL}$ in O. sumatrana, respectively. It was found that bryonolic acid (EC50 = 26.7 ± 0.74) only marginally quenched DPPH radical

but ellagic acid, myricetin, quercetin, rutin and kaempferol ($92.4 \pm 3.82, 74.1$ $\pm 1.29, 76.04 \pm 2.63, 76.8 \pm 1.11$ and 71.22 ± 1.09 (µM), respectively) showed strong DPPH radical scavenging activity. Then, the isolated compounds from S. polyanthum and O. sumatrana (myricetin, ellagic acid, betulinic acid, β -sitosterol, rutin, quercetin, kaempferol and bryonolic acid) were tested for their cytotoxic effects towards three types of cells including normal human embryonic liver (WRL-68), normal green monkey kidney (Vero) and human hepatocarcinoma (HepG2) cell lines. The cells were treated with different concentrations of the compounds and the results showed that the compounds from S. polyanthum and O. sumatrana were non-toxic towards normal cells. However, betulinic acid and bryonolic acid had high cytotoxicity towards HepG2 cells. Next, the cytoprotective effects of the isolated compounds against hydrogen peroxide-induced WRL-68 and Vero cells were investigated. Quercetin, kaempferol, myricetin, ellagic acid, betulinic acid, β -sitosterol and bryonolic acid showed significant protective effects compared to control against oxidative stress-induced WRL-68 and Vero cells. Furthermore, betulinic acid and bryonolic acid showed higher protective effect compared to ellagic acid, kaempferol, myricetin and quercetin and the activities of the antioxidative enzymes such as superoxide dismutase (SOD) and catalase (CAT) were enhanced in a dose-dependent manner. In conclusion, this study demonstrated that most compounds from S. polyanthum and O. sumatrana were cytoprotective against oxidative stress induced by H2O2 with betulinic acid and bryonolic acid having the highest potential to be developed to be used as anticancer candidates and alternative medicine.

FACULTY OF ART AND DESIGN



Name: JUHANITA JIMAN

Title : CRITICAL ANALYSIS OF MAT AS AN ICONIC CHARACTER AND ITS CULTURAL MANIFESTATION IN LAT THE KAMPUNG BOY ANIMATION

Supervisor : PROF. DR. MULIYADI MAHAMOOD (MS) DR. MUMTAZ MOKHTAR (CS)

This thesis critically studies Mat as an iconic animation Malaysian character and how much the visual values (line and colour) being exploited to establish its appearance. Mat from Lat the Kampung Boy is chosen to be the subject of this study because of his presence and effectiveness in his genre is well established. Because of visual appeal is very important in creating a believable, strong and effective iconic character, this study is about finding and determining what and how far visual elements can be exploited to make a true iconic character. The visual investigations in this thesis include: elements of design (line and colour) and Principles of Animation (visual appeal and solid drawing). On top of from visual elements, there are two other major influences affecting the development of iconic characters; local and imported elements. These two influences are going to be studied and addressed thoroughly as well. This thesis employed a thorough analysis and qualitative methods to seek tangible data and information that will help the visual establishment of iconic character in Malaysian animation industry. The research findings from

data collection and analysis were triangulated to corroborate both analysis and qualitative research methods: the qualitative findings were used to validate and explain further on the analysis. Based on triangulation of the evidence from the thorough analysis findings and the qualitative data analysis results, this research study proposes a generalised idea of the effectiveness of visual appeal in Malaysian iconic character. This thesis is concluded with detailed suggestions and recommendations on creative ways to establish Malaysian contents and approach in producing recognisable Malaysian iconic character whereby the findings of this research suggested that elements of design (line and colour), principles of animation (visual appeal and solid drawing), local and foreign cultural influences as well as character archetypes, storytelling and film language are the crucial elements in building and establishing a strong and recognisable iconic character.





Name : MUHAMMAD JAMEEL MOHAMED KAMIL

Title : UNDERSTANDING DESIGNER DESIGN ACTIVITY; UNCONSCIOUS INTERACTION BETWEEN HUMAN COGNITION AND BEHAVIOUR IN EVERYDAY PRODUCT

Supervisor : ASSOC. PROF. DR. SHAHRIMAN ZAINAL ABIDIN (MS) ASSOC. PROF. DR. ING. OSKAR HASDINOR HASSAN (CS) DR. ADZROOL IDZWAN ISMAIL (CS)

Product designers were expected to apply their hermeneutic as well as reflective design thinking skills to find a fit between technology and human behaviour interaction, including the notion of experiencecentred. However, due to dynamics of changes in technology and the way users interact with products, the past several years have witnessed a growing interest and enthusiasm for designing the product which explicitly emphasise on user behaviour and interaction. Therefore, the recent studies have been paying attention to critically understand the elements of interaction between human and product used in everyday life. Unfortunately, it has been profound that there are limited discussions were presented within a single coherent perspective of designers' design thinking related to the Unconscious Interaction between Human Cognition and Behaviour (UIHCB) in everyday product. In other words, a little intention has been devoted on how the UIHCB in everyday product can aid designers' design activity. Thus, the purpose of this research is to understand designer design activity towards the UIHCB in everyday product. The research objective is to determine the attributes of unconscious interaction in everyday life, what are their responses towards the UIHCB in everyday product, how their reflective practice can be described, and how does the understanding of UIHCB in everyday product helps to aid designers' capabilities in generating product design ideations. Four research questions have been formulated to get a firm answer posed in this research. The main empirical effort for this thesis involved qualitative and quantitative research in gathering and analysed implicit and explicit designer's knowledge. It included methods such as surveys, observation studies and evaluation studies. Through the empirical

findings, the study found that the attributes of unconscious interaction in everyday behaviour can be identified through observations. This leads to the significance development of understanding the attributes, and helps to widen a gaze about the possibilities of looking at the realms of UIHCB in everyday product. Moreover, the study also found that designer's perception, analysis and reflection on UIHCB in everyday product have a significance characteristic, which helps them to analyse the subtle and amusing interactions between the person and the product as essential elements in design resource. Thus, they can expand their thinking and reasoning parameters by reflecting to produce a various conceptual design solution. Nevertheless, the study also found that designers are proficient enough to determine the 'misfit' in design. They also interactively frames the design problem, names the relevant things they attend to within this frame, working or 'moves' toward a solution and reflects on the outcomes. The final findings of the study found that each level of form entities in all the selected conceptual design ideation has the elements of consistency, uncertainty, and functionality. Thus, it can be concluded that the UIHCB in everyday products is applicable and useful for designers to create valuable conceptual ideation, enduring design solutions and enhancing product values. In conclusion, this thesis presents a descriptive conceptual framework for understanding the UIHCB in everyday product and how designer thinks and reasoning on this matter. The significance knowledge and the applications of this study incorporate the procurement for design education and the productinteraction industries.

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





Title : TEACHING ENGLISH IN SECONDARY SCHOOLS IN SARAWAK, MALAYSIA: ESL TEACHER COGNITION PERSPECTIVES

Supervisor : ASSOC. PROF. DR. BROMELEY PHILIP (MS)

The main aim of this study was to explore teacher cognition in the context of instructional practice among English teachers in secondary schools in Samarahan division, Sarawak, Malaysia. Teacher cognition by Borg's definition includes 'what they know, believe, think and do'. In Borg's schematic conceptualization of teacher cognition, it is illustrated that teacher cognition developed and is shaped by schooling and the professional education of the teacher. In the context of pedagogic practice, it is influenced and affected by contextual factors such as school environment, curricular, resources and students so much that it is not static but dynamic. Shulman outlined seven knowledge types to represent teacher cognition, but in this study only three knowledge domains/types namely, Knowledge of Students (KS), Pedagogical Content Knowledge (PCK) and General Pedagogical Knowledge (GPK) were deemed relevant to pedagogic practice. To address the main aim of the study, three research questions were posited namely, what are ESL teacher cognition perspectives?, what are the existing and new features of each knowledge domain?, and what are the similarities of KS, PCK and GPK of the four teacher participants? To answer the research questions, a mixedmethod approach was employed: (i) self-constructed teacher inventory questionnaire was administered to 89 ESL teachers to gauge their beliefs

and actual practice, (ii) observations, stimulated recall protocols and semi-structured interviews were administered to four individual cases, selected from 89 teachers, to generate qualitative data on their KS, PCK and GPK. The quantitative data from teacher inventory indicated a Very High range between 4.1 to 4.52 mean scores for KS, PCK and GPK out of 5-point Likert scale. This shows some positive congruence between the teachers' stated beliefs and actual practice. The qualitative data captured evidence of existing categorical features of KS, PCK and GPK as outlined in the theoretical framework, and also some new emergent categorical features utilized by the four teacher participants such as taking into consideration students' proficiency level and preferred learning styles in their lesson planning, also empowering their students via more opportunities to participate, and assuming more of a facilitatorcum-motivator role. While the study had shown some evidence of teacher cognition in actual classroom practice, a longitudinal study that spans a long duration of data collection is highly recommended for future research to understand ESL teacher cognition better in Malaysia.



51



Name: ZUHAILI AKMAL ISMAIL

Title : CRITIQUE SESSION IN ART & DESIGN STUDIO – A FRAMEWORK FOR ART EDUCATION

Supervisor : MRS. HARRINNI BT. MD NOOR (MS) PROF. DR. ABDUL SHUKOR BIN HASHIM (CS) DR. MOHD KHAIREZAN BIN RAHMAT (CS)

Critique session for art students is for good ideas to emerge while simultaneously refining the feedback necessary to resolve any problems within the students' design work. Unfortunately, students and art educators perceived this session as a daunting process due to the non-existent strategies or frameworks in creating a positive and collaborative learning approach for both parties. Moreover, for art educators in Malaysia, there are no references for the general guideline to good practices in critique session in the documents provided by the Malaysia Qualifications Agency (MQA) Code of Practice for Programme Accreditation (COPPA) and the Code of Practice for Institutional Audit (COPIA). This research is a mixed methods research which utilized both qualitative and quantitative methods that identify factors that contribute to student satisfaction and dissatisfaction in the existing critique session, design and develop a critique session framework for the teaching and learning in art & design studio and evaluate the effectiveness of the new framework for the teaching and learning in art & design studio. The research method framework is divided into three phases: the pilot study (online survey), pre-design and development (observation & focus group) and post-design and development (online survey). The pilot study

(online survey) suggested a low rate of students' satisfaction towards the existing critique session students' and general dispositions toward five dissatisfaction factors including course activity, processed induced, educator's performance, teaching materials and didactic competencies. Through the pre-design and development (observation), the researcher discovered that there are two types of student behaviours and learning preferences which are non-participants and semi-active participants. These learning preferences were later adapted in designing a new framework, the ZA Framework. Through the online survey in the postdesign and development phase, the total mean score for all dimensions (positive climate, class management, productivity, student engagement and teacher sensitivity) were almost to 3 (high agreement), reflecting a positive student attitude towards the ZA Framework. The majority of each dimension was under dispersed which fulfill the model fit. This finding is in agreement that the ZA Framework allows the expression and elaboration of instrumental meanings within the Malaysia art & design studio through a critique session.

FACULTY OF COMMUNICATION AND MEDIA STUDIES



53

Name : HARMI TAAZIM MOHAMAD

Title : THE COMMERCIALISATION OF NEWS AND EDITORIAL FREEDOM: A STUDY OF BULETIN UTAMA TV3

Supervisor : PROF. DR. DARUSSALAM ABU BAKAR (MS)

This qualitative study is focusing on the commercialisation of news in Buletin Utama, TV3. Researcher concerned is to investigate how to balance the news reporting based on the journalism principle in combine with the paid news content to serve public interest. Do the media practitioners concern and realise that this may cause to certain implications to the newsroom culture and news credibility. Therefore, this study is to understand several research questions as per below query: (i)To what extent has the commercialisation of news items duration in Buletin Utama affected the space of editorial content?(ii)Who are the advertisers that had consume the commercialisation of news duration in place of editorial content in Buletin Utama?(iii) Are there any restraint forces for editors of Buletin Utama in maintaining editorial independence from the providers of financial support?(iv)How does Buletin Utama manage a creative negotiation to ensure credibility of news stay intact and at the same time serve the stake holders and to ensure survival in the 21st century? Firstly, the study focused on the durations of the commercialization of news items in Buletin Utama. By using content analysis, the researcher collected the data from the three years of Buletin Utama. The findings showed that there are 6,075 commercialization of news in Buletin Utama for the year 2007, 2008 and 2010. Data was analysed according to 'items', 'category of business' and 'sector of

business' for the three years in study. The 'items' are the news items that the advertisers bought to be on aired on Buletin Utama. The type of the commercialisation news items are 'live-read', 'TVC', 'advertorial' and 'promo'. For the third research question the researcher referred to the in-depth interview with 15 respondents from the News and Current Affairs of TV3. The researcher had identified the themes for the 3rd research question, i) advertorial as a source of financial for TV3, ii) Buletin Utama credibility at stake iii) high ratings, iv) clients trust, v) content value decides, vi) angle of the news, vii) client do not dictate, viii) technical error ix) fulfilling the need of client. From these themes, the researcher had deduced the themes into two important discovery; i) revenue is not everything, credibility rules, ii) editorial independence intact. Lastly on the 4th researcher question, from the respondents, the researcher found 10 themes from the respondents to answer the 4th research question, i) KPI Target, ii) Making profit from NCA, iii) content benefits everybody, iv) suitable for Buletin Utama,, v) product endorsement, vi) news line-up, vii) management pressure, viii) duration, ix) news value and x) hard news comes first. From the 10 themes deduced to 2 important discoveries to answer 4th research question; i) public interest served well, ii) balanced world.

ACADEMY OF CONTEMPORARY ISLAMIC STUDIES





Name: AMIYAMIN HAJI MOHAMAD YUSOP

Title : PENGUKURAN DISLEKSIA AL-QURAN DALAM KALANGAN MURID SEKOLAH RENDAH

Supervisor : ASSOC. PROF. DR. MOHD NOR MAMAT (MS) ASSOC. PROF. DR. S.SALAHUDIN SUYURNO (CS)

Kesedaran dan minat terhadap masalah membaca adalah konsisten sehingga menghasilkan banyak kajian dan inovasi dalam pendidikan. Begitulah juga halnya dengan kajian berkenaan masalah membaca al-Quran di Malaysia. Kajian-kajian lalu berkenaan masalah membaca al-Quran membuktikan bahawa golongan yang lemah dalam pembacaan ini adalah disebabkan oleh faktor-faktor latar belakang keluarga, tahap ekonomi, faktor pendidikan ibu bapa, bahan bantu mengajar, minat dan lain-lain. Kajian-kajian lalu juga menunjukkan bahawa faktor disleksia tidak dibincangkan sebagai punca murid lemah dalam menguasai kemahiran membaca al-Quran di Malaysia. Kajian berkenaan masalah disleksia harus dilaksanakan kerana disleksia merupakan antara punca mengapa murid gagal dalam menguasai kemahiran membaca sedangkan mereka telah mengalami proses pembelajaran yang secukupnya sama seperti rakan sebaya mereka yang lain (Lee, 2004). Oleh itu, adalah menjadi keutamaan untuk membina alat ukur bagi mengenal pasti disleksia dalam membaca al-Quran. Sehubungan itu, objektif utama kajian ini ialah membina instrumen yang standard bagi mengenal pasti disleksia dalam membaca al-Quran. Kajian ini menggunakan teori pembinaan instrumen ujian oleh Miller, Lovler dan McIntire (2013) sebagai garis panduan. Hasilnya, Tujuh ujian telah dipilih sebagai alat ukur bagi

mengenal pasti disleksia jenis fonologi. Ujian-ujian yang telah dipilih ialah Ujian Kecerdasan Non-Verbal, Ujian Membaca, Ujian Membaca Bukan Perkataan, Ujian Buang Fonem, Ujian Kenal Pasti Rima, Ujian Sebut Nombor dan Ujian Menamakan pantas. Jumlah sampel yang digunakan ialah 510 orang murid yang berumur 7 dan 8 tahun daripada tiga belas buah Sekolah Rendah Agama JAIS dalam sembilan buah daerah di Negeri Selangor. Murid-murid ini terdiri daripada 263 (51%) orang murid lelaki dan 247 (49%) orang murid perempuan. Kesahan kandungan ujian telah dilakukan oleh panel pakar melalui semakan dan perbincangan. Kesahan konstruk ujian diperoleh daripada nilai korelasi antara item-item ujian dengan skor ujian dan dengan menggunakan analisis faktor penerokaan (EFA). Kesahan kriteria pula diperoleh daripada nilai korelasi antara ujian-ujian yang mengukur konstruk yang sama. Dapatan kajian menunjukkan pekali kebolehpercayaan ujianujian adalah pada nilai 0.80 dan ke atas. Keputusan ujian membuktikan bahawa semua ujian yang dijalankan berupaya mengukur tahap kemahiran murid bagi mengenal pasti disleksia al-Quran. Hasil kajian menunjukkan bahawa 49 (9.6%) murid menunjukkan kriteria disleksia jenis fonologi. Perbincangan kajian dan cadangan kajian akan datang juga turut dimuatkan dalam kajian ini.

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

ACADEMY OF LANGUAGE STUDIES



Name: MALISSA MARIA MAHMUD

Title : TRANSFORMATIVE DRIVEN MECHANISM FRAMEWORK AS KEY SUCCESS INDICATORS FOR BLENDED LEARNING

Supervisor : ASSOC. PROF. DR. OTHMAN ISMAIL (MS) ASSOC. PROF. DR. ZARINA RAMLAN (CS)

Current literature shows that blended learning has inevitably permeated and transformed the landscape of educational practices. However, in the same vein, it also depicts less consideration given to the impending gaps in the blended learning experience, consequently indicating a paucity of evidence in the context of these technological interventions. This study aimed to examine and identify the Key Success Indicators (KSIs) for blended learning approaches. The research is delineated in seven research questions postulated to address the overall facets in blended learning: the powerful and the combined Effect Sizes (ESs), the definitions of blended learning, the types of technological intervention, the specific ratio or percentage of intervention, and the quality of indicators determined in the language related blended learning studies and other subjects related to blended learning studies. These research questions have guided this study to probe into the magnitude and power of ESs yielded from the 96 included samples by employing meta-analysis as an instrument of analysis. In addition to the ESs, this study also aimed to determine the key facets in blended learning approaches wherein the qualitative content analysis method was employed to analyse the samples. Besides that, two novel approaches were also employed as part of the data analysis to examine the categories of technological interventions and ratio of technology versus traditional approaches. The means of analyses enabled vital insights about the critical success indicators in a blended learning environment. Specifically, the findings from the seven research questions outline the KSIs as quantifiable measurements and guidelines in implementing the proposed Transformative Driven Mechanism (TDM) Framework that the researcher firmly believes possesses tremendous transformative potential in augmenting the quality of students' learning experience and ultimately reshaping the entire teaching and learning landscape.

56

55



Name : NORAINI BINTI AHMAD BASRI

Title : FACILITATING HIGHER ORDER THINKING SKILLS (HOTS) IN ESL READING THROUGH COMPUTER MEDIATED LEARNING TUTORIAL

Supervisor : ASSOC. PROF. DR. SAIDATUL AKMAR ZAINAL ABIDIN (MS) DATO' PROF. DR. AHMAD REDZUAN ABD RAHMAN (CS)

Developing learners' critical reading skills at tertiary level is crucial because learners need the knowledge and skills to be able to read academic materials constructively throughout their university courses. However, L2 learners have difficulties in developing higher order thinking skills (HOTs) such as analyzing, synthesizing and evaluating, all of which are important for critical reading. Among the problems identified in this study are learners' lack of performance in advance reading and critical thinking, learners' motivation in acquiring the skills and the lack of useful learning supports which can facilitate knowledge acquisition and skills attainment of HOTs. There is an urgent need to seek effective tools that can be used to teach these skills in the classroom. For this purpose, technology has been found to assist learners' vocabulary growth, improve learners' reading comprehension and motivation, and increase their reading performance. This study applies a mixed-method (quantitative and qualitative approaches) at examining the use of a customized computer-mediated learning tutorial (CMLT) in the teaching of higher order thinking skills in ESL reading classrooms. One hundred and eighty-five (185) undergraduate learners who pursued their degree at Universiti Teknologi MARA, Malaysia participated in this study. The experimental group learners were given lessons and activities on Reading and Critical Thinking course through the use of a CMLT. Meanwhile, the control group learners were only exposed to standard textbooks as

their reference for the course. The research intervention (CMLT) was developed based on the Instructional System Design model and Gagne Nine Events of Instruction. A pretest, posttest and the final examination were administered to find out learners' performance in their Reading and Critical Thinking course. Surveys and interviews were also conducted to solicit information regarding learners' perceived usefulness of the CMLT and their motivation in learning the course after they had been exposed to the intervention. In addition, statistical analyses were performed to determine learners' performance before and after using the CMLT. Results of the findings showed that technology did assist learners in their reading and critical thinking course. The experimental group learners outperformed their counterparts both in their posttest and final examination performances. Moreover, the experimental group learners' motivation showed improvements after they were exposed to the treatment. It is hoped that his study would help educators to use technology as an alternative teaching tool in developing L2 learners' reading and critical thinking skills. There is also a need for language educators to work closely with instructional system designers in coming up with interactive multimedia templates that can be shared. Coming up with common templates will allow new contents to be added easily, modified and improved over time.

ARSHAD AYUB GRADUATE BUSINESS SCHOOL



Name: MOHD ZAKI BIN AWANG CHEK

Title : OPTIMIZING CONTRIBUTION RATE OF SOCSO'S INVALIDITY PENSION SCHEME (IPS): AN ACTUARIAL PRESENT VALUE (APV) MODELLING

Supervisor : PROF. DR. HJH. ZURIAH ABD RAHMAN (MS) PROF. DR. NURISZURA ISMAIL (CS)

This dissertation proposes the optimisation of the contribution rate for Social Security Organisation (SOCSO)'s Invalidity Pension Scheme (IPS). In performing this study, four objectives were set. Firstly, this study aims to statistically analyse the current situation of the contribution fund collection and the claim benefits payment under SOCSO's IPS. Secondly, it seeks to develop an actuarial formulation based on the benefits coverage from SOCSO's IPS. Thirdly, it attempts to determine an optimal contribution rate to support the benefits provided under SOCSO's IPS using an actuarial approach. Fourthly, it proposes an appropriate contribution rate to be implemented by SOCSO. Currently, the contribution rate for SOCSO's IPS is 1%, which is shared equally between employer and employee. This contribution rate is directly deducted from the employee's monthly gross salary. This contribution rate needs to be adjusted upwards by SOCSO in the near future to ensure that all payments of claims are sufficiently covered. Based on the 9th Actuarial Valuation Report issued by the International Labour Organisation (ILO), recent statistics show that immediate revision of contribution rate is necessary

in order to achieve the minimum loss ratio (max 20%) in SOCSO's IPS funding systems. In this study, the Actuarial Present Value Approach is applied to all benefits under SOCSO's IPS. SOCSO data from 1985 until 2014 are used in this study. Seven assumptions are made in this study, namely mortality rate, salary ceiling, interest rate, retirement age, increment salary rate, age entry, and salary entry. By optimising the worst-case scenario (single simulation), this study has found that the optimal contribution rate is 2.2% rather than the current 1%. This can be attributed to the fact that since 1969, many changes have occurred in the workplace, working conditions are different and many new jobs have been created. Therefore, an Actuarial Present Value Approach with regards to actuarial modeling was conducted to optimise SOCSO's IPS contribution rate. In conclusion, an optimal contribution rate of 2.2% should be introduced and implemented in the future as part of the efforts to reduce society's burden whilst ensuring that adequate protection is provided to the nation's workforce.

Name: SITTI SYAMSIAR BINTI MUHARRAM

Title : STRATEGIC RESOURCES, ENVIRONMENTAL MANAGEMENT ACCOUNTING (EMA) AND BUSINESS PERFORMANCE OF SABAH CONSTRUCTION INDUSTRY

Supervisor : ASSOC. PROF. DR. HJH. SARMINAH SAMAD (MS) ASSOC. PROF. DR. HASLINDA YUSOFF (CS) DR. HAIJON GUNGGUT (CS)

The construction industry and its activities are among the major sources of economic growth and development in Malaysia and across the world. Like other countries, the construction industry in Malaysia also encounters a lot of challenges such as the delay to complete the project in time, the expenditure exceeding the budget, the building defects and over dependent on foreign workers, construction waste, and poor productivity. These consequently contribute to poor performance, especially in terms of cost and time overrun. The purpose of this study was to examine the relationship between strategic resources (tangible resources, intangible resources, and dynamic capabilities) and business performance. Additionally, the study aims to examine the moderating effect of environmental management accounting (EMA) in the relationship between strategic resources (tangible resources, intangible resources, and dynamic capabilities) and business performance. This study uses self-administered questionnaires where respondents were selected using stratified random sampling from construction companies in Sabah. Two hundred and ninety-nine (299) responses were received out of three hundred and fifty (350) questionnaires distributed. The data

analyses were conducted using Statistical Package for Social Science (SPSS) Version 22.0. These include descriptive statistics, frequency tabulations, and inferential statistics which include correlation and regression analysis. The correlation analysis revealed that there are significant relationships between the three (3) dimensions of strategic resources (tangible resources, intangible resources, dynamic capabilities and the overall strategic resources) and business performance. The results obtained from the multiple regression analysis found that among the three (3) dimensions of strategic resources, dynamic capabilities shown the highest contribution on business performance. Hierarchical multiple regression analysis on the moderating effect of environmental management accounting (EMA) found that EMA has moderated the relationship between two dimensions of strategic resources (intangible resources and dynamic capabilities) and business performance. This study creates a new knowledge in terms of the importance of strategic resources, as well as environmental management accounting (EMA) towards the business performance of Sabah construction industry.

58

FACULTY OF BUSINESS MANAGEMENT



59

Name : AZLUL KALILAH ZAGHLOL

Title : EXCHANGE RATE BEHAVIOUR AND MANAGEMENT IN MALAYSIA: EMPIRICAL STUDY ACROSS REGIMES

Supervisor : PROF. DR. HJH. SAADIAH MOHAMAD (MS) PROF. DR. IZANI IBRAHIM (CS) PROF. DR. WAN MANSOR WAN MAHMOOD (CS)

Given the heightened volatility in the financial market due to global economic developments, a study on exchange rate behaviour becomes crucial for the economic stability and achievement of macroeconomic objectives. There have been claims that fixed exchange rate regime is more prone to overvaluation and responsible for devastating currency crises. However, empirical studies on exchange rate behaviour do not seem to have established whether currency misalignment and the regime choice are the ones potentially responsible. This study thus examines the behaviour of exchange rates and its management given the unique experience in Malaysia during the 1997 financial crisis. Firstly, its objective is to measure real exchange rate misalignment (RERMIS) upon estimation of its equilibrium level. Secondly, this study tests the Fixed Exchange Rate Regime-Misalignment (FERRM) hypothesis in establishing whether the pegged regime contributed to the worsening of misalignment. The third objective looks into the exchange market pressure (EMP) and its associated intervention. It answers the question of "deliberateness" with regard to exchange rate management policy, specifically whether it is a resulting behaviour of deliberate action or merely due to the market forces. The fourth brings in the lead-lag relationship between Thailand and Malaysia to revisit the contagion issue based on a more advanced methodology, the wavelet. The first part that addresses the first two objectives employs the ARDL-UECM and Pesaran's Bounds test. A model of the long run equilibrium real exchange rate (ERER) based upon macroeconomic fundamentals is employed to calculate RERMIS. It calculates the ERER and examines whether the real exchange rate departs from its estimated equilibrium. The second part addressing the third objective employs an EMP methodology advocated by Eichengreen, Rose and Wyplosz, and Jeisman. EMP and the degree of intervention (DI) indices are computed with the objective to assess the presence of intervention. Finally, the third part addressing the fourth objective applies wavelet tools to examine the presence of contagion and its associated duration. Findings suggest that the peg regime exhibited misalignment that did not worsen when compared to the period under floating. Thus rejecting the FERRM hypothesis that the misalignment worsens under peg. It concludes that the cost of switching policy regime is not detrimental to an economy, suggesting a sustainable peg. Work on the intervention indices unfolds the presence of consistent intervention suggesting "deliberateness" of exchange rate policy. Intervention is deemed commendable as long as it results in the tracking of ERER. The third part provides support to the establishment of contagion. There were evidences to suggest that the duration of contagion effects may have persisted up to two months before it is entirely abated. The leadlag analysis concludes that Thailand's currency market leads Malaysia. This study provides significance to the literature, both in terms of the sustainability of fixed regime and "deliberateness" of exchange rate management (ERM) in Malaysia. Contagion work contributes in terms of the identification of a duration benchmark for other studies. Methodologically, the wavelet analysis may contribute as an alternative to research on currency market contagion. Another contribution is manifested by virtue of it being one of the pioneering compilations of report examining exchange rate behaviour across regimes from the three major perspectives and its policy implication to enhance ASEAN exchange rate policy harmonization agenda.

Name : HARTINI AB GHANI



Title : TAKAFUL PARTICIPATION READINESS MODEL (TPRM): THE INFLUENCE OF TAKAFUL KNOWLEDGE, RELIGIOUS COMMITMENT AND MATERIALISM WITH THE MODERATING EFFECT OF SWITCHING COSTS

Supervisor: PROF. DR. SOFIAH ABD RAHMAN (MS) PROF. DR. HJH. ZURIAH ABDUL RAHMAN (CS)

Takaful (Islamic Insurance) was introduced in Malaysia to provide a better alternative for Muslims. As Muslims are known to be very concerned with religious obligation, family Takaful, thus, should be the life insurance coverage of choice. However, despite the obligation of having family Takaful and Muslim is the predominant religion in Malaysia, the penetration rate of family Takaful in 2013 was only 14 percent as compared to conventional life insurance of 55 percent. It is therefore essential to investigate the factors causing or inhibiting the low penetration rate. Past studies have shown that switching costs are among the contemporary issues in explaining consumer behaviour. The effect of switching costs, however, has never been tested in the area of Takaful. The objective of this study is therefore to empirically test the relationship between switching costs and behavioural intention of the Malay professional conventional policyholders, leading to advancing a Takaful Participation Readiness Model (TPRM). The theory of planned behaviour (TPB) forms the basis in developing the Takaful Participation Readiness (TPRM). The investigation begins with a qualitative method. The result of the qualitative study was then used as inputs to the constructs in this

study which are knowledge, religiosity, materialism and switching costs. In this study the religious commitment and Takaful knowledge are hypothesised as positively related whereas materialism iss hypothesised as negatively related. As this study is a quantitative study, self-administered questionnaires were distributed to the respondents who met the criteria set by the researcher. This study employs exploratory factor analysis (EFA), confirmatory factor analysis (CFA) and structural equation modelling Amos Graphic. The results of this study contribute to Takaful industry by providing an empirical evidence of the relationships between religiosity, knowledge, materialism and switching costs towards Takaful participation readiness. The findings indicate that participation readiness is significantly influenced by knowledge and switching costs particularly relational costs, uncertainty costs and set-up costs. Although literatures showed that materialism and religiosity do influence behavioural intention, this study however, proved otherwise. For future research, this study should cover not only the professionals in Wilayah Perseketuan and Selangor but to all cities in Malaysia including Sabah and Sarawak.



61

Name : HASNIZAWATI HASHIM

Title : LEADER-MEMBER EXCHANGE, EMOTIONAL INTELLIGENCE AND DISABLED EMPLOYEES' JOB EMBEDDEDNESS: THE MEDIATING ROLE OF ORGANIZATIONAL CLIMATE

Supervisor : PROF. DR. HJH. NOORMALA DATO' AMIR ISHAK (MS)

The foundation of this research is that disabled employees will engage with their job if they receive support from each of the important elements in the workplace. There are many researches that focused on investigating various outcomes of job embeddedness but little is known on what makes PWD stay with their job. Understanding job embeddedness among person with disabilities is very crucial as it focuses on the factors that may influence their job retention. Hence, the Unfolding Model in this study provides basic understanding on the relationships between variables that makes people embedded to their job. Furthermore, Social Cognitive Theory is applied according to the justification that individual behaviour could be explained through a self-regulatory system. This system explains that individuals are believed to have control over their own thoughts and behaviour. This system will be operated if it is activated by the person. So, job embeddedness is the construct that describes the activation or deactivation of an individual's self-regulatory system. This research investigates specifically, (1) direct relationship between leadermember exchange, emotional intelligence, organizational climate and job embeddedness, 2) direct relationship between leader-member exchange, emotional intelligence and organizational climate, and 3) organizational climate mediation relationship between a) leader-member exchange, b) emotional intelligence and job embeddedness among disabled employees in Malaysia by applying The Unfolding Model, Social Cognitive Theory and supported by the Person-Environment Fit Theory. A two-stage sampling technique was applied to randomly collect data from disabled employees in private and public sectors at the operational level in Malaysia. Further, to examine the direct and mediating effects of the hypotheses a

structural equation modelling software (Analysis of Moment Structure) or AMOS was used. Results showed support to the direct hypothesized relationships between emotional intelligence, organizational climate and job embeddedness. On the other hand, leader-member exchange was found not to support the direct relationship with job embeddedness. Furthermore, emotional intelligence and leader-member exchange were confirmed to have a significant relationship with the organizational climate. Organizational climate was also found to fully mediate the relationship between leader-member exchange and job embeddedness. However, organizational climate was found to partially mediate the relationship between emotional intelligence and job embeddedness. This research makes several theoretical contributions and provides further insights on the relationship between leader-member exchange, emotional intelligence, organizational climate and disabled employees' job embeddedness, and mediating effect of organizational climate on the relationship between a) leader-member exchange and disabled employees job embeddedness, b) emotional intelligence and disabled employees' job embeddedness particularly in Malaysia. Further, methodological and practical implications are discussed. Besides, several potential possibilities for future research are identified and discussed. In brief, this research helps to produce in a more comprehensive view on the relationship between leader-member exchange, emotional intelligence, organizational climate and job embeddedness and mediating effect of organizational climate on the relationship between a) leader-member exchange and job embeddedness, b) emotional intelligence and job embeddedness which focus on disabled employees.

Name : MOHMAD NAJID RAMLI

Title : PERSONALITY TRAITS, SURFACE TRAITS, ORGANISATIONAL CULTURE AND PERFORMANCE OUTCOMES OF THE CALL CENTRE AGENTS IN THE KLANG VALLEY

Supervisor : ASSOC. PROF. DR. SYED JAMAL ABDUL NASIR SYED MOHAMAD (MS) ASSOC. PROF. DR. HJH. NORZANAH MAT NOR (CS)

The main thrust of this present study is to identify the antecedents and underlying dimensions of performance outcomes of the call-centre agents in the Klang Valley. The data for the provision of the empirical evidence was drawn from the call centres of five participating banks namely, Maybank, CIMB, RHB, Bank Islam, and Public Bank. The two underlying dimensions of performance outcomes are customer service satisfaction and job performance. Additionally, the two antecedents of performance outcomes were basic personality traits and surface traits. The first antecedent is composed of two underlying dimensions namely customer orientation and adaptability whereas the second antecedent is made up of two underlying dimensions namely customer orientation and adaptability. The sampling design was quota sampling of which the gender composition was 60.0 per cent female and 40 per cent male. This present study strives towards explicating social phenomena by embracing the methodological principles of positivism within which explanation, evaluation, prediction and testing of theories which were hypothesised by earlier researchers. The five underpinning theories for the conceptual model are the resource-based theory, equity theory, social exchange theory, agency theory and organisational culture. The conceptual model depicts 14 direct relationships between pairs of the six underlying dimensions of which 12 were found to be significantly related. In addition, personality was found to mediate the relationship between emotional intelligence and adaptability whereas customer orientation was found to mediate the relationship between emotional intelligence and customer service satisfaction. However, adaptability was found to mediate the relationships between emotional intelligence and customer service satisfaction, customer orientation and customer service satisfaction as well as personality and job performance. Organisational culture was found to moderate the relationships between emotional intelligence and personality, customer orientation and adaptability as well as adaptability and job performance. This present study is founded upon the parameters of the proposed five research questions. The data analyses were conducted by a process of multivariate analysis using structural equation modelling (SEM) and AMOS (Analysis of Moment Structures) software package Version 22.0. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were performed to validate the scales. The descriptive analyses were performed on all the underlying dimensions and the demographic profile of the 380 respondents.

Name : WAN NADIAH MOHD NADZRI

Title : MODELLING FACTORS INFLUENCING BRAND EXPERIENCE AND ITS CONSEQUENCES ON MALAYSIA'S NATIONAL AUTOMOTIVE BRANDS

Supervisor : PROF. DR. ROSIDAH MUSA (MS) PROF. DR. FARIDAH HJ. HASSAN (CS)

Automotive players that neglects post purchase have suffered poor sales as consumers no longer tolerate with mediocre services. Not only automotive players produced low quality car but also bad operational facilities when servicing their car. Resulting in low brand experience and consumers are left unsatisfied with their car purchase. However, brand experience has received enormous attention by researchers over the decades. Evidently, past research revealed that brand experience plays a vital role in understanding desired outcome such as brand trust, brand loyalty, brand community, brand attachment and brand engagement. In fact, brand experience has been in the spotlight by both academic and practitioners within design literature, thus bringing two perspectives together. Mehrabian and Russell theory was employed as the theoretical foundation in developing present conceptual framework. This study emphasizes on using PADI model as a tool to measure the new brand experience scale. The significance of this study, lies in the fact that, it attempts to examine the antecedents of brand experience such as servicescape, brand image and servicescape which in turn investigates the consequences within Malaysia national automotive industry. Basically, this study emphasis on theoretical and emotional design of environmental psychology within the business experience process. The data has been extracted from four hundred (400) Malaysia's national car brand urban adults' users with a minimum of one (1) year car consumption via drop off and collect survey technique. Structural Equation Modelling (SEM) was utilized

testing hypothesized relationships among the constructs, as postulated in the model. The results derived from this study has shed new insights, firstly on the development of PADI model, the new brand experience scale. Results show that dominance emotion is the most important determinant of brand experience and seconded by intelligent emotion. In terms of the antecedents of brand experience, interesting findings shows that servicescape has no significant relationship with the brand experience of national car users. The most important driver of brand experience is car brand attribute. On another note, brand experience has direct impact on brand trust. However, brand trust has the highest impact on brand loyalty and brand attachment. Ultimately, this study's prior objectives were developing plausible brand experience scale model that has statistical and explanatory power, which permits interpretation of results confidently, achieved after few minor adjustments made to the proposed model. Moreover, this study validates the new brand experience scale named PADI model, which attempts to offer new insights on how consumers feel using their existing national car brand. It relates to the emotions that car users feel about national car brand which influence their experience and behavioural responses. Practitioners and academicians can use PADI model to properly address brand experience. Besides that, assessing brand experience's potential enable them to achieve greater impact on business performance such as expanding profit growth, consumer's. retention and minimizing gaps between consumer organization.



64

Name: ZURAINI ALIAS

Title : THE RELATIONSHIP BETWEEN SERVICESCAPE, EXPERIENTIAL VALUES, SELF-IMAGE CONGRUITY AND LOYALTY INTENTION OF CUSTOMERS TOWARDS DEPARTMENT STORES IN MALAYSIA

Supervisor : PROF. DR. ROSMIMAH MOHD ROSLIN (MS) ASSOC. PROF. DR. SITI HALIJJAH SHARIFF (CS) PROF. DR. MOKHTAR ABDULLAH (CS)

The changing lifestyles of consumers are altering the way they shop and the kinds of experiences they seek when shopping. In particular, the increasing significance of e-commerce and the advancement of internet technology have a direct and fast impact in the multiplicity of goods offerings, designs of the websites, services, and various aspects of information. Despite the advancement of technology that has induced a large majority of consumers to shop online, there are still those who prefer the experience of shopping at the store where they can see, feel, and touch the goods they are buying and experience the environment when shopping. It is on this premise that this study is envisaged to determine whether environmental cues brought about by servicescape developments of department stores in Malaysia do induce loyalty intention among the shoppers. Using experiential values and self-image congruity as the mediating variables, this study addresses the extent that loyalty intention of shoppers to department stores in Malaysia are influenced by servicescape dimensions in getting them to re-patronize or to shop again at specific department stores, thus inferring loyalty intention. Although a few previous studies have addressed the linkage between servicescape and loyalty intention, none has actually integrated experiential values and self-image congruity as mediating variables in the relationship. This study has extended current studies by addressing the mediating effects of experiential values and self-image congruity into the model that linked servicescape with loyalty intention. Focusing on prominent department stores in Malaysia that are anchor tenants in well-known shopping malls in urban centers in Malaysia, 560 questionnaires were distributed through the mall intercept method to customers of Aeon and Parkson department stores in four geographical zones representing the northern, central,

southern and east malaysia. In total, 558 usable questionnaires were obtained and the analysis proceeded with both descriptive analysis and inferential analysis to test the model that was developed. Smart pls 2.0 m3 was used to assess and test the structural model. The findings indicate that among three constructs (servicescape, experiential values, and selfimage congruity) total effect of servicescape has the strongest effect (0.692) on loyalty intention. The inclusion of experiential value in the conceptual model tells us that it is an extremely significant in displaying a mediating influence on the relationship between servicescape and loyalty intention. Furthermore, there is partial mediation effect of selfimage congruity between servicescape and loyalty intention. The overall findings of the study display a conclusive model that shows that loyalty intention is directly influenced by servicescape of department stores. Experiential values are influenced directly by servicescape and also acts as a mediator in the relationship between servicescape and self-image congruity. It also mediates the relationship between servicescape and loyalty intention. It was also found that self-image congruity influenced servicescape directly and also acts as a mediator in the relationship between servicescape and loyalty intention. This study has established the importance of not only servicescape for department stores but also stresses the importance of creating experiential values that are in line with the image of the customers. Future studies should also look at servicescape implications in other contextual situations especially in the service industry and to incorporate more technological dimensions in the measurement of servicescape to allow for the inclusion of retail technology in the servicescape implementations.

FACULTY OF ACCOUNTANCY





Name: MOHD BUKHARI CHE SEMAN @ SULAIMAN

Title : VALUE CREATION IN SELECTED MALAYSIAN SMALL AND MEDIUM ENTERPRISES (SMEs) FROM ACTIVITY, RESOURCE-BASED AND DYNAMIC CAPABILITY PERSPECTIVES

Supervisor : DR. ANUAR NAWAWI (MS) PROF. DATIN DR. SUZANA SULAIMAN (CS)

Today, unlike in the 1970s and 1980s, for Malaysia, cheap labour is no longer a competitive advantage. Competitive and resilient SMEs are important in the growth and development process of the Malaysian economy including the adoption of appropriate strategies, as SMEs have great potential to be the engine of the economic growth as could be seen in other developed countries both in East and West like Germany and Japan (Khan and Khalique, 2014, pp. 40 - 41). With intense competition, firms are competing for resources to produce products and services demanded by the customers in the marketplace. In order to attract customers either to maintain or improve market shares, firms are forced to deliver the value added products and services which are better than their competitors. The term "value" as a concept is of interest to many disciplines including economics. Value in economics has been studied for more than 200 years and the concept is still evolving today. Thus, the adoption of strategic value creation approach is needed to steer the small and medium enterprises (SMEs) that contribute up to 90% of the economic activities of many countries in the world generally, and Malaysia particularly. This research aims to have an in-depth study on the value creating components and drivers from activity (value chain), resource-based and dynamic capability perspectives that affect performance of selected Malaysian SMEs. The case study approach adopts purposive sampling on SMEs involved in the food and beverage industry. This study

is based on data collected using three common qualitative methods which are semi-structured interviews, field observations and content analysis of documents from two SMEs located in the east coast of peninsular Malaysia (in the states of Kelantan and Terengganu respectively). The data were coded and analysed using NVivo software version 10 in deductive and inductive methods to evaluate and determine the value creation components and drivers that had been created by the two companies in order to survive and be successful in the business for more than 20 years. This research suggests that value creation components are indeed the determinants of excellent achievements in the context of both SMEs studied. The results of the study also suggest that holistically, components and drivers of value creation work together and complement each other in creating value for these two SMEs. The study provides vital cues and leads that can be exemplary for other firms to emulate. These lessons drawn from the innate distillation of experiences of two relatively successful SMEs, hitherto tacit, now coded, may also be construed as falling under the realm of knowledge management. More than anything else, the findings enhance and enrich the tapestry of intricate and complex theoretical perspectives of activity, resource-based and dynamic capability seen together and applied in the context of value creation.





Name: NIK MOHD NORFADZILAH NIK MOHD RASHID

Title : EARNINGS MANAGEMENT AND CORPORATE TAX PLANNING AND THEIR IMPACTS ON FIRM VALUE

Supervisor : ASSOC. PROF. DR. ROHAYA MD NOOR (MS) PROF. DR. NOR'AZAM MASTUKI (CS)

The research aimed to study the impacts of Earnings Management (EM) and Corporate Tax Planing (TP) on the changes of the Firm Value (FV) among public listed companies in Malaysia. Financial determinants of EM and Corporate TP which were both creative accounting strategies that formed the predictor variables, had first been identified. These were obtained from secondary data of 357 selected public listed companies from 2001 until 2012 retrieved from Thompson One Datastream database. Diagnostic analyses were performed to test normality and serial correlation of the data and obtain descriptive statistics including the analysis of variance for both EM and TP among the companies in the selected industries. Hence, in this study the measurement used for EM was related to the Accrual Earnings Management (AEM) and Real Earnings Management (REM) while the measurement for TP referred to accrual-based Effective Tax Rates (ETR1) and cash-based Effective Tax Rate (ETR2) level of the companies. Balance panel data of the selected companies within 12-year period produced 4,284 firm-year observation for further analyses determined by specification methods comprising Pooled Ordinary Least Squares, Fixed Effect and Random Effect regression analyses. The investigation were continued for the first phase of the study which related to the investigation of the financial determinants towards EM and Corporate TP among the companies. Results from the first phase initially disclosed that there was a significant relationship that existed between the selected financial transactions towards the EM and TP in the business transaction activities. In the second and third phases, the relationship between EM and changes in FV as well as the relationship between TP and changes in FV in the

companies were analysed respectively. The findings revealed that there were significant relationships that existed between EM and the changes in FV as well as between TP and changes in FV. Hence, it can be concluded that both EM and TP creative accounting strategies were important to be used by the companies in order to stimulate changes in FV transactions in the business transaction activities. In the fourth phase, indirect effects of selected financial attributes of EM and Corporate TP on the changes in FV were examined. The findings provided empirical evidence of the existence of the influence of Audit Quality (AQ), Deferred Tax (DTX), Government Ownership Percentage (GOP) and Financial Distress (FDR) to be significantly meaningful on the relationship between AEM strategies and the changes in FV as well as on the relationship between ETRs and the changes in FV. Results showed that there were partial mediation effects of the financial attributes in the relationships of EM and TP, which were measured by AEM strategies and ETR1 respectively, on FV. Finally, in the fifth phase, indirect effects of the Corporate TP on the relationship between EM and changes in the Firm Value were examined. The findings also revealed that Corporate TP was found to be partially significant in mediating the relationship between EM strategies and changes in the Firm Value in the companies. Overall, it can be concluded that both EM and Corporate TP were important creative accounting strategies that should be mutually studied because they had significant influence on the changes of the Firm Value in the companies. Therefore, the current study provided evidence regarding the usefulness of the information from EM and Corporate TP in the business transaction activities.

Name : RASYIDAH BINTI CHE ROSLI

Title : TAX MALFEASANCE OF HIGH NET-WORTH INDIVIDUALS IN MALAYSIA: ARCHIVAL AUDITED DATA AND ELITE INTERVIEWS

incomes) have significantly influenced tax malfeasance of HNWIs.

In Stage 2, from July 2015 to January 2016, elite interviews were

conducted on 30 legal and tax professionals. Data were transcribed

and analysed using NVivo 10. First, the findings show that sources of

income, engaging unethical tax professionals and types of strategies are

factors that influence tax malfeasance among HNWIs. These findings

are consistent with the results obtained in Stage 1. Second, the majority

of the legal and tax professionals had the opinions that the lack of

transparency and disclosure, anomaly of penalties structure, the lack

of criminal prosecution in tax cases and the perception on government

spending contribute to the high tax malfeasance activities among

HNWIs in Malaysia. Last but not least, they suggested that the IRBM

to increase its enforcement activities and mandating HNWIs to disclose

any tax minimisation schemes. In order to crack down tax malfeasance

of HNWIs, the government need to be transparent where automatic

exchange of information among relevant authorities domestically and

internationally must be implemented urgently. Overall, this study has

merit as it integrates the economic deterrence theory and behavioural

theories to examine tax malfeasance of HNWIs in the Malaysian

tax setting. This study has developed a proposed framework and an

integrated tax compliance model of HNWIs in Malaysia. The findings

provide important insights to the IRBM and tax authorities in other tax

jurisdictions on how to improve tax compliance of HNWIs.

Supervisor : ASSOC. PROF. DR. LAI MING LING (MS) ASSOC. PROF. DR. ROSLANI EMBI (CS)

The Luxembourg and Panama leaks reveal that tax malfeasance of high net-worth individuals (HNWIs) is a pervasive and universal problem. In Malaysia, financial scandal and domestic tax fraud cases have also surged significantly. However, published empirical research on tax malfeasance of HNWIs is scant. At the time of study, little is known about the determinants of tax malfeasance among HNWIs and how to improve tax compliance of HNWIs in Malaysia. This study aims to fill up a research void. The objectives of the study are (a) to analyse the profiles of Malaysian HNWIs who were caught to engage in tax malfeasance as a result of tax audits, (b) to examine if economic factors influence tax malfeasance among HNWIs, (c) to assess if non-compliance opportunity determinants influence tax malfeasance, (d) to investigate whether the involvement of tax professionals influence tax malfeasance among HNWIs, and (e) to examine if non-economic determinants play a role in tax malfeasance. This study has two stages. In Stage 1, archival data analysis method was employed. With written permission, the data of the 235 audited HNWIs that engaged in tax malfeasance from year 2009 to 2013 were obtained from the Inland Revenue Board of Malaysia (IRBM). Of the 235, 40 per cent of HNWIs were above 55 years old and a majority (89 per cent) were males and had multiple sources of income. A research model with five hypotheses was developed to examine the determinants of tax malfeasance among HNWIs. The multiple regression analysis found that out of the five hypotheses, three hypotheses (sources of income, hiring of tax professionals and underreporting of other

FACULTY OF INFORMATION MANAGEMENT



Name: ALWI BIN MOHD YUNUS

Title : THE DEVELOPMENT OF A PRESERVATION FRAMEWORK FOR PRIMARY RESEARCH DATA AND RECORDS FOR RESEARCH IN DIGITAL FORMATS

Supervisor : DR. ASHMADI GHAZALI (MS) DR. IRWAN KAMARUDDIN ABD KADIR (CS)

This study is an attempt to gain greater understanding of the preservation of primary data and records of social science research in digital formats. The work draws from the perceptions and ideas of those involved in the management and preservation of these records namely the researchers, research administrators, records managers and IT officers at the public research institutions and related organizations. Essentially mix-method in nature, this study sampled 411 respondents from eleven research institutions and related organizations for quantitative data and twelve informants for qualitative data from individual interviews and focus group discussions to permit purposive sampling. Qualitative data was also elicited from documents analysis. Phase one of the studyinvolved the examination and analysis of international best practice models and developed a generic model based on the InterPARES Chain of Preservation (CoP) and the United Kingdom Data Archives (UKDA) models. Phase two of the study involved investigation of the existing practices on the preservation of these data and records in the selected Malaysian public research institutions and related organizations. Phase three involved critical analysis of data gathered in phase two against the generic model developed in phase one of the study in order to develop a framework for the Malaysian case. The framework was validated through a focus group discussion. The views and opinions of the focus group discussion offers valuable insight into the formation of the conclusive framework which consisted of (a) generic model elements of the CoP and UKDA; and (b) those common elements of the Malaysian case that match the elements of the CoP and UKDA; and (c) those common elements of the Malaysian case that did not match the generic model elements of the CoP and UKDA but perceived by the focus group as essential elements if the framework is to be successfully adopted and implemented. Theoretical contribution of the study include the development of a conceptually construct framework of electronic recordkeeping systems and data archiving systems. Methodologically, the study shows the effective use of the mix-method approach within the interpretivist naturalist research paradigm. However, this framework must be understood within the specific context of the environment in which the field work was carried out. In order to evaluate of its universal application, similar projects employing the same methods but conducted in contrasting environments or in other countries have been found to have great value.

DOCTORAL RESEARCH ABSTRACTS



Name : MOHD SHAHRUL NIZAM MOHD DANURI

Title : ICT USAGE TO SUPPORT AGRICULTURE TRANSFORMATION TOWARDS AGRIBUSINESS AMONG SMALLHOLDER FARMERS

Supervisor : ASSOC. PROF. DR. MOHD SAZILI SHAHIBI (MS) DR. MOHD RAZILAN ABDUL KADIR (CS)

The main objective of this research is to investigate and understand the factors that contribute to the usage of ICT to support the agribusiness transformation among smallholder farmers in Malaysia by extending the existing theoretical framework. The perception of smallholder farmers plays an important role in utilising ICT as tools for improving their agriculture and business activities. Agriculture provides the main and raw source of foods for humans. Agricultural activities have been developed intensely in modern techniques and activities depending on the country, culture, and environment, such as the global climate and sustainability. Malaysia still imports food, as local providers cannot support the supply and demand within the country. Hence, the government has introduced many initiatives to support the agricultural industry to produce more food for local needs. Instead of introducing agricultural programmes and educating farmers, the government is focusing on the use of agricultural technology with ICT-based tools, and farmers in Malaysia are gradually recognising the importance of tools, such as fertigation and precision agriculture; nevertheless, they are still unable to improve their yield and supply the local demand for food. The introduction of agribusiness to the farmers is still not well understood and it is difficult to implement due to their limitations as smallholder farmers. This research uses a multimethodology, to explore the nature of the phenomenon by integrating the multiple factor analysis with the integrated nature of the work, and an empirical system prototype has also been incorporated into the integrated information systems theory. Two research methods were initiated to achieve the research objectives. The first method involved distributing

copies of a questionnaire to the smallholder farmers in Taman Kekal Pengeluaran Makanan (TKPM) in Selangor. By using SPSS for statistical analysis, this evaluated the new ICT usage framework being constructed including hypotheses testing and answering several research questions. To answer the other research questions, a second method was conducted with the aim of conducting an empirical study through exposing the farmers to the experimental prototype. Together with the result from the previous study and the secondary information from the Department of Agriculture, the first Farm Management Information System (FMIS) prototype for Malaysian farmers was developed using information systems development methodology. The research concluded that information system elements are also associated with ICT usage among smallholder farmers with strong evidence from the acceptance test and feedback interview. The result gives the researcher the opportunity to outline the final solid ICT usage framework in this study. From the findings gathered, the researcher has proposed an ICT usage framework and FMIS website guidelines in the Malaysian context. Overall, the findings suggest the low level of information system elements and farm works design may influence the technology factor towards ICT usage. This thesis provides valuable and practical information for government policy makers, researchers, and local enterprises to understand and formulate the ICT usage framework as the best method to improve the local agricultural industry.

70

69

Name Title

Name : NORHAYATI HUSSIN

Title : STRATEGIC INFORMATION MANAGEMENT (SIM) AMONG MANAGERS IN MALAYSIAN BUSINESS ENVIRONMENT

Supervisor : PROF. DR. ADNAN JAMALUDIN (MS) DR. ABD LATIF ABDUL RAHMAN (CS)

Strategic Information Management (SIM) in an organization is sustained by significant factors. Without these factors, SIM ceased to exist, and therefore organization could not capitalize on the flexibility of information resources to develop innovative strategies to face the competitive environment. Not understanding what factors could contribute to SIM in an organizational context, many organizations have failed to capitalize their information resources strategically to assist them in their competition. With the fact that SIM is dependable on certain factors, it is only important that organization should determine, understand, and strategize the development of these factors. Strategic Information Management (SIM) occurs in an organization where managers utilize strategic information (SIU) with the purpose to formulate business strategies. To successfully use the strategic information, the managers must have a positive Information behaviour (IBM) with the support of Organizational Information Management Practices (OIMP) and Organizational Information Technology Practices (OITP) in an organization. It also needs the organization gives a better support in the management of information that acquires the process to create, organize, and distributing the Strategic Information. This thesis documents a study of the Strategic Information Use (SIU) and all factors associated to support managers for business strategy formulation. The premise upon which such a research initiative is founded concerns the subject is one of under-researched in information management topics, and this area is limited in scope and scale. The primary objective of the study is to investigate the Strategic Information Use (SIU) of the

managers in the organization with high and low information intensity for strategy formulation in Malaysian business organization. This thesis makes a significant contribution to the Strategic Information Management (SIM) literature by developing an integrative framework which examines Strategic Information Management (SIM) in Malaysia business environment. The model developed, identifies the influence of Information Behaviour of Managers (IBM) and the moderating such OIMP and OITP towards IBM, the influence of Organizational Information Management Practices (OIMP) on Strategic Information Use (SIU) for the formulation of business strategy. A conceptual model has been created through deductive approach, primary data through questionnaires were collected from 491 business organizations that represent high and low information intensity. Financial services industry is representing organization with high information intensity, while, the manufacturing industry representing low information intensity. Data was analyzed according to the descriptive properties and underlying correlation structure. Several principal components were derived from these analyses which were used in hypotheses testing. Subsequently, to examine the interrelationships between factors, this study use SmartPLS 2.0 to conduct the analyses. The research findings are discussed and considered in light of current knowledge in the area. Some conclusions are made from the findings. Furthermore, implications for academics and business practitioners are drawn that indicate the relevance and applicability of this research to the business organization practices. Limitations of the research and possible future research are set out.

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

MALAYSIAN INSTITUTE OF TRANSPORT (MITRANS)

Name : RUDIAH BINTI MD HANAFIAH



Title : A DECISION MAKING MODEL FOR ASSESING THE INFLUENCE OF STEAMING SPEED ON THE REVENUE PERFORMANCE OF TANKER ON TIME CHARTER

Supervisor: ASSOC. PROF. DR. OOI UI JOO (MS) MR. NOORUL SHAIFUL FITRI BIN ABDUL RAHMAN (CS)

Transporting cargo by maritime transportation has been met with uncertain conditions that have influenced not only the movement volumes but also the expenditure cost and revenues. Therefore, speed reduction has been used as a strategy to solve this problem, particularly for the container and tanker sectors. Accordingly, studies related to speed reduction have increased rather vastly and have involved various pertinent aspects, such as the economic model and environmental impact. However, among these studies, none has looked into the benefits of speed reduction for small-sized vessel, particularly from time charter perspective and from the consideration of shorthaul trading routes. The current study addresses this issue through a number of real-test cases and the Malaysian petrochemical industry was chosen as the subject matter. The objectives of this study are to (1) identify the factors that affect the revenue performance of tanker on time charter, (2) analyse the impact of the contributing factors on the revenue performance of tanker on time charter, (3) evaluate the impact of implementing speed reduction on the revenue performance of tanker on time charter, and (4) develop a decision-making model that is most suitable for tanker on time charter. In meeting the objectives,

the Bayesian Networks (BN) was adopted to assess the revenue performance of tanker on time charter. The proposed framework, which was successfully evaluated, illustrates the dependency among the variables. A combination of various decision-making methods was applied; the Analytic Hierarchy Process (AHP) and the Technique for Order Performance by Similarity to Ideal Solution (TOPSIS) were adopted to determine the most suitable level of steaming speed. Results from the analyses indicated that the revenue performance of tanker on time charter performed better by sailing at low speed than in full speed. The developed decision-making model also showed that the Extra Slow Steaming Speed (ESSS) is an ideal strategy that can maximise the revenue performance of tanker on time charter. As a conclusion, the developed model can be used by industry practitioners as a tool and guideline that allows parameters to be added and dropped at any time without affecting the backbone of the model.



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