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Interdisciplinary issues in Economics,
Business and Social Sciences
(IEBS-July-2018)
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July 21-22, 2018



IEBS–Tokyo Japan

International Conference on Interdisciplinary issues in
Economics, Business and Social Sciences

July 21-22, 2018

Hotel Mystays Ochanomizu Conference Center

Book of abstracts

Volume 01, Issue 11

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- 1. Mr. Metin Gurani**
Conference Coordinator

- 2. Mr Leon Yap**
Conference chair

- 3. Hideo Owan**
Conference Coordinator

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Conference Chair Message

Dr Ishida Otaki

International Conference on “International Conference on Interdisciplinary issues in Economics, Business and Social Sciences” serves as platform that aims to help the scholarly community across nations to explore the critical role of multidisciplinary innovations for sustainability and growth of human societies. This conference provides opportunity to the academicians, practitioners, scientists, and scholars from across various disciplines to discuss avenues for interdisciplinary innovations and identify effective ways to address the challenges faced by our societies globally. The research ideas and studies that we received for this conference are very promising, unique, and impactful. I believe these studies have the potential to address key challenges in various sub-domains of social sciences and applied sciences.

I am really thankful to our honourable scientific and review committee for spending much of their time in reviewing the papers for this event. I am also thankful to all the participants for being here with us to create an environment of knowledge sharing and learning. We the scholars of this world belong to the elite educated class of this society and we owe a lot to return back to this society. Let’s break all the discriminating barriers and get free from all minor affiliations. Let’s contribute even a little or single step for betterment of society and welfare of humanity to bring prosperity, peace and harmony in this world. Stay blessed.

Thank you.

Dr Ishida Otaki
Conference Chair
IEBS-Secretariat, 2018

Conference Schedule

DAY 01 Saturday (July 21, 2018)

Venue: Room 1

09:00 am – 09:10 am	Welcome Reception & Registration
09:10 am – 09:20 am	Opening Ceremony
09:20 am – 09:30 am	Welcome Remarks – Conference Coordinator TARIJ
09:30 am – 09:40 am	Introduction of Participants
09:40 am – 9:50 am	Group Photo Session
09:50am – 10:00 am	Grand Networking Session and Tea Break

DAY 01 Saturday (July 21, 2018)

Session 1 (10:00 am – 12:30 pm)

Venue: Room 1

Track A: Engineering, Technology & Applied Sciences

ASET-JULY-101	Fuzzy-Driven Reliability Redundancy Allocation Problem for Reliability Evaluation in Logistics Industry	Chia-Ling Huang
ASET-JULY-103	Double Gene Targeting Multiplex PCR-RFLP Discriminates Bovine and Porcine Substitution in Commercial Food Products	Sharmin Sultana
ASET-JULY-104	Influence of Changing Government Fees and Mining Tax on Final Pit Limits of Phonesack Coal Mine at Kaleum District, Xekong Province in Lao PDR.	Bounkham PANYAVONG
ASET-JULY-106	Influence of Block Dimension and Equipment Selection on the Final Pit Determination of Coal Deposit at Heenherp District, Vientiane Province, Lao PDR	Keopaseuth ketumala
ASET-JULY-114	Change Detection of Bi-Temporal UAV Images	Dr Dongyeob Han
ASET-JULY-115	A Prototype Design of A Smart and Portable Coastal Fisheries Assistant System	Min-Hsuan Lu
TKE-478-102	Modelling of Oscillating Water Column Devices –Part I: Model Statement	Aitor J. Garrido

Track B: Business, Economics, Social Sciences and Humanities

IEBS-JULY-1012018	Family influences in the internationalization of the Top 1000 Taiwanese enterprises: Enduring relationships with stakeholders do count	Yu-Chen Wei
IEBS-JULY-1302018	Political Violence and Foreign Policies	Sanyi Yang
IEBS-JULY-1312018	The Application of Comparisons to English Learning	Wan-Jeng Chang
IEBS-JULY-1352018	Use intention of Thai Internal Audit towards Data Analytics tools	Thunyane Pothisarn, Ph.D.
IEBS-JULY-1172018	A Robust Trinomial Tree for General Local-Volatility Models	Yuh-Dauh Lyuu

Lunch Break (12:30 to 01:30 pm)

DAY 01 Saturday (July 21, 2018)

Session 2 (01:30 am – 04:00 pm)

Venue: Room 1

Track A: Engineering, Technology & Applied Sciences

ASET-JULY-105	Using Homogeneity Agitation Technique to Make Chitosan/Essential Oil Microcapsules: Efficacy Evaluations	Chao-Tsang LU
ASET-JULY-108, 108C	Blends of PLA/NR with Epoxidized Soybean Oil: Rheological Property, Morphology and Mechanical Property	A.A. Burkov & S.V. Fomin
ASET-JULY-109, C, C2	Electrochemical Behavior of Terbium Ions on Mo Electrode in NaCL-KCL Melt	O.V. El'kin, D.A. Kozulin & A.N. Kibishev
ASET-JULY-110	Relaxation Behavior of Elastomer Composites: The Effect of a Hybrid Carbon Black/Carbon Nanotubes Filler	E.S. Shirokova
ASET-JULY-112	Mental Workload Evaluation of 2D and 3D Laparoscopic Training through EEG Measurement	Hung-Jen Chen

Track B: Business, Economics, Social Sciences and Humanities

IEBS-JULY-1212018	Category-wise analysis on features of freemium mobile app services based on topic modeling and online review data	Youngjun Kim
IEBS-JULY-1222018	A neural network approach for identifying new service opportunities from multidimensional vector space: A case of mobile application market	Burmguuk Lee
IEBS-JULY-1372018	Parallel Trade under Vertically Related Markets	Tsai Mingfang
TKS-478-101	A Repetitive Rectifying Sampling Plan Based on Process Capability Index	Ching- Ho Yen
TKS-478-102	Management of “Nora Rongkru,” a Thai Local Ritual Ceremony: A Case Study of Suwanmanee Family in Chingko Sub-District, Singhanakorn District, Songkhla Province	Ponpipatsarn Ratchakorn
TKS-478-103	Network of FTAs Infatuation: Untangling \"Spaghetti Bowl Effect\"	Perada Dulyapiradis
TKS-478-104	Better Model Selection For Poverty Targeting Through Machine Learning: A Case Study In Thailand	Pisacha Kambuya
MRSSM-078-ANI106 & 107	Determinants of Video on Demand(VOD) Viewing Patterns: An Empirical Evidence from Korean IPTV Industry	Jeehyung Jo & Jong-Hee Lee

Closing Ceremony
(04:30 - 05:00 pm)

List of Conference Attendees

The following Scholars/ practitioners/educationist who don't have any paper presentation, however they will be attending the conference as delegates & observers.

Sr. No	Official ID	Name	Affiliation Details
01	IEBS-JULY-114A2018	Yejee Jeong	Department of Liberal Arts, Faculty of Humanities and Business Ewha Womans University, Seoul, Korea

DAY 02 Sunday (July 22, 2018)

City History and Discussion Session

The purpose of the second day conference will be for the participants to learn more about the local history and culture, or get to know the other participants better. Therefore,

Option 1: City History and Culture Tour: All the participants are free to organize your own group tours together and get to know each other better.

Option 2: Discussion Session: All the participants are free to make group discussions on behalf of your same research interest and get a chance to cooperate in the future Research.

**TRACK A: BUSINESS, ECONOMICS, SOCIAL
SCIENCES AND HUMANITIES**

Family influences in the internationalization of the Top 1000 Taiwanese enterprises: Enduring relationships with stakeholders do count

Chiung-Wen Tsao¹, Yu-Chen Wei^{2*}

Abstract –This study investigates the moderating effects of employee commitment, customer loyalty, and corporate reputation on the relationship between family influence and international expansion. A cross-national research design was conducted using both survey and secondary data of 119 firms taken from the top 1,000 Taiwanese enterprises. This study found moderating effects in the positive impact of family influence on international expansion. Specifically, the study found the relationship between family influence and international expansion stronger for companies with greater relational support from employees, customers, and the public. Multi-level data collection and a longitudinal research design in future research could help in further understanding the relationships between the variables in this study. This paper suggests that family business should establish enduring relationship with their employees and customers and have a plan to improve family reputation that will benefit international market expansion. This study draws on the relational perspective to investigate how family influence results in different international expansion.

Keywords: family influence, internationalization, employee commitment, customer loyalty, corporate reputation, relational support

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A Robust Trinomial Tree for General Local-Volatility Models

U Hou Lok¹, Yuh-Dauh Lyuu^{2*}

Abstract The local-volatility (LV) model for option pricing assumes the instantaneous volatility is a function of the stock price and time. This model is popular because it captures the volatility smile observed in practice besides retaining the preference freedom of the Black-Scholes model. Tree is prevalent among numerical methods for LV models. However, all past attempts to construct an efficient tree for general LV models are prone to having invalid stock prices or transition probabilities. This paper presents a robust trinomial tree for general LV models. Our tree guarantees validity and efficiency. Numerical results confirm the excellent performance of the tree.

Keywords: Option Pricing, Local-Volatility Model, Trinomial Tree, Transition Probabilities

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Category-wise analysis on features of freemium mobile app services based on topic modeling and online review data

Youngjun Kim^{1*}, Yongtae Park², Changho Son³

Abstract Abstract For the past decade after the advent of smartphones, the mobile platform market has grown remarkably in the information and communication technology industry. It is apparent that the key to this growth is the countless mobile app services provided by platforms such as Apple's AppStore and Google Play. Freemium model, by which a service is offered free of charge, but a premium is charged for advanced features or functionality, is one of the key strategies for generating revenue in the mobile app service market. Although extensive research has been carried out on the effects and determinants of the freemium strategy, no single study exists which focuses on differences in freemium mobile app service categories. Therefore, this study proposes a framework for exploring impactful features for successful freemium app services according to categories. To this end, the topic modeling is conducted on reviews of each app provided by the app service platform, and the importance is checked through sentiment analysis. This study will provide a deeper insight into the strategy for the freemium model app services.

Keywords: Mobile app service, freemium, topic modeling, online review data

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A neural network approach for identifying new service opportunities from multidimensional vector space: A case of mobile application market

Burmguk Lee^{1*}, Yongtae Park², Changho Son³

Abstract With the explosive growth of service industry, excessive competition has made it difficult to find new service opportunities. Many companies try to contrive new service by using service map, but most of service map methodologies reduce the data dimension for visualization. The reduction of data dimension inevitably leads to information loss, which may have important implications for the overall circumstance. In response, this paper focuses on minimizing this information loss that occurs during these data dimension reduction processes. This study suggests a brand new approach using the multidimensional vector space to explore new service opportunities. In detail, we find the vacuum in multidimensional vector space composed of service factors, by applying a neural network model. The suggested approach is composed of three parts: first, collecting application descriptive data and review data to extract the service factors, second, developing multidimensional service space and figuring out vacuum of service map, and finally, identifying new service opportunities. The proposed approach will be applied to mobile application services which can utilize large amount of detailed data. The proposed approach is expected to identify new mobile service opportunities more comprehensively than service maps.

Keywords: NSD, multidimensional vector space, neural network, service opportunities

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Political Violence and Foreign Policies

Sanyi Yang*

Abstract The countries that have emerged from the former Soviet Union after the end of the Cold War have always been an important subject for international politics studies. In this paper, the author selects Ukraine and Kyrgyzstan as focal points of regional security case studies. These two countries share several similarities: Firstly, they were members of former Soviet Union and have gained independent sovereignty after the end of Cold War. Secondly, Ukraine and Kyrgyzstan in the early years of independence were relatively high democratized countries and the activities of non-governmental organizations were more active. Secondly, both Ukraine and Kyrgyzstan experienced the color revolution in the early 2000s, but they also broke out a follow-up revolution after that. The assumptions in this paper are: First, the outbreak of the revolution symbols the failure of the state, and the political structure cannot respond to the political demands of the opposition. Therefore, revolution and subsequent development is a set of causal incidents that are closely related to each other. Corruption and regional differences are the internal causes of the revolution. Second, while Ukraine and Kyrgyzstan have similar levels of democratization and the number of revolutions, the political conditions in the two countries are different. The Kyrgyz political elite has strong connection with kremlin; however, attitude toward Kremlin split among different political elite groups. Third, the level of Western involvement in these area is also highly correlated with geopolitical factors.

Keywords: Political Violence, Foreign Policies, Ukraine, Kyrgyzstan

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The Application of Comparisons to English Learning

Wan-Jeng Chang*

Abstract The main purpose of the present article is to estimate academic achievement and gender peer effects on social comparisons and self-regulated learning behaviors in a Taiwanese EFL context. The participating students were 50 non-English-major freshmen studying in Central Taiwan. Analyses of the data reveal the following findings. First, female students preferred or felt more comfortable making social comparisons with other female students, and they applied more self-regulated learning strategies. Second, male students had a stronger drive to make social comparisons, and they would prepare harder over time for the tests. Third, students with relatively low ability tended toward upward comparison and tended to give up or only study the easy parts.

Keywords: peer effects, social comparisons, self-regulated learning behaviors, English as a Foreign Language (EFL)

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Use intention of Thai Internal Audit towards Data Analytics tools

Thunyane Pothisarn, Ph.D.*

Abstract This paper studies the use and intention to use of data analytics tools of Thai internal auditor. Where the knowledge about current situation of information technology using in internal audit tasks, characteristics of use and intention to use are limit. Questionnaire survey via off-line and on-line channel were used to access the data from Thai internal auditors which 260 Thai internal auditors were participated. This study adopted three constructs of Unified Theory of Acceptance and Use of Technology Model: (UTAUT): Performance Expectancy, Effort Expectancy and Social Influence to explain and predict Use intention of Thai internal auditors towards data analysis tools. conducted with Thai internal auditors. The data analysis was analyzed with descriptive analysis and Structure Equation Model (SEM). The study found that Majority of the respondent are female (69.6%) with master's degree, one third of respondents (35.7%) has less than five years' experience in internal audit work and most of them are auditing in service industry (40.4%). Thai internal auditors adopted data analytic tools in various type where majority of respondents used Spreadsheet software to perform management and information technology audit activates at initial stage in unpredictable performance based on individual competence and not on repeatable processes. Regarding the factors use to predict use intention of internal auditors toward using data analytic tools, the statistics result show that Performance Expectancy and Effort Expectancy found to be not significant determinant the Behavior Intention, but Social Influence factor seem to be the main factor affecting the use intention to use data analytics tools of Thai internal auditors.

Keywords: Thai internal auditors, Data analytic tools, Use intention, UTAUT, SEM

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Parallel Trade under Vertically Related Markets

Tsai Mingfang*

Abstract This paper sets up a two-country model in which there is one domestic manufacturer authorizing its product to a distributor in the foreign country. The distributor can sell the product not only to its own market (i.e., the foreign market) but also back to the domestic market. The latter is called as parallel trade. The paper investigates the effects of parallel trade on the wholesale price and the profit of the manufacturer if the domestic market structure is vertically related markets. With a vertically related market structure, it is found that the optimal wholesale price charged by the manufacturer might be higher (lower) under parallel trade regime than that under no parallel trade regime, depending on the market size difference. Moreover, parallel trade may increase the profit of the manufacturer.

Keywords: Parallel trade, Vertically related markets

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A Repetitive rectifying sampling plan based on process capability index

Ching- Ho Yen^{1*}, Hung-Shu Wu²

Abstract In quality control, sampling plan and process capability index are two important decision tools. Since the popularity of process capability index, considerable research papers of sampling plan based on process capability index have been addressed. However, these research papers almost focus on the conventional sampling plans, accepting or rejecting the whole goods of one lot directly. In fact, under some circumstances rectifying inspection is frequently used due to the supplier's monopoly or the urgency of buyer's shipment. Therefore, designing a rectifying sampling plan based on process capability index is a practical issue. In this paper, we consider the quality costs resulting from the rectifying inspection, including inspection costs, internal failure costs and external failure costs and develop the quality costs model. Referring to the two-point principle of operating characteristic curve, we apply the quality costs model and repetitive sampling to design a repetitive rectifying sampling plan based on process capability index, which minimizes the quality costs of one lot. In addition, sensitivity analysis is executed to investigate the behavior of the relevant parameters against the quality costs. Finally, we compare the proposed plan with Yen et al.(2015) in terms of the quality costs. With the results of our proposed methodology, the industry can take that as another alternative method for rectifying inspection.

Keywords: Sampling plan; process capability index; rectifying inspection; operating characteristic curve; sensitivity analysis

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Management of “Nora Rongkru,” a Thai Local Ritual Ceremony: A Case Study of Suwanmanee Family in Chingko Sub-district, Singhanakorn District, Songkhla Province

Ponpipatsarn Ratchakorn *

Abstract This qualitative study aims to investigate management of “Nora Rongkru” (a southern local Thai ritual) of a family and a community in to provide a case study and a guideline for cultural management in other areas. In addition, the participation of a community is also examined to promote rapport between the family and the community, which could maintain and carry on the ritual. Data collection included a literature review of relevant document, an interview, and participant observation. Participants were members in Suwanmanee Family, the assigned persons, and the organizers. Data analysis employed POSDCoRB (Gulick Luther, 1937) and the descriptive analysis was applied. Results show that members in Suwanmanee family members and the community were involved with the management of “Nora Rongkru.” The management of the event was congruent with Luther Gulick’s POSDCoRB in terms of the plans, organizational management, the recruitment, task assignment, the coordination, the report, and the budget. All these processes were supervised by Suwanmanee family members. These people, who had experiences organizing this ritual, took key roles in accelerating the ceremony.

Keywords: POSDCoRB, Ritual Ceremony, “Nora Rongkru,” Locality

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Network of FTAs Infatuation: Untangling \"Spaghetti Bowl Effect\"

Perada Dulyapiradis*

Abstract Over the past decades East Asia become described as “Factory Asia” and involve in “triangle trade” among regions. However, the “Spaghetti-Bowl” phenomenon makes it difficult for country to understand the export production pattern and the cross-boarder supply chains. Therefore, the application use of Community Detection in the Network Analysis is employed to examine the evidence of “Spaghetti-Bowl” effect between the Free Trade Agreements and the traded commodity goods at 6-digit harmonized system for the case of Thailand. To further determine, the result of the product community and network indicators namely Closeness Centrality, Betweenness Centrality and Eigenvector Centrality index are used as input for dependent variable in the Gravity model. The result from the community detection suggests that there are 3 main export groups 1) consumption goods and primary goods 2) intermediate goods and 3) capital goods. The Gravity Model portrays the relationship between trade negotiation and production network can affect Thailand export value. However, there is the evidence of ‘Spaghetti Bowl’ syndrome in the product group 2 as the trade characteristic of this product group is ‘triangle’ model. The result implication suggests that Thailand do not have competitive strength on the Global Value Chain of an industrial manufacturing sectors due to the nature of trade and fall in value-added particular for this product group. To mitigate this, Thailand should consider about modification and deepening of existing regional trade agreements to regulate trade activities and promote sustainable development. Furthermore, there is a room for productivity and production upgrading in product 3 if Thailand can catch up with the change in export structural transformation and serve the demand for “Factory Asia.”

Keywords: Network Analysis, Community Detection, Gravity Model, International Trade Economics, Spaghetti Bowl Effect, Regional trade

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Better Model Selection for Poverty Targeting Through Machine Learning: A Case Study in Thailand

Pisacha Kambuya*

Abstract Proxy Means Test (PMT) is the method for targeting the poor who should obtain the benefit from social programs by estimating an income or expenditure with the Ordinary Least Square (OLS) regression using set of variables which are correlated with those welfare measurements because it is difficult to measure directly. However, the variable selection in OLS would require the stepwise regression which is time-consuming task when the set of variable is very large. Therefore, this study aims to propose the Least Absolute Shrinkage and Selection Operator (LASSO) and Random Forest (RF) algorithms which are part of Machine Learning field to improve PMT model in terms of variable selection and model performance by focusing on the out-of-sample targeting accuracy of poor household in Thailand. The data in this study comes from Thailand Social-Economic Survey (SES) in 2016. The results show that LASSO and RF are more accurate models to estimate the consumption expenditure compared to OLS in out-of-sample prediction. For the out-of-sample targeting accuracy of PMT models which are improved by machine learning algorithms, the LASSO improves on total accuracy of the PMT, while RF gains in the poverty accuracy. In addition, LASSO outperforms RF in terms of reduce in leakage rate. In contrast, an undercoverage rate for RF is significantly less than LASSO. Since, there is a trade-off between the leakage and undercoverage rates, this study suggests that if policy-makers concern about the budget, PMT model based on LASSO is more prefer. On the other hand, if the objective of social welfare program is to help the truly poor, PMT model based on RF is more appropriate.

Keywords: Proxy Means Test, Poverty Targeting, Machine Learning, LASSO, Random Forest, Variable Selection

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**TRACK B: ENGINEERING & TECHNOLOGY,
COMPUTER, BASIC & APPLIED SCIENCES**

Modelling of Oscillating Water Column Devices –Part I: Model Statement

Aitor J. Garrido^{1*}, Izaskun Garrido², Jon Lekube³, Izaskun Garrido⁴, Jon Lekube⁵, Amparo, Villasante⁶

Abstract The European Energy Road Map 2050 and the Spanish Renewable Energies Plan for 2011-2020 are promoting the use of renewable energies as a necessary path to achieve the greenhouse gas reduction target necessary to avoid the rising global warming, and in particular, the use of Ocean Energy. Within the different types of on-shore wave-based energy devices, Oscillating Water Column (OWC) converters are one of the more widely used ones. An OWC plant is basically composed by a capture chamber coupled to a turbo-generator module. This paper deals with the model development for on-shore OWC wave energy power devices.

Keywords: Modelling, OWC, Wave Energy.

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Fuzzy-Driven Reliability Redundancy Allocation Problem for Reliability Evaluation in Logistics Industry

Chia-Ling Huang⁸

Abstract The reliability that has popularly used as a measure of the successful probability in providing the function properly plays an important role in the operation of logistics industry because it is one of the major index to evaluate the quality of service (QoS). And the QoS can strongly stand for the competitiveness of a logistics company in the same industry. In the logistics industry, the operation of the products needs to be received, stored, picked, inspected, packaged, and delivered that is a huge work so that the design of the operation system to ensure the reliability of QoS is very challenging but important. As we know, the reliability redundancy allocation problem (RRAP) is an famous and effective methodology to improve the system reliability. The reliability of redundancy components in each subsystem is not an exact value so that the fuzzy theory has been used to evaluate it. In addition, the design of the product layout is appropriate for the characteristics of the operation in logistics industry because it can be mass-produced. Therefore, a fuzzy-driven RRAP to enhance the reliability of the operation in the logistics industry with the product layout has studied in this paper. As well as, this study contributes to enhance university-industry cooperation.

Keywords: Reliability; Reliability Redundancy allocation problem; Fuzzy theory; Logistics industry

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Influence of Changing Government Fees and Mining Tax on Final Pit Limits of Phonesack Coal Mine at Kaleum District, Xekong Province in Lao PDR.

Mr. Bounkham Panyavong^{1*}, Prof. Dr. Panlop Huttagosol²

Abstract Recent years, some of mining fees and taxes in Lao PDR have been reformed. Therefore, mining activities are impacted from higher operating cost. Alternative final open pit designs are under the influences of changing government fees and mining tax policies. In the case study for this paper illustrates that the most influential factors of final pit limits and mine reserves are fees and mining tax policies on the economic block values. The MineSight 3D software was used to run the model in the open pit designs. Each modeling block value included the coal price, mining costs, processing costs, fees and mining tax. The mining cost and equipment cost resulting from mine equipment selection were estimated for this coal mine. The pit design methods were run for the open pit optimizations are Lerchs-Grossman and Floating Cone Algorithms. The mineable reserves from each open pit were analyzed and compared. The pit optimization is Lerchs-Grossman Algorithms. The increasing reserves were affected from reducing fees and mining tax, which related to the promotion of the mine development. In addition, the increasing coal production extracted from the deposits will help to maximize revenues to the Lao government. Furthermore, socio-economic of the country will be developed.

Keywords: Mine Equipment Selection; Equipment Cost; Fees and Tax Policies; Economic Block Value; Minesight 3D Software; Open Pit Optimization; Final Pit Limits; Estimate Ore Reserve

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Mental Workload Evaluation of 2D and 3D Laparoscopic Training through EEG Measurement

Hung-Jen Chen*

Abstract Laparoscopic surgery is slowly replacing the traditional invasive surgeries due to the benefits, including speedy recovery time, and reducing the chance of complications. But this surgical approach also limits the surgeons' depth perception and vision. They need to spend more time to complete the operation, thus leading the surgeons to have higher mental workloads. This research, through the usage of EEG and NASA TLX analyzed 12 participants who performed tasks with different depth perception to understand the effect of 2D and 3D images on one's mental workload. This experiment uses Alpha brainwave and blink rate as the index for mental pressure while the Gamma wave is used as the index for concentration. Prior to the start of the experiment, participants were asked to rest for 2 minutes to calibrate the brainwave signals from unwanted noises. Afterwards, participants were asked to wear the Muse headband and to stand 2 meters away from the 3D monitor while performing the two tasks (peg transfer and circle tracing). From the brainwave result, 3D display results in higher Alpha wave activity, blink rate, and lower Gamma wave activity. In general, the participants feel more relaxed and have lower concentration level in the 3D environment. The NASA TLX survey results also show that stereoscopic vision can be helpful in lowering mental workload and frustration. Due to the result of both subjective and objective analysis, we conclude that the 3D display technology provides helpful depth perception and direction, thus lowering the mental demand of the participants during the completion of the tasks. However, 3D displays do not produce good enough images, therefore causing eye-fatigue to the participants.

Keywords: Brain Wave, Electroencephalogram, Blink Rate, Stereoscopic, 2D Images, 3D Images, Mental Workload.

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Relaxation behavior of elastomer composites: the effect of a hybrid carbon black/carbon nanotubes filler

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Abstract The glass transition in hybrid carbon black/carbon nano-tube (CB/CNT) filled elastomer composites has been studied through dynamic mechanical analysis (DMA) and differential scanning calorimetry (DSC). The storage modulus E' and loss tangent (TanD) are recorded from -100 to 100 °C and a frequency of 10 Hz. The thermal analysis was carried out at 2° C/min temperature increment. The vulcanizates were made as per conventional technology. The CNT were introduced into rubber compounds as CB/CNT masterbatches resulting from joint ultrasound processing. The CNT content in the rubber compounds varied from 0.1 to 0.5 phr. The DMA data proved that introduction of CB/CNT hybrid particles resulted in the spread of TanD temperature peaks for all the samples towards lower temperatures and the subsequent shift of the maximum TanD position by 4.0 to 15.6 degrees. The DSC data demonstrated the existence of additional low-temperature α -relaxation transitions in the modified vulcanizates (-123...-118 °C). The observed relaxation behavior could be explained by the increase of vacant volume in the vulcanizates along with the rise in segmental mobility of some macromolecules when compared against the reference sample. The highest hybrid filler content vulcanizate demonstrated certain TanD drop in the glass-to-rubber transition zone and the TanD rise in the high-elasticity state, which fact indicated formation of additional filler-filler and filler-polymer interactions. Thus, the CNT treatment with carbon black resulted in a synergy effect upon the rubbers' dynamic characteristics; hence, it can be applied to the task of raising the material frost resistance point.

Keywords: Hybrid Filler, Frost Resistance of the Material

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