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Annual Research Session-2015

ABSTRACTS

Sabaragamuwa University of Sri Lanka

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Dr. M. S. M. Aslam

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Message from the Vice Chancellor

Sabaragamuwa University of Sri Lanka

"Ayubowan"

As the Vice-Chancellor of the Sabaragamuwa University of Sri Lanka, it is a great pleasure for me to extend my deepest appreciation for the 5th Annual Research Session (ARS). As one of the upcoming national Universities, contribution for the knowledge and partaking in anticipating development challenges of the nation and beyond through new research findings would be an inevitable. The University is proud to have this annual forum of the academic and students to present and disseminate their latest research findings while its celebrating 20th anniversary in this year. This also contributes immensely to enhance the research culture of the University.

Continuing the ARS ensure the leadership of the University to reach the status of research university in foreseeable future. In addition, this forum provides a greater opportunity for an interdisciplinary research dialogue for the academics and students from diverse fields. Holding the ARS with simple and charm manner convince the stakeholders and the University to establish an affordable path to continue the event without huge burdens. Including a keynote speech from an eminent scholar as role model enable the participants and contributors enhance their wisdom and virtue. The ARS also found as one of the important deliverables of the Centre for Research and Knowledge Dissemination. I also take this opportunity to appreciate and thank CRKD and the ARS committee for their tireless effort to make the 5th ARS a success.

Professor Chandana P. Udawatte
Vice-Chancellor
Sabaragamuwa University of Sri Lanka

Message from the Director

Centre for Research and Knowledge Dissemination

A great privilege to hold the 5th ARS ...

In marking the significance of the Annual Research Session (ARS), as the Director of Centre for Research and Knowledge Dissemination (CRKD) it is a privilege for me to extend this message on the 5th ARS of Sabaragamuwa University of Sri Lanka (SUSL). Research and Knowledge dissemination are the major and prime tasks of the university to determine the sustainability. Providing a platform for academic and students annually to disseminate their new research findings through the ARS shows the university's consistent encouragement and leadership towards its vision. Since the CRKD is the body purposefully established for the research and knowledge dissemination of SUSL, holding the 5th ARS marks the milestones in the successful journey. Besides, the ARS is becoming a well-recognized institutional stimuli to build the confidence and research culture among the growing academics and researchers. Hence a number of enthusiastic and energetic young researchers from diverse disciplines in the university proliferate the magnitude of the 5th ARS remarkably. Enabling the interdisciplinary networking and dialogue among the growing researchers widen the knowledge on research and sharpen creative thinking on research. Eventually this enables the university to create highly talented and well-informed staff and graduates to shoulder the development process while providing solution for unsolved problems. This also will be an opportunity for the CRKD to expand its resource base to serve for the stakeholders and wider community. The presence and keynote speech of the well-known scientist and eminent scholar in Sri Lanka helps the upcoming scholars and researchers to mould them to suite the future world. As the Director of the CRKD I really appreciate and acknowledge the leadership and guidance of the Vice-Chancellor, Prof. Chandana P. Udawatte, and the support of Registrar and Acting Bursar in holding the 5th ARS. I am also obliged to acknowledge the 5th ARS organizing committee specially the Chairman, Dr. Udeni Jayalal and Coordinator, Dr. Salinda Premadasa, for their untiring efforts to hold it through many challenges.

I extend my best wishes for the success of the 5th ARS while extending my gratitude for contributors and presenters.

Dr. M. S. M. Aslam
Director
Centre for Research and Knowledge Dissemination
Sabaragamuwa University of Sri Lanka

ARS 2015: Fifth Annual Research Session

Sabaragamuwa University of Sri Lanka

On behalf of the organizing committee of the 5th Annual Research Sessions, Sabaragamuwa University of Sri Lanka (SUSL), it is a great pleasure and a privilege to extend our welcome note to the Annual Research Session 2015 (ARS-2015). The ARS has certainly shaped-up the research landscape of the university over the last few years, with the influence and stimulation from many respected senior researchers in the university, paving way for further improvement.

This year, we are delighted to see fifteen members of the academic staff presenting their research findings of post-graduate studies conducted in and/or collaborating with esteemed universities five different countries, making ARS 2015 is a venue to share their significant findings to a multidisciplinary audience. The ARS 2015 is also enriched with a poster session of the best undergraduate research students identified by respective departments and the winner of the student of the year award at the 2014 general convocation.

We are indebted to our chief guest Prof. S.H.P. Parakrama Karunaratne for gracing this occasion with a keynote speech as well as the Vice-Chancellor and Director and the staff of the Centre for Research and Knowledge Dissemination for all their contributions. We would also like to make this an opportunity to express a huge 'thank you' to all who worked hand-in-hand to make this event a success. Although the utmost effort was taken to keep up to the promise of providing an innovative, informative and enjoyable experience, and a perfect way to give farewell to the year 2015 on an academic note, we sincerely apologise for any inconvenience caused in regard to the organizing of the ARS 2015.

Finally, we wish all the presenters as well as non-presenting researchers of SUSL all the success in their research endeavours, making 2016 a promising year to our research portfolio.

Dr. R. G. Udeni Jayalal - *Chairman,* Dr. H. K. Salinda Premadasa - *Coordinator*
ARS 2015 – Fifth Annual Research Session

Sabaragamuwa University of Sri Lanka
Summary of the Keynote Speech

Vital Role of Academic Researchers in Anticipating Developmental Challenges

Professor S. H. P. Parakrama Karunaratne

Director in National Institute of Fundamental Studies, Kandy, Sri Lanka.

The primary duty of a university lecturer is known to be teaching undergraduates and postgraduates. However, academics are bound to conduct a substantial amount of research work in their specialized subject areas. Research work is essential for the generation of new knowledge and to develop and maintain the recognition of the academic and the institution, and also for carrier development. Hirsch Index or `H' index, based on the citations made for his/her publications, is one of the widely used measures to assess the performance of a researcher. Publication of novel research findings in higher impact journals while disseminating the research outcome through international and national research symposia should always be encouraged. Assessment of research output of an academic or an academic department or a university/institute can be done through `H' index and other similar methods of evaluation. Discussions are currently being held for introduction of such tools to assess Sri Lankan academics.

UNESCO Institute for Statistics had estimated an average of 894 researchers in the world per million inhabitants in 2004. According to the National R&D survey of Sri Lanka, the country had only 278 researchers per million of the local population from 2009 – 2012, with only 111 on a full-time basis. This number is far below than that of the countries in this region. If Sri Lanka is to be, at least, on par with the world average, approximately 20,000 S&T research personnel are expected to be engaged in R&D. It has been estimated that only 25% of the university academics are involved in active research at present. Thus, it is important to essentially channel the R&D expenditure of the Higher Education sector to motivate the remaining 75% of the university-based researchers by providing adequate incentives, research funds and facilities, so that they may contribute to the R&D efforts of the country by conducting active research and become mentors of research based postgraduate degrees.

Identification of research areas anticipating developmental challenges is also of vital importance to the country. Mere research to get the number of publications increased, or for promotions, would not serve the country in facing the

developmental challenges. However, it is important to note that the knowledge-based basic research, which may have no apparent significance or justification for country's short-term development, is also important for the advancement of a knowledge-based society. Research by academics in a university not only contributes to the development of knowledge, but also helps to develop a research culture among colleagues and, postgraduate and undergraduate students. This contributes to the generation of human resources with innovative ideas which can be linked to the rapid economic development in the country.

Transfer of knowledge from the researcher to the end user, especially in the field of S&T, is a huge challenge itself. Very often, our researchers are satisfied once the results are published and not concerned about transferring the knowledge. Even if the enthusiasm for knowledge transfer is there, they are reluctant to join hands with companies and the companies, in turn, fear taking up such novel challenges/opportunities. Although there are established intermediate organizations to bridge the gap between the researcher and the private partner, the fear of not receiving the due credit lies within the researcher. However, few stories of success do exist in Sri Lanka, where the researchers have effectively transferred the research findings by commercializing the products for the benefit of the country and the society.

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An Implication of Agent-based Simulation Model for Land Tenure Security and Utility Dynamics

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As UN-HABITAT highlighted urban squatting is one of the major issues that facing by the developing countries. It is well known fact that tenure insecurity that results from urban squatting hiders the economic progress of a country. It has predicted that the issue of tenure insecurity become severe in coming decades. Urban squatting mainly results from human-spatial relations govern by the market forces. However, expansion of squatting cannot only be deducted to market forces, other socio-economic relations associated with urban spaces such as inadequate land policies, mismanagement of public lands and attitudes of people are also contributing to this end. This makes urban squatting is a difficult issue to handle. Econometric models, however, the above human relations have largely neglected and hence they lead for ineffective decision making. Lack of understanding of the impacts of policy implication is another issue that face by the policy makers. Therefore, understanding the total-element relations and their dynamics within the context of urban land tenure is imperative for effective policy implication. In the current study, a literature review has been conducted to identify the socio-economic factors that are affecting on the expected benefits from land resources. This has led to identify the major elements of land tenure security that can be influenced by the human-spatial relations. Perceived uncertainty associated with expected benefits from those elements, however, is determined through interaction of three worlds, namely, world of social structure, world of perceptual structures and world of cognitive structures, and are codetermined within large autopietic system. Self-congruity theories, social structural theories, as well as cognitive science theories were use to define an analytical framework for the above interactions. This framework and the econometric model on utility of land tenure were then utilized to define an agent-based simulation model for land tenure security-utility dynamic model. The outcome of the model shows that total-element relations, sociometric, econometric, and cognitive structures of agents are imperative for successful policy implication.

Keywords: Land tenure system, land tenure security, agent-based models

Efficient Generation of 3D Building Models from Airborne Laser Scanning Point Clouds and Aerial Photos

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Geometrically and topologically correct 3D building models are required to satisfy the increasing demand in, for instance 3D cadaster, virtual reality, emergency response, robot navigation, and urban planning. Airborne Laser Scanning (ALS) is still the preferred data acquisition system for automated building modeling. Although ALS point clouds are useful for a highly automated processing workflow with high vertical accuracy, their sparse point distribution reduces the planimetric accuracy of model boundaries significantly. In comparison to the ground sampling of digital aerial images to the centimeter level, the planimetric accuracy of building models derived from point clouds is severely limited. Since point clouds and images have rather complementary properties, the integration of these two data sources leads to building models of high vertical accuracy, as well as planimetrical accuracy. In this study, a new framework for the automatic reconstruction of building models by integrating ALS point clouds and digital aerial image data is proposed. Topology preserving 3D roof models is first derived from point clouds. These models are subsequently refined to increase the planimentric accuracy with image data. In addition, some of the topological inaccuracies of the initial roof models are rectified. A novel approach employing a cycle graph analysis is introduced to generate the topology preserving roof models from point clouds. Initial and refined roof models derived from the developed schemes are analyzed with the ISPRS benchmark test data. The results of the three test scenes showed that both methods are acceptable, and can be used with more complex urban scenes. While proving the robustness of the cycle graph approach by the initial results, the refined models demonstrate that image integration improves the planimentric accuracy significantly, with almost 100% topological and geometrical correctness.

Keywords: Airborne laser scanning, cycle graphs, reconstruction

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Heterogeneous Sorption of Heavy Metal Cadmium by a Waste Material from Aquaculture Ponds: A Duality Approach

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Attention of the researchers, at present, is deserved by the heavy metal burden on the mankind and the environment. The issue is specially triggered with continuous anthropogenic inputs of chemical substances supposed to be rich in heavy metals. In particular, heavy metals such as cadmium (Cd) and arsenic (As) are considered as one of the causes of the Chronic Kidney Diseases of uncertain etiology (CKDu) in Sri Lanka. Consequently, management of such heavy metal inputs to the environment and also amputation of them are accounting priority area of research. Naturally forming aquaculture pond waste material (aqua waste) has demonstrated promising adsorption characteristics adding a value to the waste and reducing the burden of Cd in aqueous phase at ambient conditions simultaneously. This duality approach showed that under the optimized conditions of as little contact time and settling time as 30 minutes, unmodified aqua waste showed 98% removal of Cd from 10 mg dm^{-3} aqueous solution at 1:20 adsorbent/solution ratio. Amongst different adsorption isotherm models, the Freundlich model in its linear form depicted validity of the adsorbent- adsorbate (Cd) adsorption system at equilibrium with a high regression coefficient of 0.933. Such an adsorption is characterized by non-ideal sorption on heterogeneous surfaces, which explains multilayer sorption. Thus, the aqua waste exhibits its potential towards real time applications as an adsorbent for heavy metal Cd from aqueous solutions without prior modification of the material.

Keywords: Adsorption, anthropogenic inputs, CKDu, cadmium, heavy metal burden, isotherm models

Measurement of Digestible Phosphorus Content in Feed Ingredients for Poultry

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A study was conducted to investigate the usefulness of regression method to determine the true ileal phosphorus (P) digestibility of common feed ingredients for poultry. Four semi-purified diets were formulated from each ingredient to contain graded concentrations of total P. In all test diets, the test ingredient was used as the sole dietary source of P and the calcium: non-phytate P ratio was maintained at 2:1. Total P output in ileal digesta [expressed as g/kg dry matter intake (DMI)] at each level of inclusion were calculated and regressed against dietary P contents (g/kg DM) in a linear regression. True P indigestibility and endogenous P losses were calculated from the respective slope and intercept of the regression equation. True ileal phosphorus (P) digestibility coefficients of maize, canola meal, wheat, sorghum, soybean meal (SBM) and maize-distiller's dried grains with solubles (maize-DDGS) for broiler chickens were calculated to be 0.676, 0.469, 0.464, 0.331, 0.798 and 0.727, respectively. The endogenous P loss of maize, canola meal, wheat, sorghum, SBM and maize-DDGS were 0.020, -0.464, 0.080, -0.087, 0.609 and 0.418, respectively. For plant-based feed ingredients, the determined true digestible P contents were consistently higher than corresponding non-phytate P contents (Maize, 1.72 vs. 0.75; canola meal, 4.55 vs. 2.82; wheat, 1.49 vs. 1.11; sorghum, 0.78 vs. 0.55; SBM, 5.16 vs. 2.15; maize-DDGS, 5.94 vs. 4.36 g/kg, as fed basis, respectively). True ileal digestibility coefficients of P of three meat and bone meal (MBM) samples ranged from 0.420 to 0.693. The endogenous P loss of three MBM samples (MBM-1, MBM-2 and MBM-3) were determined to be 0.049, 0.142 and -0.370, respectively. Total and true digestible P contents of MBM-1, MBM-2 and MBM-3 were determined to be 37.5 and 26.0; 60.2 and 36.6; and 59.8 and 25.1 g/kg, as fed basis, respectively. The data suggested that the use of regression method to estimate true ileal P digestibility in feed ingredients has number of drawbacks. Overestimation of true ileal P digestibility as a result of using calcium and P-deficient diets and the negative endogenous P losses observed for some feed ingredients (canola meal, sorghum and MBM-3) were main concerns. Negative ileal endogenous P losses were also shown to be associated with low true ileal P digestibility in these feed ingredients.

Keywords: Digestibility, ileal, phosphorus, poultry

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Visualization of Context-Aware Web Service Clusters

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Web services have shown potential in a distributed computing paradigm that is suited to publishing and describing business processes and models as services. Therefore, most business organizations are moving towards the adoption of Web services, resulting in an increased number of services being published on the Internet in recent years. With this proliferation of Web services, service discovery is becoming a challenging and time-consuming task. Clustering Web services into similar groups, which can greatly reduce the search space for service discovery, is an efficient approach to improve discovery performance. A principal issue for clustering is computing the semantic similarity between services. Current approaches use similarity-distance measurement methods such as keyword, information-retrieval or ontology based methods. These approaches have problems that include discovering semantic characteristics, loss of semantic information and a shortage of high-quality ontologies. Further, the approaches do not consider the domain-specific context in measuring similarity and this has affected their clustering performance. In this research, we propose a context-aware similarity method that learns domain context by machine learning to produce models of context which is created using snippets that are extracted from real Web using search engines. Support vector machines are trained to produce a model for computing the similarity of Web services for different domains. We are able to compute reasonable similarity values by capturing the semantic relationships between services within a particular domain through the extracted context and trained support vector machines. In addition, our approach overcomes limitations of current similarity calculation methods, including the lack of up-to-date information, the lack of high-quality ontology, and the loss of machine-interpretable semantics. To analyze visually the effect of domain context on the clustering results, our clustering approach applies a spherical associated-keyword-space algorithm as the clustering algorithm that projects clustering results from a three-dimensional sphere to a two-dimensional spherical surface. Visualization helps with human manipulation of the results and gives inspiration for a specific domain from visual feedback. Experimental results show that our clustering approach works efficiently for the domain-context-aware clustering of services.

Keywords: Web services, web service clustering, context-awareness, cluster visualization

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Attitudes and Motivation of Second Language Learners: Particular Reference to Second Year Students of Faculty of Social Sciences and Languages in Sabaragamuwa University of Sri Lanka

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The competence in English language has now become an inevitable key to succeed in any scenario since it has become a pre-eminent international language today. Having learnt this phenomenon, the government had taken several steps to make English a compulsory subject in schools from grade three onwards and now most of the higher education institutes and universities have introduced English as a subject and most of them conduct their study programs in the medium of English. However, in spite of the great efforts exerted in the universities to teach English as a second language, one can hardly come across undergraduates fluent in English. In Sabaragamuwa University of Sri Lanka (SUSL) as well, most of the undergraduates' performances in the examinations raise serious questions on their English knowledge. The author assumes that even though many factors affect the second language learning, the undergraduates' attitudes and motivation play a major role in determining second language learning. Hence, this study aimed to investigate the attitudes and motivation of second-year students of Faculty of Social Science and Language (FSSL) in SUSL towards learning English. It also attempted to examine the relationship between undergraduates' attitudes and the grades they earned and the attitudes and the departments into which they are attached. In addition, it explored the undergraduates' overall motivation, motivation orientation levels, and looked into the correlations between the undergraduates' motivation with respect to their grades and departments. The study was carried out with hundred and ten second-year undergraduates at FSSL in SUSL using a survey designed on a five-point likert-scale. Informal interviews and classroom observations were also used to gather data. The data collected were analyzed through descriptive statistics, and Pearson correlation procedures. The study achieved its objectives by ascertaining that almost seventy percent undergraduates possess positive attitudes and high motivation towards learning English. The study also revealed that the undergraduates' attitudes and motivation do not differ in terms of the grades they earned and the departments they attached in to. However the study recommends taking necessary implementation to make better attitudes and create high motivation in language learners and enhance the quality of graduates in Sri Lanka by building their competency in English language.

Keywords: Attitudes, motivation, motivation orientation, second language learners

Demand Based Geographic Information System for Analyzing Recreational Opportunity in Protected Areas in Sri Lanka: Special Reference to Udawalawe National Park

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It has been a vast development of Information Technology in the globe. Geographic Information System (GIS) has been recognized as a useful tool by wide range of disciplines in managing, storing, analyzing and visualizing the spatial and non spatial data. Tourism is one of the disciplines which can be applied GIS technology to get maximum benefits. Tourism in Sri Lanka also helps to develop the economy of the country and it provides economic values to tourism resources as well. This study addresses to identify the recreational opportunity in protected areas in Sri Lanka by using GIS with special reference of Udawalawe National Park as one of the worth full protected areas for flora and fauna in Sri Lanka. The main objectives of the study were to identify potential areas for recreational activities in different degree and quickest and the cheapest paths for achieve various destinations inside the park and to publish all information related with tourism through Web GIS. Further, the study was analyzed the socio economic changes specifically due to tourism industry. The 1:50,000 digital data and topographic data from the Department of Surveying were used to create recreation related maps. Digitizing, Topological applications, Network analyzes, Geodatabase models, weighted overlay techniques, DEM, Proximity analysis, Web GIS were used to create and analyze the spatial data using Arc GIS 9.3. The secondary data were used to identify the current situation of the study area. Primary data was collected through a questionnaire survey and observation. Randomly selected 50 tourists and 100 of community members who are living around the study area were considered to analyze the socio economic changes due to the recreational activities. Chi-square was used to analyze the primary data using SPSS 16.0. To present the spatial and non spatial data maps, charts, tables were used. Finally all tourism data were stored inside the Geo-database using Transverse Mercator projection system. Study is identified the tourism potential areas including sight seen, adventure, and environmental sensitive areas. Study created a model based on the transport network system inside the park to identify the quickest and the cheapest paths to achieve various destinations. All information published through web GIS to easy access to the tourists. Study pointed out strength, weaknesses, opportunities and threats of recreational potentials in Udawalawe National Park, Sri Lanka.

Keywords: Geographic Information System, geo-database, recreation

Impact of Women's Labour Force Participation on Fertility Behaviour in Sri Lanka

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It is intricate for women to decide the time of the next birth, number of children and the time to stop childbearing. However, in modern society, due to changing of women's traditional household activities and the influence of various socio economic and demographic conditions the women take a decision on fertility behaviour. Especially the employment status of women is highly dealing with their fertility decision making. The main objective of the study was to identify the impact of women's labour force participation on fertility behaviour. Secondary data were obtained from the Demographic and Health Survey 2006/2007 conducted by the Department of Census and Statistics to analyze fertility behaviour at national level. Descriptive statistics and Cox regression method were mainly used for the analysis. The study found that women's labour force participation, exposure to the media, use of contraceptives (ever), age at marriage, husband's education, age difference between husband and wife, BMI, preferred number of children, women's education, residential sector, ethnicity and wealth Index are statistically significant in the determination of fertility behaviour of women. By expanding the result, the study further found that women's labour force participation is positively associated with the risk of ending childbearing at early ages and consecutive birth spacing. However negative relationship between women's age at first birth and labour force participation is recorded. The women who engage with elementary occupation and skill category recorded high risk of having first child at early ages. Therefore the study concluded that labour force participation as one of the important determinants in fertility behaviour of women. However, Sri Lankan labour market also pays low attention regarding child care facilities for their employees than other developed and developing countries. Therefore government and private sector should improve child care facilities in the working environment. Further there should be formal rules and regulation for child care facilities as a policy suggestion.

Keywords: Women's labour force participation, fertility behaviour

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Internet, Market Orientation and Customer Perceived Value: An Integration and Empirical Examination

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Customer focus being at the heart of a market orientation, a market-oriented organization is committed to generate superior value for customers. The Internet shows a great potential for information acquisition, sharing and dissemination, all of which are essential processes of market orientation. Yet, the emerging role of the Internet as a new and revolutionary way of performing market orientation has been patchy, with lacuna of theoretical frameworks and models. The nature of market orientation on the Internet particularly the mechanisms and intermediated variables underlying the relationship between market orientation and customer perceived value on the Internet remains an area of ambiguity. Drawing upon the market orientation theory and the consumption-values theory, the conceptual framework conjectures the mechanism underlying the relationship between market orientation and customer perceived value on the Internet with the use of a mediator called information-based value creation. Following the positivistic research paradigm and quantitative research design, face-to-face questionnaire survey was adopted. In order to meaningfully measure the research gap, a research setting where both sides of the service exchange are in a qualified position to assess the relationship between market orientation and customer perceived value was required. Data stemmed from 116 hotels, involving 116 managers and 644 tourists were used to assess the proposed relationships in the hotel industry in Sri Lanka using Partial Least Squares–Structural Equation Modelling. The findings demonstrate that the relationship between market orientation and customer perceived value on the Internet is mediated by information-based value creation in a complementary pattern. Moreover, the findings indicate that the proposed framework explains 96.6% of the variance in information-based value creation and 92.2% of the variance in customer perceived value, providing strong evidence of its explanatory power. The findings are useful for hotels to deliver superior value to their customers through proper integration of the Internet into market orientation process. The significance of this study stems from theory triangulation. Dyadic data collection and Partial Least Squares–Structural Equation Modelling are significant and novel contributions in terms of methodology.

Keywords: Customer perceived value, hotel industry, information-based value creation, internet, market orientation

Literature Surpasses History in Post-conflict Situations: Representing the 'Unrepresentable' through the Inter-ethnic Love Relationship in Karen Roberts' July

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In the face of military victory in 2009, it is socially significant to ensure that this new phase of post-conflict Sri Lanka regarding the relationship between the Sinhalese and the Tamils should be a lasting one. Part of this process of post-war recovery inevitably involves caring for and supporting the surviving soldiers and innocent civilians who have suffered physically and psychologically. One way to approach this connection between historicising the conflict and supporting traumatised survivors is to reconsider the past through literature that is exclusively based on Sri Lankan ethnic war. In this regard, the study questions whether literature surpasses history in post-conflict situations as history reveals facts and figures in a catastrophe whereas literature unfolds psychological trauma of the victims and survivors of an insurgency. Karen Roberts' *July* is a Sri Lankan English fiction based on the real incident of anti-Tamil riots in July 1983 – an organized mob violence of the majority Sinhalese against the entire Tamil race, the so-called minority in Sri Lanka. The novel represents the traumatic experience of the romantic relationship between a Sinhalese girl and a Tamil boy and how their inter-ethnic love relationship is responded by a multi-ethnic society. In this task, it is intended to give some inner consciousness and humanity to the emotional incidents related to the historical record of hostility in anti-Tamil riots in July 1983. In this regard, the term 'trauma' is unmistakable which directly connects with the representation of the suffering community in this novel. Trauma is a significant measure of psychological risks in terms of historical as well as modern political catastrophes. Underpinning the weight of the fiction given on the post-traumatic survival of the Sinhalese girl in the face of the murder of her Tamil man committed by her own Sinhalese brother, I argue that literature surpasses history in a post-conflict situation as literature carries more power in addressing the readers in a sensational manner about racism, hostility, torture and trauma whereas history aims to enhance knowledge of the readership regarding the facts related to roots of war, its causes and its crimes against humanity. The study concludes that literature representing the 'unrepresentable' trauma can be recognized as crucial in a post-conflict society where traumatic memory itself warns the reader not to inspire another trauma-inducing incident in the future.

Keywords: History, literature, post-conflict consciousness, survival, trauma

Moonlighting Trends in the Labour Market of Sri Lanka

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Holding two or more jobs by one individual is called moonlighting in Labour Economics. Dual job holding, multiple job holding and secondary job holding provide similar meaning for the term of moonlighting. Moonlighting has both micro and macro implications on both individual and the economy. In micro economic aspects, it provides supplementary income to the family leading to uplift the living standards of people while it has some negative socio and health implications on the individual worker. In macroeconomic aspects, it has positive implication on economic growth and that is acting as a coping strategy for inflationary pressure and shrinking labour force due to population ageing. The aim of this study was to carry out an economic analysis of the trends of secondary job holding in Sri Lanka. The study has used secondary data from Annual Labour Force Surveys conducted by the Department of Census and Statistics from 1999-2010. The age group 15-64 was used as the working age in this study. Data pertaining to the Northern and Eastern Provinces were removed from the analysis due to the inconsistency of the data availability due to conflict. Descriptive statistics were used to present moonlighting trends in Sri Lanka. During recent years, moonlighting has demonstrated an increasing trend as an important labour market dynamic. Male, married, middle aged and rural sector workers moonlight more while the gender gap in moonlighting trend is reducing by birth and labour cohorts. Both highly and less educated workers are moonlighting more. Spatially, Anuradhapura and Monaragala Districts are leading with higher rates of moonlighting. Skilled agricultural and fishery workers and professionals are the two leading occupational categories who are moonlighting while agricultural workers, workers from mining and quarrying and from education sector are leading in relation to production sectors. Moonlighting rate among public sector employees has been increasing continuously in Sri Lanka while that rate has been a continuous decline for formal private sector employees indicating the inefficiencies and poor human resource management in the government sector. Most of the moonlighters select agricultural employment as their second job. Mean number of work hours in primary employment has been stable in recent years while mean hours of work in the secondary employment have been increasing. This suggests substitution of leisure hours for work hours in secondary employment.

Keywords: Moonlighting, labour supply, recent trends

Politics of Tamil Fiction: A Critical Study of Class Contradiction and Ethnic Conflict Constructed in the Up-country Tamil Novels

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Up-country Tamils, descendents of the immigrant workers, brought by the British to Sri Lanka from South India during the 19th and early 20th centuries to work in their coffee, rubber and tea plantations, were predominantly settled in the central region of the hill-country. They evolved into a significant portion of the working class of this country during the pre–independent period and into a separate ethnic community in the post–independent Sri Lanka, identifying themselves as *malayahath thamilar* in Tamil and symbolizing the consolidation of their ethnicity separating themselves from the indigenous Sri Lankan Tamils. The Up-country Tamils have produced a rich and a unique variety of literary works, ranging from folk literature to modern poetry, fiction and theatre, the aesthetic expressions of their socio-political and cultural life. They are separately identified as malayahath *thamil ilakkiyam,* the Up-country Tamil literature, and constitute an integral part of Sri Lankan Tamil writing. The Up-country Tamil writers and also some writers from the North have produced a number of Tamil novels depicting the socio-cultural life of the Up-country Tamils. Most of the novels are in the realistic mode of narratives and portray the Up-country Tamils as an exploited working class and an underprivileged and suppressed ethnic community. The modern Tamil literary historians and critics have written on various aspects of Up-country Tamil literature, but there is no in depth studies on the politics of this writing. The paper studies critically the politics of selected Up-country Tamil novels to find out how the writers constructed the social reality into a fictional reality, the textual strategies they used to construct the social reality in their novels, their political ideology and aesthetic sensibility. The main focus of the paper is the political dimension of class and ethnicity portrayed in the novels and the aesthetic value of them.

Keywords: Upcountry Tamils, Tamil literature, socio-cultural life, suppressed ethnic community, political dimension, novels

The Linguistics Study of the Present Day *Vedda* Speech

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Vedda or Vanniyaletto as an aboriginal group of Sri Lanka have survived for several millennia by adapting and coping with internal and external stress imposed on them. At present they are facing pressure that threatens to modernize them which could easily result in disappearing their as an ethnic group. Over ten decades have passed since the time the Seligmanns (1911) did their field work on the culture of the Veddas has been changed considerably. Since then such significant changes create an urgent need for an update investigation in the field of Veddas study. Therefore the intent of this research is to identify the current linguistic situation of Vedda speech based on the current Veddas settlement areas, particularly in Dambana. As this research is a Qualitative Empirical Research, the Participant Observation Method based on Case Study has been used for data elicitation. The findings of this research show that the language contact phenomenon may play major role in the Vedda Language from their history to at present. With regard to language contact situation of Vedda Language, it shows that current Vedda Language has borrowed not only lexical stocks but also sounds, grammar, and meaning from dominant languages, particularly Colloquial Sinhalese. Through the key findings of this research, it is clearly evident that the present day Vedda Language is fast disappearing due to modernization. Finally the result of this research shows that the current Vedda Language became an extreme language mixture due to long time cultural and linguistic assimilation and the language situation is severely endangered.

Keywords: Colloquial Sinhalese, cultural assimilation, language contact, linguistics assimilation, modernization, vedda language

The Role of Occupational Role Salience and Value of Achievement on Work-to-Family Conflict among Dual-Earner Couples in Sri Lanka

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Work-to-family conflict has emerged as a rising issue for dual-earner families all over the world. Now this pattern is rapidly and inevitably spreading into Sri Lanka as well. In the wake of this, a better understanding of how to reduce work-to-family conflict has become an important conundrum for individuals, families, and organizations. Still the challenge remaining for researchers is to identify the unique antecedents and moderators that influence work-to-family conflict. Based on scarcity, identity, and value theories, we examined the direct and interactive effects of occupational role salience and value of achievement on work-to-family conflict. More specifically the direct effect of occupational role salience on work-to-family conflict was examined. Then the moderator effect of value of achievement in the relationship between occupational role salience and work-to-family conflicts were examined. This study was conducted based on positivistic research paradigm. Survey data was collected from 167 dual-earner couples in Sri Lanka. All the variables in this paper have been measured from the private sector employee perspective. A hierarchical multiple regression analysis was conducted to test the hypothesised model. The results showed that over salience in occupational role directly increases work-to-family conflict. Further, it reveals that individual's higher value of achievement directly impacts in elevating work-to-family conflict. This research will contribute for advancement of the existing knowledge as life role salience and values are still under researched areas in work-family literature.

Keywords: Dual earner couples, occupational role salience, value of achievement, work-to-family conflict

Voices of *Dasasilmātās*: Ethnographical Inquiry on Resistances against the Feminist Influence in the New *Bhikkhunī* Revival in Sri Lanka

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New *bhikkhunī* revival movement is a global project, which intends to empower Buddhist female renunciation with the idea of homogeneity. While acquiring this liberal notion of higher status, it has become a cause of fragmentation among alternative Buddhist female *renunciant* communities. This study mainly has brought criticisms for the Western liberal feminist approach. Although, the feminist academia and activists are one of the pioneers of the *bhikkhunī* revival movement in Sri Lanka, these International and local proponents are being criticized for their intervention. Thus, the main objective of this study is to recognize *dasasilmātās'* responses towards this mediation of feminist activism, as *dasasilmātās* are the oldest alternative form of female *renunciant* group, who highly affected by the new status of *bhikkhunī*-hood. This ethnographic study has carried out on the phenomenological basis by employing observation and in-depth interviews. The sample consisted of 16 executive committee members of the *Silmātā Jāthika Mandalaya*, 24 *dasasilmātās*, 10 *bhikkhunīs* and a government officer from the Department of Buddhist Affairs. According to ethnographic findings, most of *dasasilmātās* do not recognize and accept the International *bhikkhunī* higher ordination ceremonies and contribution made to them by local and international feminist activists. Interestingly, Majority of them did not recognize *bhikkhus* and other male activists as pioneer feminist activists, who also have involved in the reestablishment of *bhikkhunī* movement in Sri Lanka. Instead, they have highlighted the Western feminist influence. Therefore, they hardly identify the high profile of Asian feminist involvement in revival of *bhikkhunī* order in Sri Lanka. For instances, in reality there were multiple transnational *bhikkhunī* advocacy projects. *Dasasilmātās* not only equates feminism with the West, but also with elite class status. They reject accepting *bhikkhunī Kusuma* as the first *bhikkhunī*. Further, inner disagreements or fractions among local feminists and activists in the early period of the *bhikkhunī* revival movement are important concerns.

Keywords: Feminist, fragmentation, higher ordination, homogeneity, renunciation, revival

A Study of Physical Activity Level of Government Teachers in Colombo District

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Countries across a broad spectrum of economic development were experiencing an unprecedented rise in non-communicable diseases (NCDs). Non Communicable diseases were the leading cause of death globally than all other causes combined, of which 80% of deaths occur in low and middle income countries. The NCDs affect all levels of socioeconomic and ethnic groups. In considering the government teachers in Colombo district, most of them are doing their activities based on school and home. The prime aim of the present study was to identify the physical activity level (PAL) of the government teachers in Colombo district. Two hundred subjects were selected for the sample by using multi-stage sampling method. Data were collected through Global Physical Activity Questionnaire (GPAQ) that was developed by WHO to assess the PAL of people by considering work, transport and recreational related activities. Chi-squared test, Kruskall-Wallis test and Mann-Whitney test were used to analyze data by the Minitab 14 software. Average PAL of government teachers were 1009 MET min (910, 1109). Furthermore 19% (0.14, 0.25) government teachers were in high PAL and 28% (0.22, 0.35) in low PAL. 53% (0.46, 0.60) were indicates the moderate PAL. According to the BMI classification 55.3% of normal weight individuals were reported as high level of physical activity, 46.4% over weight individuals were reported as law level of physical activity and 83% of obesity individuals were reported as moderate level of physical activity. The PAL of male teachers (1175 MET Min) was significantly different from female teachers (961 MET min), ($p<0.05$). There was no significant effect of the transport media to the changes of PAL of the government teachers ($p>0.05$). Furthermore, average value of PAL was not significantly changed with the civil status of teachers ($p>0.05$). Present study reveals that, the government teachers who were subjected to the project were in moderate active level. Continued improvement in monitoring of physical activity would help to reduce the non-communicable diseases.

Keywords: Physical activity level, government teachers, BMI, GPAQ, NCD, MET min

A Study on the Impact of Automated Teller Machines (ATM's) Service Quality on Customer Satisfaction: Special Reference to People's Bank in Bandarawela

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Banking sector is the mirror of the economy anywhere in the world. In Sri Lanka, It is monitored by the Bank Supervision Department of the Central Bank of Sri Lanka. People's Bank is the state-owned commercial bank has paid attention to provide best customer service and to build strong customer relationship. Automated Teller Machine (ATM) banking is the popular access channel to banking services in Sri Lankan banking sector. Due to number of complains the first author found that there was a problem with ATM's service quality and customer satisfaction in People's Bank. The main purpose of this study was to identify the significant impact of ATM's service quality on customer satisfaction in People's Bank, Bandarawela. The current study stated seven hypotheses based on ATM's service quality dimensions including reliability, responsiveness, ease of use, convenience, fulfilment, security and accuracy. A quantitative, deductive approach with positive paradigm was used in the study. The study population was the customers of People's Bank in Bandarawela who currently uses ATMs. 163 customers were selected using the convenient sampling technique as the sample. Cronbach's alpha and KMO value ensured the reliability and validity of the questionnaire. The data were analyzed using correlation and regression analysis using SPSS 21.0 and Minitab 16.0 software. All dimension of ATMs' service quality had a significant positive relationship with customer satisfaction. Regression analysis resulted that reliability, responsiveness, ease of use and convenience had a significant positive impact on customer satisfaction, while security had a significant negative impact on customer satisfaction. As, regression analysis was eliminated the fulfilment and accuracy from regression model, there was no significant relationship of impact of fulfilment and accuracy on customer satisfaction. The current study revealed that ATM's service quality generates impacts on customer satisfaction at Peoples Bank, Bandarawela.

Keywords: Electronic banking, customers' satisfaction, service quality

A Study on the Prevalence of Eating Disorders among National Level Female Boxing Players in Sri Lanka

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According to the Diagnostic and Statistical Manual of Mental and Behavioural Disorders (DSM IV) Eating disorders include Anorexia Nervosa (AN), Bulimia Nervosa (BN) and Eating Disorders Not Otherwise Specified (EDNOS). Athletes who take part in weight category sports often feel pressure to lose weight rapidly and they follow abnormal eating patterns to reduce their weight. Therefore this study examined the prevalence of eating disorders among national level female boxing players. Subjects included were forty five national level female boxing players in Sri Lanka, aged between 18to 32 years. All the players were administered SCOFF questionnaire for screening and Eating Attitude Test (EAT- 26) to classify individuals at risk for eating disorders. Further, female Athlete Screening Tool (FAST) questionnaire was used to identify the player's eating behaviours, physical activity level and personal beliefs regarding their eating habits. Body Mass Index (BMI) was taken as an anthropometric parameter of the players. Chi squared was used to find the relationship between eating disorders and the value of BMI. Results of SCOFF questionnaire showed > 2 marks by 53.34%and were screened as at risk. According to EAT- 26 and DSM VI criteria, 53.34% were found at risk and 46.66% were not at risk. Among the risk players, 95.84% were Anorexia Nervosa and 4.16% were Bulimia Nervosa. Considering the BMI level 26.66% players were within normal limit and 73.34% players were in the underweight, overweight and obese categories. Chi squared test results showed that there was a significant relationship between eating disorders and the value of BMI ($p<0.05$). This study revealed that there was high prevalence of eating disorders among national level female boxing players and it is important to each national level sports team should have the access to the service of a qualified nutritionist / dietician to get dietary advices for minimize the risk of eating disorders.

Keywords: Eating disorders, female boxing players, SCOFF, EAT- 26, FAST

Addressing the Public Health and Food Security Concerns of Babesiosis through Molecular Detection of *Babesia bovis* in Suspected Carrier Cattle of Selected Localities in Sri Lanka

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Emergence of babesiosis in both public health and food security concern in global perspectives cannot be ignored. The dairy farming plays an important role in food industry that, fulfilling the protein requirement through producing both milk and meat. The farming operations may get hampered due to non-infectious and infectious diseases. Infectious diseases also cause huge production losses in all farming operations in time to time. Babesiosis is well known as an emerging zoonotic disease causing heavy production losses due to both the clinical diseases and carrier animals. Babesia parasites, mainly *Babesia bovis* and *B. bigemina*, are tick-borne hemoparasites inducing bovine babesiosis in cattle globally, and these parasites are considered to be endemic in central Sri Lanka and the prevalence of babesiosis is high in other areas. Carrier cattle infected with babesiosis have low number of parasites in circulation. Babesiosis is difficult to detect and is a challenge to conventional diagnostic methods. However, diagnosis of carrier animals in herd is important for preventing outbreaks by transmission through vector ticks to healthy animals and for obtaining epidemiological data of the disease. Here, we have conducted nested PCR detection of *B. bovis* in carrier cattle (Jersey crosses, Friesian crosses and Australian milking zebu) of selected localities of Sri Lanka. For this study, 30 blood samples collected from suspected carrier cattle were analyzed using light microscopy and nested PCR. Screening by light microscope indicated that 47% of the samples were positive. PCR analysis of samples diagnosed that 80% of the samples were positive. Hence, 33% of the animals appeared to be healthy through routine light microscope diagnosis were in fact carriers posing a threat for the healthy herd population. The high prevalence of babesiosis in carrier cattle in Sri Lanka emphasized that island-wide control and prevention programs against bovine babesiosis are needed to minimize the financial burden caused by the parasites to reduce to production losses. This preliminary study on molecular detection of *B. bovis* in selected localities offers a rapid and efficient screening method for suspected carrier herds while providing new avenues to minimize losers incurred in milk production due to unidentified carrier animals.

Keywords: *Babesia bovis*, PCR, bovine babesiosis, carrier animal, ticks

An Empirical Investigation on Solo Female Travellers in Sri Lanka

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Over the years, travel for leisure has seen a significant increase of Solo female participation. A Solo female traveller is a free and independent women traveller who is not having anyone available to travel with, at that particular time they make sheer desire or enjoyment of travelling along. The main objective of this study was to identify the behavioural characteristics and travel motivations of Solo female travellers in Sri Lanka. Also, the study discovered the relationship between Solo female travellers' attitudes & perception and satisfaction related to their holiday stay in Sri Lanka. The study completed with mix research approach based on structured questionnaire survey and structured personal interviews. The respondents were consisted of 50 Solo female travellers and 10 accommodation and travel service providers in the industry. The descriptive statistics and the regression analysis were mainly utilized to analyze the collected data. The findings reflected that Solo female travellers are the self-motivated young travellers who wish to use normal destination facilities. The majority of Solo females expect only budget facilities and their behaviours ordinary same as backpackers. In addition to that, travel motivations of this segment are 'visit a place that they have not visited before' and 'experience new and different lifestyles or traditions'. The regression results indicate that the factors 'Attraction & Facilities' and 'Supportive Services' have significant impact on Solo female traveller Satisfaction. The factors, such as Accommodation & Food, Infrastructure Facilities and Behaviour of Community, are not significantly impact on Solo female traveller Satisfaction. The findings of the study indicated the need of improvement in all the facilities to match with the requirement of this niche segment. This study provides the useful guidance and accurate information to establish a friendly environment to promote Solo female travel market in Sri Lanka.

Keywords: Attitudes and perception, satisfaction, solo female travellers, tourism, travel motivation.

Cultivated Paddy Area Identification and Rice Yield Estimation Using Free Satellite Images

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An effective pre-harvest rice yield estimation method is very important for assessment of seasonal rice production for strategic planning purposes. In Sri Lanka, a conventional method is used to estimate seasonal rice production and it fails to forecast rice yield before harvest because the experiment is conducted during the harvest. This study was focused to identify cultivated paddy lands and forecast rice yield using free satellite data. 8-day composite images (250m spatial resolution) from Moderate Resolution Imaging Spectroradiometer (MODIS) sensor onboard the NASA EOS Terra satellite were used from 2007 to 2014. In this study, a new method has been suggested to identify cultivated paddy lands by analyzing temporal dynamics of the paddy cultivation. Then linear and exponential yield forecasting models were built at different times of the season based on NDVI and EVI2 vegetation indices. Accuracy assessment results show that the suggested cultivated paddy lands identification method has ability to identify cultivated paddy lands with 74% average accuracy. According to the comparison between estimated yield and national statistical data, both NDVI and EVI2 based models give more reliable estimations about 96 days after beginning time of the season. But, EVI2 based model (derived at 96 days) give more reliable estimations than NDVI based model with 92% average accuracy. Therefore seasonal rice yield can successfully be forecast before one month to harvest time using EVI2 based model. Improvement of this study will help to forecast national level yield estimations in the country by illuminating problems faced with current system.

Keywords: Rice yield, vegetation indices, MODIS, NDVI, EVI2

Determinants of Capital Structure of Firms: Evidence from Colombo Stock Exchange

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This study investigates the determinants of capital structure of firms and the relationship between capital structure and the value of firm listed in Colombo Stock Exchange (CSE) Sri Lanka. The study involved 51 companies listed in CSE and has tested data for the period of ten years from 2005 to 2014. The Panel Data regressions model used to test the theoretical relationship between the financial leverage and determinants of the firms. The result reflected that all the variables are significantly affect on the capital structure decisions. Profitability, growth opportunity and non debt tax shield found negative association with the leverage while tangibility showed positive relationship with leverage ratio. The research found that the profitability, tangibility, growth opportunity and non debt tax shield are some key determinants of the capital structure decisions in Sri Lanka. Moreover, same sample and same method were used to analysis the relationship between capital structure and the firm value. The result of the study revealed that, share price and earnings per share have positive significant impact on leverage and price earnings has negative insignificant impact on leverage. Therefore, the end result revealed that capital structure has significant impact on firm's value.

Keywords: Capital structure, Colombo stock exchange, panel data regression

Development of Cashew Nut Spread with Cocoa

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Cashew nuts are one of the most nutritious, healthy and tasty tree nuts. Nut spreads are popular and widely accepted by the consumers due to their flavour, nutritional values and convenience. The market leader of the nut spread industry in Sri Lanka is the product "Nutella". However there are no locally manufactured nut spreads similar to the product "Nutella" in the local market. Therefore the prime objective of this study was to develop a nut spread with cocoa which is similar to the product "Nutella" using locally grown cashew nuts. Cashew nut spread with cocoa was developed using the ingredients of cashew butter, cocoa powder, sugar, water, vegetable oil, skimmed milk powder, whey powder, lecithin and carrageenan. Three developed spreads having different cashew butter to cocoa powder ratio were evaluated for sensory attributes of appearance, colour, odour, spreadablity, taste, mouth feel and overall acceptability. Another sensory evaluation was conducted with two developed spreads and the product "Nutella" to evaluate the same sensory attributes. Shelf-life of the most sensory scored sample was tested for six weeks by evaluating microbial, physico-chemical and sensory properties. A cost analysis was done for the selected product and its crude protein, crude fat, moisture, total solids, ash and crude fiber content were determined. Data about the sales of the product "Nutella" were collected from all local Cargills super markets for the year 2014 and for first five months of the year 2015.This study reveals that the cashew nut spread with cocoa prepared with 8.5% cashew butter and 5% cocoa powder scored maximum for almost all sensorial quality attributes and the product "Nutella" was most preferred than those of developed products. The best sensory scored sample could be stored best at refrigeration condition. A reducing trend was observed in pH value, but the product remained unchanged with respect to brix value and oil separation. The selected product contains 0.91% crude protein, 14.66% crude fat, 28.51% moisture, 71.49% total solids, 4.16% ash on dry basis and 1.83% of crude fiber. The cost for 180 g bottle of the best scored spread was Rs.70.10. Cashew nuts can be effectively used for the production of a nut spread with cocoa and it will open a new avenue for the utilization of cashew nuts. The developed product could have a good potential in Sri Lankan market.

Keywords: Cashew nut, cocoa, Nutella, nut spread

Event Related Brain Potentials on Visual Stimulus and Most Cognitive Tasks

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Brain Computer Interfaces (BCIs) are direct interfaces for communication between the Brain and the Computer. Event Related Potentials (ERPs) are a very important sub area of Brain Computer Interfaces which illustrate electrical potentials associated with the brain for auditory, sensory, motor or cognitive events. This is a newly spread area that can be used to provide better solutions for disabled people, diagnose diseases, credibility tests, virtual reality, robotic movements and so on. In this research, Electroencephalogram (EEG) based Event Related Potentials on two existing data sets have been used for picture-based visual stimulus and cognitive task. Preprocessing techniques such as filtering, segmenting, averaging are applied and decomposed independent components using Independent Component Analysis (ICA) to remove noisy and artifactural components. Common Spatial Pattern (CSP) as training model approach and Principal component Analysis (PCA) as feature extraction method are applied and Linear Discriminant Analysis (LDA), Quadratic Discriminant Analysis (QDA), and Log Regression Analysis (LOGREG) are applied as classification algorithms. Those processed datasets are used to identify most significant lobe areas, wave types and influence of P300 for visual picture stimulus & cognitive tasks and best classification algorithm for cognitive tasks. All findings are considered based on one subject is the limitation of the experiment. As the results of completing the above procedures, most significant lobe areas for picture visual stimulus were parietal lobe & occipital lobe, waves were P5, P3 and best classification method for cognitive tasks was Log Regression Analysis (LOGREG). P300 wave was mostly influence for the visual stimulus than the cognitive tasks. These findings can be used for developing devices for the people who are suffering with visual weaknesses and for the backward children. As ongoing research, based on ERP is creating a publicity available database for the credibility assessment and future work will be the experiments based on that database.

Keywords: Brain computer interface, filtering, heat maps, linear discriminant analysis (LDA), log regression analysis (LOGREG), quadratic discriminant analysis (QDA)

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Hormonal Regulation of Flower Quality According To the Method of Application in *Dendrobium* 'Jaq Hawaii' *x Dendrobium* 'Singapore White'

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Orchid cut flower industry plays a highly competitive role in global trade. Increased number of new entrants within the last decade has led to a tight competition. Consequently, the product quality standards have been upgraded. Inability to achieve specific quality requisites set by international floral auctions has become a major obstacle to increase local share in global trade. Diurnal Temperature Variation (DTV) of 10-12 °C is ideal to increase quality and quantity of orchid flowers. Due to sudden day-time rains in highest orchid producing areas of Western Province, do not allow plants to be exposed to required DTV. Therefore, the present experiment was conducted at Sumudu Orchids, Padukka (Mid Country Wet Zone) under 50% shade level to investigate the effect of plant growth regulators on enhancing flower quality. Sole and combination effects of Giberelin A_3 (GA_3) and 6-Benzylaminopurine (6BA) were tested according to drench and spray mode of application on intergenera, *Dendrobium* Jaq Hawaii x *D.* Singapore White. The experiment was arranged with Randomized Complete Block Design and each treatment combination contained five replicates with four plants per each. Data on average petal length, petal width, sepal length, sepal width, labellum length and labellum width, area of flower and internode length were collected on the fourth day after full blooming. Time taken for blooming was calculated starting from when the flower bud reached 3 mm diameter to full blooming. Sole application of 125 mg/L GA_3 increased petal length, sepal length and labellum length whereas, 200 mg/L 6BA increased the petal width, sepal width, labellum width and area of flower. Reduced internode length was observed in every treatment which contained 125 mg/L GA_3. Both sole application of 125 mg/L GA_3 and combination of 125 mg/L GA_3 with 200 mg/L 6BA were able to reduce days taken for blooming. Internode length and ratio between length and width of petal, sepal and labellum were minimum at 200 mg/L 6BA. It enriches the visual appearance. Between the modes of applications, spraying was found to be the best. Therefore spraying 200 mg/L 6BA can be suggested as a potential treatment to increase flower quality in *D.* Jaq Hawaii *x D.* Singapore White.

Keywords: *Dendrobium*, drench, flower quality, plant growth regulators, spray

Identification of Zinc or Aluminium Phosphide in Agricultural Commodities by Phosphine Generation using Gas Chromatography

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Zinc phospide (Zn_3P_2) and aluminum phosphide (AlP) are well known rodenticides which are used to control insects and rodents especially at grain storages. In the aqueous or acidic medium metal phosphides releases phosphine gas (PH_3) which is harmful to rodents, who do not have a vomiting reflex. Exposure of higher concentrations of PH_3 can be harmful to domestic animals and even human life. The $AgNO_3$ test was conducted to acquire a draft idea about the presence of metal phosphide in the samples. For the analytical purpose, samples were hydrolyzed with aqueous sulphuric acid inside a gas chromatography-headspace (GC-HS) vial. Toluene was used to trap the released PH_3 and the vials were roller mixed to get a better extraction. The toluene layer was separated and inspected by gas chromatography–nitrogen phosphorous detector (GC-NPD). Metal identification of the chemical compound was done using inductively coupled plasma mass spectrometer (ICP-MS). Only one sample out of five tested samples showed positive contamination with metal phosphide. The ICP-MS results confirmed the presence of AlP in the suspected chemical compound. This method could be used to identify metal phosphide contamination in agricultural commodities like rice, dhal, coriander and other grains.

Keywords: Metalphosphide, phosphine, toluene trapping

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Key Determinants of Cross Selling of Dwelling House and Personal Accident Policy for Private Motor Car Policyholders: Special Reference to AIA General Insurance Lanka Ltd.

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This study pertained to examine the Private Motor Car insured's cross selling viability on Dwelling House and Personal Accident policies in AIA General Insurance Lanka Ltd by mixed method. AIA product portfolio Dominated by motor insurance, which is a loss line class among general product classes. Cross selling non motor products to motor insured became an essential requirement for AIA because this will improve combined ratio of this company. Throughout the previous literature, many scholars revealed that cross selling direct antecedents namely cross selling self efficacy, motivation and role clarity were valid predictors of cross selling sales performance and the particular study hypothesized that there is a significant impact of cross selling sales performance: its direct antecedents (Cross selling self efficacy, motivation and Role clarity). In this study, 196 wealth planners from 36 branches were selected randomly, and data were collected through in-depth interviews with 15 managers. The data were analyzed by data reduction, data display and conclusion was drawn. The particular mix method study confirmed cross selling self efficacy, motivation and role clarity have significant positive impact on cross selling sales performance and managers were perceived that cross selling significant for AIA and General Insurance Industry of Sri Lanka. Customer awareness, wealth planners' lack of interest on non motor products, cross selling training, target, motivation and attractive products are the factors affecting cross selling sales performance. Hence, this study provides new insights to management for building future plans and strategies.

Keywords: Cross selling motivation, cross selling sales performance, cross selling role clarity, cross selling self-efficacy

Modelling Canopy Development of the Fourth Plantation Crop in Sri Lanka

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Gliricidia sepium (Jacq.) Walp. is a leguminous Multi-Purpose Tree (MPT), and is the fourth plantation crop in Sri Lanka. Also it ranks as the second highest consumed leguminous tree in the world. But insufficient quantitative information on eco-physiological response to various climatic conditions has resulted in poor decision making for energy plantation management of farming systems. Quantification of the canopy development and thereby dry matter production by means of a crop model is the only reliable tool to quantify the complex processes involved with physiology and environmental interaction of a crop. Hence, the present study is focused on modelling the leaf area increment and shoot extension (canopy development) in *G. sepium*. The study followed 3 main steps as (1) Model development, (2) Model calibration and (3) Model Validation. The model consists of different sub-modules that deal specifically with weather and crop. The weather module calculates the thermal time for developmental processes of the crop using weather data and cardinal temperatures. The main time step is one day and uses a daily input of weather data, and is designed to simulate canopy development of the crop. The parameters and relationships needed to build the functions in the model were derived from calibration and validation field experiments conducted at the farm, Faculty of Agricultural Sciences, Sabaragamuwa University of Sri Lanka. The canopy development model was calibrated using experimental data for leaf area (LA) and shoot length (SL). The calibration results reported that, the simulated LA correlated well with measured values with model efficiency measure (N-S) of 0.96 and mean absolute error (MAE) of 7.8 cm^2. Similarly, simulated SL correlated well with measured values with N-S, 0.97 and MAE, 1.07 cm. The model validation with independent field data from the shade trees of tea land for LA showed satisfactory model performance with N-S, 0.78; MAE, 12.7 cm^2. The developed model will be useful to predict the LA and thereby Leaf Area Index (LAI) which is essential to calculate dry matter Production for the energy plantations in Sri Lanka.

Keywords: Crop simulation, *Gliricidia*, canopy development, thermal time, cardinal temperatures, modelling

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Rainfall Pattern Analysis and Build Rainfall Forecasting Model

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Identifying the rainfall pattern is increasing demand for each and every country to prepare plans for future. Also identifying the rainfall pattern is very important to prevent and to prepare for upcoming natural hazards. For a country like Sri Lanka, Rathnapura district has a very complicated climate pattern. Sometimes floods were occurred rapidly and severe droughts take place again in a few months. So a study of the rainfall pattern is very important to understand these climatic changes. So the main objective of this study was to build a model to forecast the rainfall pattern using existing rainfall data of the study area. The study was also aimed to validate seasonal changes up to some extent using Standard Precipitation Index (SPI). For this study, statistical approach was carried out to find the pattern or trend of the rainfall data. First, eight Rain Gauge locations were selected inside of the study area. Then rainfall data from eight rain gauge locations were collected from the Meteorological Department of the Sri Lanka. Various statistical methods such as Regression analysis, Trend analysis, SARIMA model, were used to identify most suitable statistical methods to predict precipitation data. After utilizing all above mentioned methods, SARIMA model was identified the most suitable method to derive the model with required accuracy with 95% confidence level for the obtained results. Then models were derived separately for Gauge Stations. Then values were forecasted using those models. Due to the deviation of forecasted values with the actual values, validation procedure was carried out by using derived SPI values. Then output was mapped with the aid of Arc GIS software to get the rainfall contour maps of future forecasts for first five months in 2016 year. Then graphs were drawn to identify the relationship between predicted precipitation values and SPI values. Finally, with the aid of the derived models, forecasted values and derived graphs; final conclusion has made as there wasn't any identifiable or clear trend in precipitation amount in the study area according to this research.

Keywords: Rainfall pattern, statistical approach, SARIMA model, rainfall contour map, SPI value

Soil Erosion in *Uma Oya* Watershed and It's Association with Water Quality

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Soil erosion and sedimentation are naturally inter-related processes occurring in the landscape. Human interventions accelerate the soil erosion in catchments increases the amount of sediment delivery to the rivers causing water quality deterioration. Uma Oya watershed is an intensively cultivated landscape with high levels of human activities contributing to land degradation. However, the empirical evidence on quantitative assessment of soil erosion and their association with surface water quality is lacking in the context of river catchments in Sri Lanka. Therefore, this study was aimed to determine the relationship between soil erosion and its' association with water quality in Uma Oya watershed. The soil erosion rates of the ten selected micro-catchments were evaluated using Integrated Valuation of Ecosystem Services and Trade off (InVEST) Sediment Retention Model, which is based on Revised Universal Soil Loss Equation (RUSLE). Stream water quality was assessed for water samples collected at the stream sections at the base of each micro-catchment at monthly intervals. Physicochemical water quality parameters and benthic macro-invertebrate indices of EPT taxa and Chironomidae% were calculated to evaluate the overall ecological health of the streams associated with micro-catchments. Pearson's correlation test was conducted for water quality and sediment delivery data to estimate their association. The results indicated that average soil loss of selected micro-catchments varied between 36.44 tons/ha/yr to 222.38 tons/ha/yr. Correlation analysis between average soil loss and average water quality parameters at sub-catchment level indicated significant ($p<0.05$) positive relationships with phosphate concentration, %Chrinomidae, BOD, alkalinity and TDS concentrations. A significant ($P<0.05$) negative correlation was detected with %EPT taxa. The findings of the present study suggest that the stream ecological health and soil erosion in the catchment are closely related indicating possible impacts of land degradation.

Keywords: InVEST sediment retention model, soil erosion, water quality

The Impacts of Job Involvement, Work Related Social Support and Working Time on Work Interference with Family Conflict With Reference to Orit Apparels Lanka (Pvt.) Ltd: Seethawaka 03

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Work-family conflict has been come in to play in most individuals' lives since it creates negative effects for organizations' as well as individuals' well being and behaviour. Current study focused on work interference with family conflict which is one dimension of the construct of work-family conflict. Since work interference with family conflict was found as the problem in Orit Apparels Lanka (Pvt.) Ltd. - Seethawaka 03 which derived through a preliminary survey. This study examined the impact of work related social support, job involvement, and working time on work interference with family conflict. Population in this study accounted for 349 employees where the sample comprised of 191 employees and the stratified random sampling method applied to select the sample. Self-administered structured questionnaire was employed to assess all the variables of the study. Both Minitab 16 and SPSS 21 software packages were used in data analysis. Statistical results from multiple regression analysis indicated that work related social support was negatively impact on work interference with family conflict. Job involvement was found as an antecedent which also impact on work interference with family conflict. On the other hand, working time was found to have no significant impact on work interference with family conflict. Among the significant variables the highest impact on work interference with family conflict was indicated by job involvement. As future research directions, it would be beneficial to expand the research done on work interference with family conflict in the garment industry in Sri Lanka since that sector having the issue among all levels of employees as well as the antecedents relevant to family domain would be further take into consideration. Findings also emphasize the managers to take necessary steps to derive more family friendly policies in organizational context in order to reduce work interference with family conflict.

Keywords: Job involvement, work family conflict, work interference with family conflict, work related social support, working time

Value Chain Management of *Moringa oleifera*

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Moringa *(Moringa oleifera)* is potentially one of the planet's most valuable plants for human use, however it is under researched and used only to a limited extent. The Moringa is a tree crop raised for food rather than timber, and could be described as a food market on a trunk. The tree yields at least four different edible parts; pods, leaves, seeds, and roots. Beyond edibles, it provides products that contribute to village life and self-sufficiency across Africa and Asia. However limited research base and a lack of knowledge make it difficult to identify and manage value chain innovations which could improve utilization of the crop. This research was intended to explore the Moringa value chain, giving special attention to its governance and coordination. Data collection was done using interviewer administrated structured questionnaire with three categories of respondents; farmers, intermediaries and consumers. The sample was identified using a combination of multistage sampling and snowball sampling. Two distinct value chains were identified relating to pods and leaves respectively. Descriptive statistics shows that other than the male head of the household, traders are the key decision makers in production activities. The decision to grow Moringa has significant relationship with factors like demand for Moringa pods in the market, tolerance to drought, low cost and high yield of Moringa. Inferential analysis showed that Sales decisions were influenced by; price, convenience of transport and transparency of the transactions. Application of the Mann-Whitney test indicates that Moringa leaf value chain showed a greater level of coordination than the Moringa pod value chain. Consumer preferences lie with pods rather than leaves. RBQ test results confirmed that the unavailability of leaves in the market contributes to this. Results revealed that the demand for both pods and leaves is year round, however seasonality has a significant impact on consumption patterns indicating a positive demand trend and future opportunities.

Keywords: Coordination, decision making, *Moringa oleifera*, value chain, governance

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