ARS
2022

ABSTRACTS
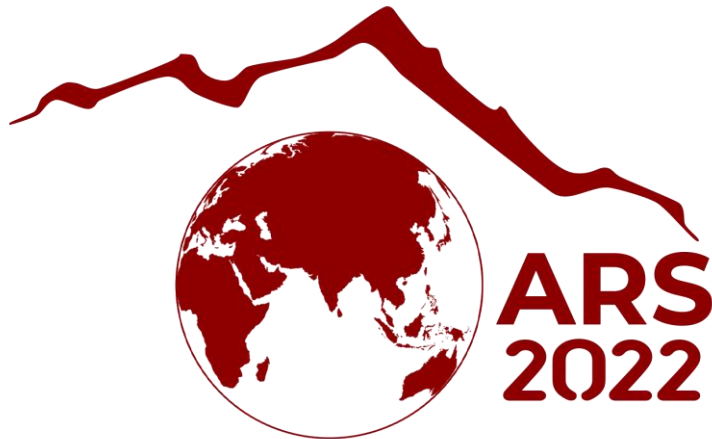
12th Annual Research Session of
Sabaragamuwa University of Sri Lanka

06th December, 2022
Belihuloya, Sri Lanka

12th ANNUAL RESEARCH SESSION

SABARAGAMUWA UNIVERSITY OF SRI LANKA

06th DECEMBER 2022

SABARAGAMUWA UNIVERSITY OF SRI LANKA, BELIHULOYA, SRI LANKA

Abstracts of 12th Annual Research Session, Sabaragamuwa University of Sri Lanka

(ARS2022)

12th Annual Research Session

Sabaragamuwa University of Sri Lanka

Organized by

Centre for Research and Knowledge Dissemination

Sabaragamuwa University of Sri Lanka

06th December 2022, Sabaragamuwa University of Sri Lanka, Belihuloya

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06th December 2022, Sabaragamuwa University of Sri Lanka, Belihuloya

Message from the Vice Chancellor
Sabaragamuwa University of Sri Lanka

It is with great pleasure that I extend my warmest wishes to mark the occasion of the 12th Annual Research Session (ARS-2022). The annual research session of the Sabaragamuwa University of Sri Lanka has provided an ideal platform for university academics, postgraduate and undergraduate students to share their research findings, and I am confident that the young academia of the Sabaragamuwa University of Sri Lanka will immensely be benefited from the Annual Research Session.

I take this opportunity to congratulate the organizing committee for taking the challenge and organizing the 12th Annual Research Session in a very professional manner. The effort, encouragement and dedication of the postgraduate and undergraduate students on the research work despite the crucial situation of the country would be highly appreciated. I have no doubt that the Annual Research session will offer our university academia to share their international and national experience, latest research findings and insight with their colleagues in the different fields of interest.

I also take this opportunity to appreciate and thank Director/ CRKD and the Organizing Committee for their untiring effort to make the Annual Research Session a success.

Senior Professor R.M.U.S.K. Rathnayaka
Vice-Chancellor
05.12.2022

06th December 2022, Sabaragamuwa University of Sri Lanka, Belihuloya

Message from the Director
Center for Research and Knowledge
Dissemination

It is a great pleasure and honour to convey this message to the 12th Annual Research Session (ARS) of the Sabaragamuwa University of Sri Lanka, which will take place on 6th December 2022. ARS is an annual event organized by the Center for Research and Knowledge Dissemination (CRDK) to provide a platform for academics, postgraduate and undergraduate students to share the latest research findings in emerging areas with the multidisciplinary scientific community of SUSL.

Fifty-three papers submitted by academics and postgraduate students were accepted for oral presentation. Further, seven papers from Undergraduates were also accepted for the poster session. This would be a great success in terms of the quantity and quality of the submitted research papers. The presentation will be pre-recorded with live questions and answer sessions. We are very proud to host the first-ever research colloquium of the medical faculty of SUSL. I take this opportunity to pay my appreciation to the Dean, Prof. Nirmali Wickramarathne, and Dr. Kaushalya Kulathunga, Faculty Coordinators bearing all the responsibilities to organize the colloquium of the Medical Faculty.

We are more privileged to have eminent scientist Prof. R.M. Gamini Rajapakse, Senior Professor, Department of Chemistry, Faculty of Science, the University of Peradeniya as a keynote speaker and looking forward to listening to motivational speech to inspire young academics for more and more innovations for the betterment of the country.

I appreciate and acknowledge the leadership and guidance of the Vice-Chancellor Prof. R.M.U.S.K. Rathnayake and the support of the Registrar and Bursar in making this 12th ARS a success. I would like to thank all the members of the organizing committee, Dr. RVSPK Ranatunga (Chairmen/ARS), and Dr. (Mrs) L.D. Kalyani (Co-Chair /ARS) and Dr. Gihani De Silva (Secretary/ARS), Mr. K.K.D.W.S. Kannangara, Mr. Ashan Induranga, and Mr. Sathuta Sellapperuma Faculty Coordinators and Ms. Dilshika Polwatta (Research Assistant/CRKD) for their tremendous efforts, to make this event a success. I would like to thank the Dean of the Faculty of Graduate Studies, Prof. H.M.S. Priyanath, who has made significant contributions, bearing all the responsibilities for organizing the postgraduate colloquium.

More importantly, my sincere thanks extend to the authors of the manuscripts, the keynote speaker, the technical program committee members, technical session chairs and rapporteurs, language editors, poster presenters, and all other participants who assisted in this endeavour in numerous ways to make this event a reality.

I hope that this unique multidisciplinary conference will provide our participants with a truly transformative experience through a variety of knowledge and perspectives.

Prof. Chandrika Dissanayake
Director/CRKD

06th December 2022, Sabaragamuwa University of Sri Lanka, Belihuloya

Message from the Chairman
12th Annual Research Session 2022

I am very happy to issue this message on behalf of the Organizing Committee of the 12th Annual Research Session (ARS) of the Sabaragamuwa University of Sri Lanka. I hope this will be a valuable platform to share with others the innovative research findings of this year brought out by scholars, postgraduate students, and undergraduates from various faculties of the university. Consequently, researchers could obtain good comments from senior academics from different disciplines, which will be another excellent opportunity to expand their research studies.

This year's ARS is concerned with conducting presentations under three categories. The academic staff members of the university who conducted research studies and completed their post-graduate degrees locally and internationally includes in the first category. The second category is comprised of postgraduate students from the faculty of graduate studies of the university, and finally, undergraduate students participate in their final year research studies on poster presentations. The ARS 2022 abstract book has been registered as an international standard publication under the ISBN.

I would like to give my sincere appreciation to Professor Gamini Rajapaksa of the University of Peradeniya for his invaluable service as the keynote speaker, and it is an honour and a privilege for the entire academic community of SUSL to share the experiences of a world-renowned professor.

I would like to express my sincere thanks to Prof. R.M.U.S.K. Ratnayake, Vice-Chancellor of the Sabaragamuwa University of Sri Lanka, for his immense support, encouragement, and necessary guidance in this task. I would like to express my deep gratitude to the Director, CRKD Professor Chandrika, and her staff for the support given to us by sitting behind and giving the necessary advice and administrative contribution to make this work successful. Also, I highly appreciate the support shown by Prof. H.M.S. Priyanath, Dean of the Faculty of Graduate Studies, for organizing a part of this work.

Finally, I would like to thank all my colleagues, including Secretary, Co-Chairman, Faculty Coordinators, and research assistant/CRKD, who worked extremely hard to organize this event. Thank you very much for your teamwork. I wish you all an exciting and inspiring research session.

Dr. R.V.S.P.K. Ranatunga
Chairman of the Organizing Committee
ARS 2022 – 12th Annual Research Session

06th December 2022, Sabaragamuwa University of Sri Lanka, Belihuloya

Message from the Dean
Faculty of Graduate Studies
Sabaragamuwa University of Sri Lanka

It is indeed with great pleasure that I issue this congratulatory massage for the Annual Research Session (ARS) of the Sabaragamuwa University of Sri Lanka, as it is a very significant event organized annually to provide scholars, postgraduate and undergraduate students with a platform to disseminate their research findings. This Annual Research Session organized by the Center for Research and Knowledge Dissemination (CRKD) of the Sabaragamuwa University of Sri Lanka is particularly significant for the Faculty of Graduate Studies (FGS) as FGS is fortunate enough to organize its Graduate Colloquium – 2022 with the collaboration of the CRKD as one of the main events in the ARS of the Sabaragamuwa University of Sri Lanka. FGS annually organizes the Graduate Colloquium to encourage postgraduate students to share their research findings and progress with a panel of experts which will help them improve their postgraduate studies. I am confident that the postgraduate students of the FGS will immensely be benefited from this event.

I take this opportunity to congratulate the organizing committee for taking the challenge of organizing the ARS in a very professional manner. I have no doubt that the ARS–2022 will offer our university academia and postgraduate students to share their latest research findings and insights with their colleagues and experts in a multi-disciplinary forum.

On behalf of the FGS, I extend my sincere thanks to the Director–CRKD, Chairmen-ARS 2022, and the members of the organizing committee who shouldered the task of organizing the ARS – 2022.

I wish all the participants an interesting, thought-provoking, and productive event.

Professor H.M.S. Priyanath
Dean
Faculty of Graduate Studies

06th December 2022, Sabaragamuwa University of Sri Lanka, Belihuloya

Message from the Dean
Faculty of Medicine

As the Dean of the Faculty of Medicine, it is with great pleasure and honor I forward this message to the Annual Research Session 2022 (ARS 2022) of the Sabaragamuwa University of Sri Lanka. The ARS Sabaragamuwa University of Sri Lanka has come a long way steadily and uninterruptedly with the aim of disseminating of knowledge and creating a scientific platform for early-career researchers of the Sabaragamuwa University of Sri Lanka.

This year ARS 2022 is significant for the Faculty of Medicine as we are holding the First Medical colloquium of the faculty as a part of the sessions. This opportunity created a forum for the gathering of professionals in diverse fields to exhibit their research findings in the field of Medicine, and also to bridge the gaps through collaboration and acknowledging multidisciplinary research to provide sustainable solutions for the healthcare need of the community, nation, and the world at large.

On behalf of the Faculty of Medicine, I congratulate the Director, Center for Research and Knowledge Dissemination (CRKD) Prof. Chandrika Dissanayake, conference chair Dr. R. V. S. P. K. Ranatunga, the Faculty of Medicine coordinator Dr. Kaushalya Kulatunga, and all the committee members for organizing this conference. I congratulate all the presenters and wish a successful session for all participants.

Prof M. Nirmali Wickramaratne
Dean
Faculty of Medicine

06th December 2022, Sabaragamuwa University of Sri Lanka, Belihuloya

Summary of the Keynote Speech

Complexity, Science and Technology in Sustainable Economic Development

Prof. R.M.G. Rajapakse

Department of Chemistry, University of Peradeniya, Sri Lanka.

Scientists play a pivotal role in sustainable development. Out of seventeen sustainable development goals (SDGs), American Chemical Society identifies seven of them and additional five that chemist has direct contributions. This lecture begins with highlighting complexity of science, day-to-day activities, organizations, etc. Based on the randomness, there are three types of complexities, namely, science of simplicity, science of organized complexity and science of disorganized simplicity. Newtonian mechanics, Einstein's theories etc. belong to the science of simplicity as the trajectories (paths) of the systems can be identified. Steam engines, thermodynamics, etc., belong to the science of disorganized complexity since it is not possible to identify trajectories of these systems. The connections in organizations such as departments, offices, institutions, industries, etc. come under science of organized complexity. For our purpose, the complexity can be defined as many different elements (such as specific technologies, raw materials, products, people, and organizational units) that have many different connections to one another. The complexity matrices can be solved to find out relations and importance of connections within different segments of an organization. For instance, agriculture is a complex issue connecting various segments and abrupt breaking of one path may lead to drastic consequences as we have recently realized. The economic development of a country, region or world depends mainly on how many products a country, region or the world is manufacturing and how many of them are unique to the given country. This is manifested by the number of patents produced and how many of them have been converted to commercial products, processes, or devices. To do so, knowledge is important in the sense that the knowledge that can be translated to the development of new products. Finally, the lecture contains the new products, processes and devices developed by the keynote speaker, particularly, in converting natural minerals to value added products. It is stressed that the minerals should not be exported in their raw form without value addition. The challenges in scaling up of laboratory research to manufacture commercially important products are highlighted. Also, the importance of research collaborations in the local and global contexts is highlighted giving adequate examples. The contributions individuals can do to improve national economy are discussed.

Session I - Professional Forum

Agricultural Sciences, Applied Sciences, Management Studies, Geomatics, Social Sciences & Languages, Center for Computer Studies

06th December 2022, Sabaragamuwa University of Sri Lanka, Belihuloya

Psychological Capital and Affective Organizational Commitment Among Employees of the Handloom Industry in Sri Lanka: The Mediator Role of Work Engagement

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The study examined the effect of psychological capital on work engagement and employees' affective organizational commitment of employees in the weaving centres of the Handloom sector in Sri Lanka. Further, it attempts to find out the mediator role of work engagement in the relationship between psychological capital and affective organizational commitment. The study expands the literature on relevance by contextualizing it in one of Sri Lanka's indigenous sectors of the Handloom industry based on the Conservation of Resources (COR) Theory and the Job Demand-Resources (JD-R) Theory. Data was collected from 361 employees in the Handloom industry in Sri Lanka. The quantitative analytical technique was employed in this study through Smart Partial Least Square - Structural Equation Modelling. The study revealed that psychological capital has positively related to affective organizational commitment and work engagement, the association between psychological capital and affective organizational commitment was mediated by work engagement. This research makes a novel contribution that work engagement mediates the association between employees' affective organizational commitment and psychological capital dimensions of hope, efficacy, resilience and optimism. The study contributes to the body of knowledge on both the JD-R theory and COR theory by expanding the theoretical understanding of the mediation effect of work engagement in the relationship between psychological capital and affective organizational commitment.

Keywords: *Affective Organizational Commitment, Handloom Weaving Centre, Psychological Capital, Work Engagement.*

Effect of ICT Strength on Transaction Cost and Business Performance: An Empirical Investigation of SMEs in Sri Lanka

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The development of the SME sector is a challenging process which records a high failure rate. Many scholars have highlighted that SMEs are not equipped with sufficient knowledge and information to make rational decisions compared to large firms. Therefore, they suffer the hazard of opportunism and lead to generate Transaction Cost (TC), which discourages firms' Business Performance. Since ICT is able to assist in finding solutions to safeguard their transactions to improve business performance, this study explores the prospects of utilizing ICT on TC and the business performance of SMEs in Sri Lanka. The conceptual research model contained the independent variable, ICT strength and the dependent variable, the business performance of SMEs, while using TC as a mediator for developing and testing hypotheses using quantitative method. A sample of 400 manufacturing SMEs was selected from 81,531 SMEs in Sri Lanka by applying the Inverse Square Root Method. Pre-tested structural questions were used for data collection. Partial Least Square - Structural Equation Modelling (PLS-SEM) was used to analyze the data using SmartPLS V3. The dimension of ICT strength has a significant negative impact on TC-related determinants and assumptions, except for transaction frequency. These dimensions have had a negative impact on the TC and yet made a significant positive impact on the business performance. Uncertainty, asset specificity, bounded rationality, and opportunism negatively have impacted the business performance of SMEs, while transaction frequency was affected positively. TC did not significantly impact on business performance of SMEs. ICT strength substantially reduces the TC, and TC as a mediating variable makes neither a significant effect directly on the business performance nor on the relationship between ICT Strength and SME business performance. The study strongly recommends that SMEs reinforce their ICT strengths, especially mobile technology, with applications which can assist in minimizing the impact of TC and its related factors. The study obtained a large explanatory ability by examining all the dimensions of ICT strength, TC, and business performance that have not been studied yet. The experiment on mediating effect of TC and related factors also made a unique contribution. Research establishes a new theoretical foundation for Transaction Cost Economics (TCE) by introducing ICT strength as a new governing structure of TC.

Keywords: Business Performance, ICT Strength, SME, Transaction Cost

Engaging Crystallization in Qualitative Research: A Study on Buddhist Nuns in Sri Lanka

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"Crystallization" is an intriguing new method that has appeared in recent years that embraces the unique perspective that artistic thinking can bring to conducting and writing research. This paper explores the peculiarity of qualitative crystallization in research on Buddhist nuns in Sri Lanka. Buddhist nuns in Sri Lanka strive and thrive under a system that excludes them in certain ways. It required a comprehensive analytical approach to the study of the lives of Buddhist nuns' groups (or the survival strategies), whose places in Buddhism and the monastic community are not settled or singular. Inquiring about their place within the monastic world requires the researcher to elicit the significance of the different discourses and strategies for survival in which they engage and co-create. Discourse is the knowledge that is created about the world. Discourses talk about compelling stories that have varying degrees of power. Discourses are highly multivocal and rarely united. Crystallisation gives a language for describing and incorporating the diverse forms of representations of discourse, ranging from performances and embodied actions to sophisticated multimedia presentations and even state-sanctioned festivals of Buddhist nuns. Multidimensional thinking is a representation of multi-genre performances and truths/knowledge, as each of these genres offers a unique mode of knowing. This enabled us to address the different genres of each group of renunciants, which were at times mutually exclusive and at other times inclusive. This extension of qualitative research aims to stimulate the conversation and position crystallization as a tool for obtaining a deeper and richer understanding of the experiences of a historically silent group like Buddhist nuns.

Keywords: Qualitative Research, Crystallization, Genre, Buddhist Nuns, Discourses

The Effect of New Public Governance Policies and Practices on Administrative Performance in Sri Lanka

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The study explored and explained the challenges of introducing and implementing the New Public Governance (NPG) policies and practices on organizational performance in Sri Lanka (SL). The central research question was, "what are the challenges of introducing and implementing the NPG policies and practices in SL?" Answers to critical questions investigated were sought through qualitative and quantitative research. Using the combination of official documents and interviews with senior political elites, public officials, and academics, this thesis analyzed the 2004 Government NPG package, and the study period was confined between 2004-2020. The study was explicitly guided by the Van Meter and Van Horn model of policy implementation. The study derived its independent and dependent variables based on the model. The study confirmed that the lack of a constitutional or administrative mechanism to coordinate between the Centre and the Provincial Councils (PCs) and between PCs was a significant bottleneck in implementing NPG reforms. The study confirmed the nonexistence of multiple accountabilities as barriers in implementing NPG reforms. There was no political, administrative, or financial accountability in implementing these NPG practices. The next challenge identified was the absence of stakeholders' participation. Lack of participation of the private sector, bureaucratic, professional associations, and citizen support were the central issues for not fully implementing the NPG reforms. The study further explored the existence of various norms, attitudes, practices, and perceptions embedded in the Sri Lankan culture, the influence of politics, and insufficient information about the NPG reforms as significant challenges. The study confirmed that; SL lags far behind on many issues, such as governance effectiveness, voice, accountability, political stability, absence of violence, regulatory quality, and the rule of law and control of corruption. Therefore, based on these findings, this study concluded that reform implementation might lead to an unproductive project absent situation of necessary support and compliance of implementers. Therefore, there should be a capable institutional structure with flexible and protective legal provisions, sufficient resources, and compatible stakeholders' participation for successful NPG reforms implementation.

Keywords: *Institutional Capacity, Multiple Accountabilities, New Public Governance, Sri Lanka, Stakeholders Participation.*

Estimation of Vertical Land Motion in the Western Tropical Pacific Islands from GPS, Satellite Altimetry and Tide Gauge measurements.

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The low-lying islands in the Western Tropical Pacific are vulnerable to a faster sea level variation in comparison to the global mean sea level change. Until the Satellite Altimetry technique came into operation, the primary mode of assessing the Sea Surface Heights (SSH) was limited to Tide Gauge observations. The tide gauge inferred SSH consists of absolute sea level variations and Vertical Land Motions (VLM). Therefore, VLM trends are essential for accurate sea level prediction and coastal impact assessment. In this study, the VLM rates are computed in the Western Tropical Pacific Island using the Global Positioning Satellite (GPS) time series obtained from the Nevada Geodetic Laboratory. The length of the GPS duration and the completeness of the time series recordings served as selection criteria. Vertical position time series of the selected GPS stations were post-processed to remove the outliers and offsets and adjusted for the Post-Seismic Deformation. The VLM linear rates for each station were computed using the Least Squares Estimation method by fitting the observations to a parametric model. Estimated VLM rates showed moderate land subsidence in 26 stations (~87 %) out of the 30 GPS stations considered, and the fastest subsidence rate of 9.01 mm/yr was observed in the Tafuna island, American Samoa. In another approach, the VLM rates were deduced by the difference between Altimetry (ALT) and Tide Gauge (TG) sea level records. Similar criteria as for GPS were used for the selection of the tide gauge stations. In order to maintain equal geophysical conditions in both altimetry and tide gauge observations, corrections were applied to the tide gauge records using the ocean loading tidal model. The ALT-TG rates were then calculated for three options based on the correlation of the SSH of altimetry grids around the corresponding TGs. 19 (95 %) out of 20 TGs showed moderate subsidence. The highest correlated VLM rates obtained from the ALT-TG were then compared with the co-located GPS stations within a 50 km radius. The results of 28 combinations showed a close agreement between the two methods, with a mean rate difference of 0.08 mm/yr and an RMSE of 1.68 mm/yr.

Keywords: *GPS, Satellite Altimetry, Tide Gauge, Vertical Land Motion*

Water Use Efficiency in The Dry Zone of Sri Lanka

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Water resource economists and policy makers have suggested that by 2030 one third of the world's population will be based along river basins, and the scarcity of water for agriculture will have a tremendous impact on their livelihood. In many parts of the country, the productivity of paddy is below the potential level due to insufficient irrigation water, and in the *dry* season (*Yala* season), only 30 percent of cultivable irrigated paddy land could be used for growing due to lack of water. In Sri Lanka, Dry-Zone is the main paddy zone, and some parts of this area will face an absolute scarcity of water by 2025. This study attempts to determine the actual usage of irrigation water at different water risks in the dry and wet seasons in the large-scale irrigation schemes in the dry-zone of Sri Lanka. Primary data were obtained from 360 paddy farm plots from *Rajanganaya, Nachchaduwa* and *Huruluwewa* irrigation schemes covering upstream and downstream farmers. Actual daily water usage at the plot level was measured through the volumetric method. Under this method, water is collected in a container of known volume, and the time taken to fill the container is recorded. According to our study, on average, in the wet season (*Maha* season), upstream farmers of *Rajanganaya* have used 4.8 acre-feet (5921 cubic meters) and *Huruluwewa* upstream farmers 4.2 acre-feet (5181 cubic meters) for paddy farming. Though the water usage of Raganganaya farmers was 14% higher than that of *Huruluwewa* farmers in the wet season, the productivity variation was insignificant between the two farmer groups. However, the downstream disparity of water usage in the dry season is much higher than in the wet season. In the dry season, downstream farmers of *Rajanganaya* have recorded 5.7 acre-feet, and Huruluwewa downstream farmers have managed 3.2 acre-feet due to the scarcity of water in the dry season. The present study has suggested that collectivism is the most suitable way of common pool resource management rather than individualism, which is incorporated with the market mechanism.

Keywords: *Irrigation, Water Management, Paddy, Dry-Zone, Common Pool Resources*

A Sociological Analysis on the Suffering of Elderly Cancer Patients

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Cancer and aging populations are both globalized realities. Age-induced biological changes make people more vulnerable to cancer. Cancer is prevalent regardless of economic development levels. The elderly population in Sri Lanka has doubled between the census years of 1981 and 2011. According to the 2012 Census, 12.4% of the elderly population will be 24.8% by 2041. Cases of cancer show a steady and significant increase within a short time span between 2008 and 2018, and within the reference period, morbidity and mortality due to neoplasms have increased by 49.2% and 64.4%, respectively. Sri Lanka is going through unprecedented economic turmoil, which has resulted in dire consequences for the general public, particularly marginalized groups like low-income groups and senior citizens. Against this backdrop, this study was based on the research problem of perceiving the complex facets of suffering experienced by elderly cancer patients from an emic perspective. The study's specific objectives were to investigate various dimensions of suffering while capturing the most and least common experiences of suffering from an emic perspective. This was a pure qualitative investigation, and the study involved 59 interviews with in-house and clinical patients at the National Institute of Cancer and Oncology Clinics in five districts of Sri Lanka. Ethical clearance was granted by the Ethical Clearance Committee, Sabaragamuwa University of Sri Lanka. NVivo software was employed in qualitative data analysis. Open coding resulted in 38 codes, later refined into four focused thematic categories: physical, psychological, social, and economic dimensions of suffering. Dieting problems, pain due to treatments, a weak body, and concurrent illness were the most felt physical aspects of suffering, while death anxiety, waiting for a diagnosis, anxiety over treatments, and worrying about a cure remain the most felt psychological aspects of suffering. Worries about family, "hiding it," and feeling socially powerless are the most felt social dimensions of suffering, while treatment and test expenses, being unemployed, a shortage of drugs in hospitals, and transportation costs are the most felt economic aspects of suffering. According to research, elderly cancer patients are least concerned about hospital facilities and the quality of healthcare workers.

Keywords: *Cancer, Elderly, Patients, Suffering, Old age*

Walk the Tightrope: The Risk Entails in the Profession of National Tourist Guide Lecturers in Sri Lanka

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Since professional tour guides are brand ambassadors of a destination and local community members who have first-hand experience and know-how about the destination, their service is one of the key determinants of overall tourist satisfaction. The sustainability of this profession largely depends on factors including risks that require a clear understanding and the management of the same. Hence, the purpose of conducting this study is to structure the risk factors involved in professional tour guides, which are considerably triggered by my personal experiences as well. The professional risks of tour guides are conceptualized using the phenomenological approach. I have adopted transcendental phenomenology to understand these risks through conscious experience and subjective perceptions of tour guides. Five experienced professional tour guides were selected by using purposive, criterion, and snowball sampling methods and conducted semi-structured in-depth interviews for data collection. Recorded interviews were transcribed verbatim, followed by a manual coding process to bracket out the lived experiences of respondents employing six types of coding; descriptive, value, in vivo, versus, parent, and child coding. Professional risks of tour guides have been constructed through four main themes; safety and security, social issues, psychological stressors, and obstacles in the industry, followed by eleven categories like job security, internally-driven social issues, industry-oriented psychological stressors, and tour operator-oriented obstacles, etc., making the phenomenon multidimensional. Furthermore, the respondents showed the means for the industry to be restructured and the areas of risks that should be eliminated or reduced. The trustworthiness of the study is assured by employing the methods of peer debriefing, triangulation, member checks, audit trails, etc.

Keywords: Professional Risks, National Tourist Guide Lecturers, Transcendental Phenomenology

Research on the Underwater Acoustic Localization based on Time Difference of Arrival (TDOA)

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Recently, Underwater Wireless Sensor Network (UWSN) has engaged much consideration and provided satisfactory technical support to many application fields. Thus, Localization technology is a massive key technology of UWSNs. Due to the complex underwater environment, the ground node location method cannot be applied directly to UWSNs. It is needed to make efficient and accurate localization data to generate information on underwater-based applications among acoustic channels. According to the literature review, diverse localization techniques have been proposed for UWSNs, and the range-based localization technique has taken priority for that. The range-based method employs to perform the position computation after distance estimation. These types of methods are involved two stages called distance measurement and position calculation. Hence, the Time Different of Arrival (TDOA) localization technique is the most suitable technique for underwater localization than the Angle of Arrival (AOA), Received Signal Strength Indicator (RSSI), and Time of Arrival (TOA). It has evaluated the Iterative (Taylor) and Closed-form method (Chan method/TSWLS) for the Time Difference of Arrival, and the CRLB has been used to take the best result of the unbiased estimator. The calculation time of the Two-Stage Weight Least Squares (Chan algorithm) is shorter than the Taylor algorithm. On the other hand, the accuracy of the Taylor algorithm is higher than the Chan algorithm. However, the complexity (iterative time) of the Taylor algorithm is too long than the Chan algorithm. Thus, few types of research have improved the Taylor algorithm, while many kinds of research are improving the Chan algorithm. This study realizes and simulates the performance of the Taylor algorithm and the Chan algorithm while considering the Improved Two-Stage Weight Least Squares (ITSWLS) method using Virtual Instrumentation (VI).

Keywords: *Taylor algorithm, Time Difference of Arrival (TDOA), Two-Stage Weight Least Squares (TSWLS), Underwater Wireless Sensor Networks (UWSNs), Virtual Instrumentation*

Research and Simulation of ITS (Intelligent Transportation System) Enabled Life-Boats Tracking and Control System for Passenger Vessels.

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People have motivated to travel on passenger vessels due to its benefits, like cost-effective and availability. However, it is necessary to consider random weather conditions and technical issues to overcome the distress condition on the water. Hence, guided navigation-enabled life/rescue boats are the most appropriate solution to address the above situation. GMDSS, like safety management systems, supports only the passenger vessels or ships which are going via open oceans and work in distress situations with a passenger capacity is more than 12. The proposed system has given a solution to rescue boats with GIS-enabled "guided self-driven" till lifeboats reaching to a pre-decided destination. The control layer (control centre) coordinates the entire rescue session by communicating with the lifeboat via the boat unit fixed into the life boat/s. Moreover, this layer operates over an ITS system with an API, which functions over the establishment of the links between various units of the system and their functions, like weather forecasting and two-way communication, to take appropriate decisions for the boats during the rescue session. GPS unit and an application embedded terminal have been made up with Raspberry Pi-4 circuit board installed Raspberry PiLite-OS. The web application built with GIS visualization maps will provide live guidance to rescue boats. Boat unit integrate over the Intraoperative layer and provide positioning, communication, and identification of individual boat units within GPS satellites and a maritime Internet connection (Inmarsat Satellite or GSM). Real-time motions and boat unit tracing will be filtered with a Bayesian process ($Wt = AW_{t-l} + Y't$) to generate the most accurate positioning. Thus this study has focused on giving a solution to the rescue session of the distressed vessel using lifeboats to save human lives in a centrally controllable system.

Keywords: *Global Positioning System, Intelligent Transportation system (ITS), International Maritime Organization (IMO), Lifeboats, Lifeboat Tracking and Control system, Maritime Transportation*

Session II - Graduate Colloquium

Humanities and Social Sciences

06th December 2022, Sabaragamuwa University of Sri Lanka, Belihuloya

Imagining a New Spatiality: Re-Examining Ishiguro's Literary Trajectory

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The territorial shift from the native backdrop to the new space characterizes a situation of multiple spatiality which makes its subjects an identity crisis. Kazuo Ishiguro, the Anglo-Japanese author, was subjected to a situation of multiple spatiality due to his migrant experiences from Japan to England. Ishiguro deviates from a cultural categorization. His quest for a novice spatiality upsizes the dimension of Ishiguro's authentic space of belonging. The research employs Ishiguro's selected novellas, 'A Pale View of Hills'(1982), 'Remains of the Day' (1989) and 'Never Let me Go' (2005) as the research sample. As a qualitative study, the research employs theories of spatiality by Henri Lefebvre and Mitchel Foucault. When analyzing Ishiguro, the initial sense of entrapment as a migrant writer is evidenced through the first novella, 'A Pale View of Hills' which depicts Etsuko's inability to reconstruct psychological mobility with the geographical mobility which draws her to a migrant trauma and entrapment in both spaces. Further, Ishiguro's creation of a complete English novella 'The Remains of the Day' and his skill in re-articulating the concept of a British Butler through a perspective of a migrant writer positions Ishiguro in an alternative space which is more Western than a migrant writer. The exclusion of nostalgic regret regarding Japan equates with Kathy's (Never Let Me Go, 2005), reminiscent of memories at a time Hailsham was completely destroyed. The absence of a place to relate to herself draws Kathy to a new space that is entirely free from her memories. It is obvious that Ishiguro's desire to free himself from the categorization to a fixed dominant spatiality between East and West is transgressed by creating a new space beyond a cultural hybrid. Ishiguro's exploration of a Third space in the West provides a deeper awakening for postcolonial subjects to be free from cultural in-betweenness and to find a third space in the West.

Keywords: Ishiguro, Memory, Migration, New Spatiality Trauma

Impact of Climate Change and Variability on Paddy Cultivation in Sri Lanka

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Climate change and variability are two of the most widespread topics in recent studies. Most of the researchers study the impact of climate change on the agriculture sector in the world. Because the agricultural sector is directly affected by climatic variability, within agriculture, paddy cultivation could be named as one of the most vulnerable sectors to the variabilities of climatic parameters such as rainfall and precipitation. Rice is the staple food for 3 billion people in the world, and Sri Lankans are among them. Thus, it is crucial to study the impact of climate variability on paddy cultivation in order to safeguard the country's food requirements. This study has reviewed publications that have been published related to the topics of climate change and paddy cultivation before 2022. The findings of the study proved that there is a positive relationship between rainfall increase and paddy production during the Maha season, but it is not equally distributed. Moreover, the increasing temperature has a negative impact on paddy production. To overcome these adverse impacts, various adaptation strategies have been suggested by scholars. Promoting crop insurance, having drought-resistant and short-term crops, increasing irrigation efficiency, rainwater harvesting, and intercropping are common adaptation strategies to mitigate the adverse impacts of climate change.

Key words: *Climate Change, Climate Variability, Paddy Cultivation, Sri Lanka*

Rational Ability Driven Uncertainty, Transaction Cost and Livelihoods of the Samurdhi Beneficiaries

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Samurdhi initiative is a vital program that has been playing a visible role in assisting the poor and eradicating poverty in Sri Lanka since 1995. The beneficiaries experience negativities of information flow since they do not have the perfect ability to make rational transaction decisions which results in an increase in transaction cost. Moreover, poor rational ability influences transaction uncertainties that could also affect the transaction cost. This study is an empirical evaluation evaluate of the rational ability-driven uncertainty which affects the transaction cost and livelihoods of Samurdhi beneficiaries since the absence of previous research work creates a gap in the literature. The study adopted a quantitative approach using a sample of 1820 Samurdhi beneficiaries from Sabaragamuwa and Uva provinces employing a multistage sampling technique. PLS-SEM was employed in the data analysis process. The results revealed that rational ability has led to minimising uncertainties. Accordingly, the minimum level of uncertainties has contributed to reducing the possibility of transaction costs among the beneficiaries ratifying the partial mediate effect of uncertainty between rational ability and transaction cost. Hence, the rational ability has contributed to creating a positive influence on the beneficiaries' livelihoods. Further, the study has identified that both uncertainty and transaction cost as partial mediators between rational ability and livelihood success. As per the study, if the rationality among the beneficiaries is limited, it may lead to the creation of transaction costs followed by several scopes of uncertainties and finally hinder their livelihoods. Thus, the study urges the policymakers to take appropriate steps to enhance the livelihood success of Samurdhi beneficiaries by mitigating the consequences of uncertainty and transaction costs and facilitating them to widen their rationality without information asymmetries.

Keywords: *Livelihoods, Rational ability, Samurdhi beneficiaries, Transaction costs, Uncertainty*

An Investigation of Translating Cultural Text from One Language to Another: Translation Techniques and Strategies

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Language and culture are two distinct terms, but both terms are interwoven with each other. The term "translation" is an umbrella term that includes the language and culture itself. Translating is the process of converting language and cultural aspects from one language to another. One of the most difficult tasks for the person involved in the translation process is translating culture. Culture-specific words were deadly specific for their traditions and customs. The purpose of the research was to discuss the problems that occur when translating Sinhala cultural texts into the Tamil language and how to overcome the problems using translation techniques and strategies. The research was written using both primary and secondary sources. As for the primary source, *Gamperaliya* by Martin Wickramasinghe and its Tamil translation by Muhammad Uwais were referred. Secondary sources included books by Martin Wickramasinghe, such as Viragaya and Ape Gama. In addition to Wickramasinghe's books that were published in other languages, a couple of reviews, periodicals, magazines, and newspaper articles on the subject were further referred to as secondary sources. The first three Chapters of *the Gamperaliya* novel from Sinhala into Tamil analysed the data according to the following procedure: identify the culture and culture-specific words in the source text, analyse the source culture with the target culture, classify the translation techniques and strategies according to their nature and finally, the descriptive analysis method was used to analyse the data. This study consists of descriptive and comparative research methods. These methods helped analyse the problems the researcher faced. The comparative study was used to compare the source text with the target text. The findings of the study showed that the students used several translation techniques and strategies to overcome cultural untranslatability. The study revealed that students used translation techniques such as borrowing, adaptation, word-for-word translation, literal translation, paraphrasing, and transliteration to overcome cultural untranslatability. Translation by more neutral, translation by the cultural substitute, and translation by addition are some strategies that were applied. Finally, the researcher has made some suggestions for translating cultural texts from Sinhala to Tamil.

Keywords: *Culture-specific terms, Sinhala language. Strategies, Techniques, Translation*

Effect of Structural Aspect of Social Capital on Livelihoods of The Members of Community-Based Organizations in Sri Lanka: A Case of Uwa Province

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A community-based organization (CBO) is a non–profit organization that operates at the community level. It was established to improve the quality of life of its beneficiaries, and one of the ways that are achieved is by ensuring their Livelihood Success (LS). According to scholars, CBOs increase the LS of their members by strengthening their Social Capital (SC). However, in Sri Lanka, although CBOs have been functioning for a considerable time, the existing poverty makes it evident that the members have not achieved LS as expected. One significant reason for this is that both aspects of SC: structural and cognitive, have not been adequately addressed. Hence, this study mainly focused on how the structural aspect of SC impacts the LS of members of CBOs. This study used a quantitative method, and data were collected from 1048 members of both Samurdhi and Sanasa (784 from Samurdhi and 264 from Sanasa), which are the main CBOs functioning at the rural level in Uwa Province, Sri Lanka. Structured questionnaires were used to collect data, which was then analyzed using partial least squares structural equation modelling. The results revealed that network strength among members of CBOs has a significant positive impact on LS, while network size also has positive correlations with LS among members of CBOs. However, it was revealed that network density among members of CBOs does not significantly impact LS. Thus, the structural aspect of social capital positively contributes to the livelihood success of members of CBOs. However, the reason for network density having no significant influence on LS is that the members do not have strong trustable relationships with business, social, and other networks.

Keywords: *Community-Based Organizations, Livelihood Success, Samurdhi beneficiaries, Sanasa Beneficiaries, Structural Social Capital.*

The Impact of Food Security on the National Security of Sri Lanka

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Food is a basic need and a right of every citizen**. "**Hunger" is an emotionally charged term that calls for action and moral and state accountability. A population's access, availability, utilization, and stability are core state interests in food security. Until recently, food has disappeared as a security question; over time, world security has widely changed, and most states have focused more on individual or human security than the traditional security approach. Under the non-traditional security threats, food security becomes one of the significant positions in national security. Therefore, it's vital to understand the relationship between food and national security and to identify the measures, such as using indigenous techniques to enhance food availability. It's required to determine the strategic implication of food insecurity to the national security of Sri Lanka. The study's qualitative setup comprised identifying drivers by conducting interviews, focus group discussions with relevant parties, and critical analyses of published papers. The quantitative data would be gathered using a questionnaire-based survey method covering food and national security sectors using 300 samples. The data collected from primary and secondary sources on food and national security will be analyzed, and the hypothesis will be tested. The issues of the domestic and global economy are reasons for rising food inflation, and it reduces access to food for millions of people in Sri Lanka. Food can no longer be an isolated issue in the broader conversation about the security and development of the global commons. It has proved how it is used as a strategic weapon. The most crucial factor is that Sri Lanka must identify the local issues of food security, future threats, policy issues, and food diplomacy while avoiding food dependency on other countries**.** The study critically evaluates the interconnection and strategic implications on food and national security.

Keywords: *Food Security, Human Security, Indigenous Techniques, National security.*

Influence of Parenting Styles and Self-Efficacy on Self-Employment Intention: A Conceptual Framework

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The available empirical literature shows that parenting styles are positively associated with self-efficacy, and self-efficacy is positively related to self-employment intention. Scholars have not developed a better framework to study how do parenting styles and self-efficacy effect on self-employment intention. Interestingly, this study attempts to develop a conceptual framework to investigate the influence of parenting styles and self-efficacy on self-employment intention since previous researchers have not adequately studied this issue. The study reviewed different theories and handpicked the theoretical base to protect each variable reviewing 141 research articles. Parenting style based on Bandura's parenting styles refers to a combination of parental control and expectations for the child's learning and behaviour together with sensitivity to the child's needs. It includes authoritarian parenting, authoritative parenting, permissive parenting, and uninvolved parenting styles. Based on empirical studies, parenting style is selected as the explanatory variable. Self-employment is the most important segment in the entrepreneurial avenue, which is beneficial in uplifting the economy. The self-employment intention examines both self-employment start-up behaviour and self-employment duration. It performs as the dependent variable of this framework. Self-efficacy is a personal cognitive estimation of one's capability to manage intellectual capital to achieve pre-determined goals and events. It includes four dimensions: mastery experience, vicarious experiences, verbal persuasion, and emotional arousal, and takes as the mediator. Demographic factors such as gender, age, ethnicity, and education act as moderators. Thus, the study develops a framework comprising dependent, independent, mediate and moderate to scrutinize the effect of parenting styles and self-efficacy on the self-employment intention of youth in Sri Lanka.

Keywords: *Conceptual Framework, Parenting Styles, Self-efficacy, Self-employment Intention*

Contradictions of the Sri Lankan Indigenization Movement: A Cultural Reading of the Song of Premayen Mana Ranjitha We

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The Sri Lankan indigenization movement was not a healthy one. It was a movement infected with religious, ethnic, and political prejudices. Those prejudices also influenced the cultural indigenization movement. If cultural indigenization was established on a scientific basis, the resulting citizen would be a universal citizen with a strong national spirit. Such progressive features can be seen in *Rabindranath Tagore'*s interventions in the *Bengali cultural renaissance*. There was no clear consensus among the intellectuals involved in cultural indigenization in *Sri Lanka*. Some seem to have preferred to move towards an India-centric regional identity. Another has attempted to create a new culture through Europeanization. Another has tried to revive only the indigenous heritage. There were creators who worked hard to create a new national culture by properly combining European and indigenous cultural sources as well as Indu regional possibilities, but it is not possible to see that their goals will be achieved. Ediriweera Sarachchandra's (1914-96) involvement in the indigenization movement can be identified as a very complicated situation among these. This study questions the cultural discourse built on the melody of the song *Premayen Mana Ranjithaway*, the most popular song of his play *Maname*. According to Sarachchandra himself, these tunes are taken from *Nadagam*. If we are looking for a local drama tradition, a more effective form of drama can be found in *Nadagam*. Therefore, according to him, *Nadagam* tunes are cultural sources that show the indigenous identity. However, the melody of this song is not a tune of a *Nadagam* song. The Dravidian hymn "*Ma Mariye Karuna Hariye*" is a hymn sung for *Mary* and the first source of this creation. *Father Ja-co-me Gonsalves* (1676-1742) created a *Kantaru* song called "*Aramben Pera*" based on this melody. The melodies of such devotional songs have not been used in *Nandagam*. This melody is not found in any *Nadagam* song found in Sri Lanka. As this tune was taken from a *kantharu* chant sung in the church, it was able to attract the cultured and rich elite of that time. That use is a great cultural mix. But by continuing to try to hide these cultural sources and spreading false information about these sources, these scholars and others have misled the public. When the drama was revealed as a multicultural mixture, if the cultural discourse about it was made to teach the value of a multicultural identity, it would have generated very important results. The cultural coherence of the drama has been displaced by the academic discourse on it. No attempt has yet been made to make both creation and discourse move in parallel. This study tries to meet *Maname* with its real academic discourse.

Keywords: *Maname, Sarachchandra, E, Academic discourse, Indigenization, Kantharu.*

Session III - Graduate Colloquium

Computing & Technology

Docker-Based and Virtual Machine-Based Apache Cassandra Database Management System Evaluation

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Computer systems are a major component in the current complex era. In computer systems, to archive data and information in a well-defined manner, database management systems (DBMSs) are used. Among the plenty of DBMS vendors, Apache Cassandra is a popular no-SQL DBMS. According to traditional computer system infrastructure management, DBMSs are launched on virtual machines. After the arrival of containerization, most software applications and services were launched on container-oriented infrastructure. Docker is the most popular and trending container vendor. This research study aims to evaluate the performance of Apache Cassandra DBMS on both Docker-based infrastructure and virtual machine-based infrastructure. Docker containerized infrastructure was launched on Ubuntu 18.04 Long Term Support (used package with architecture: GNU/Linux 4.15.0-112-generic x86_64) cloud-based operating system. The host computer was with 15 GB memory capacity and 1 Gbps network bandwidth. On that host computer infrastructure, Docker version 19.03.9 was launched. Both Docker client and server engine communities are version 19.03.9. Docker Application Program Interface (API) version was 1.40. The same host infrastructure was used for the virtual machine-based infrastructure. By executing queries with 5, 50, 500, 5000, and 50000 data records on the Apache Cassandra DBMS, a particular performance evaluation was made. According to the query execution time, the increment of performance on Docker infrastructure was 0.244 (SELECT), 0.295 (DELETE), 0.496 (UPDATE), and 0.708 (INSERT) with 95% confidence. The experiment depicts that the Docker-based platform presents a higher and more advanced infrastructure for the Apache Cassandra DBMS.

Keywords: *Apache Cassandra, Containers, Database Management System, Docker, Virtual machine*

Use of Random Forest Classifier to Identify Counterfeited E-Commerce Listings

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Online counterfeiting has become a significant threat to the e-commerce industry recently. It is becoming difficult to take countermeasures as the methods, tactics, and approaches of counterfeiting are evolving, and it is difficult to create a one-stop solution. According to the Organization for Economic Co-operation and Development (OECD), counterfeiting accounted for USD 464 billion or 2.5% of world trade in 2019. Counterfeiting generally contributes to factors such as child labour, illegal drug trafficking, and money laundering, which highlights this as a significant area for further study. This study uses 23000 e-commerce listings related to Paris Saint Germain (PSG) in thirty (30) e-commerce marketplaces such as Alibaba, Amazon, Redbubble, and Mercado Libre to train a text classifier based on title, description, seller name, and product URL. This study uses Random Forest Classifier and presents results with 95% accuracy. Also, this study focused on the provisions of an image classifier to make better decisions in anti-counterfeiting strategies in e-commerce.

Keywords: Business intelligence, Counterfeiting, E-commerce, Machine learning

A Preliminary Study on Computer-Assisted Career Counselling in Higher Education

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Choosing a career is one of the most important decisions that an individual will make in life. Career decision-making is a complex process. Hence, young students fail to choose their career path so often. Career uncertainty among students can lead to several economic and social problems, such as high school or university dropouts, skills mismatch, unskilled workforce, higher unemployment rate, increased job mobility etc. Therefore, offering career counselling services within higher education is important. Unfortunately, providing adequate personalised services of a qualified career counsellor is a challenging task in developing countries. As a solution, work is in progress for implementing a career path recommendation system targeting undergraduates in computing. As an initial step, a systematic literature review was conducted with the main aim of identifying the factors affecting the career path success of undergraduates. During the study selection, nine electronic databases were queried to retrieve a total of 1274 scholarly articles. Then the study selection process was conducted under three steps, namely, duplicate removal, selection criteria application for metadata, and selection criteria application for full text. The study reduction percentage of each of these steps were 22.8%, 91.4% and 67.8%, respectively. Then eight more studies were selected through snowballing, resulting in 35 scholarly articles for final analysis. As the results of the comprehensive analysis conducted, it was evident that support for career planning and development is mostly required by senior secondary or pre-tertiary students. Further, a thorough assessment of academic performance, knowledge, skills, personality traits, preference, and extra-curricular activities is required during career decision-making. Therefore, in addressing the practical limitations of traditional career counselling, it is recommended to utilize the capabilities of computer-assisted career counselling systems to assist students with their career planning.

Keywords: *Career Counselling, Computer-assisted Career Counselling Systems, Recommendation Systems, Systematic Review*

Social Network Analysis for the Management of Information Propagation: A Study on the George Floyd Incident

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Social Network Analysis (SNA) is a research method which focuses on patterns of relations among people and entities such as organizations and states. They are worthwhile for examining an individual's or organization's social structure and interdependencies (or work patterns). Online SNA is a practical method that can reliably monitor the interactions in an online community. In this study, SNA of a video comment network series of YouTube videos related to a significant and viral incident has been performed. This study analysed the YouTube videos on the death of George Floyd and the uplift of Black Lives Matter. By analysing those video comment networks, it was able to probe a plethora of insights about the netizens, their behaviour and their influence over society. This endeavour will enlighten the path for an arena for policymakers on prevention and countermeasures on manipulations of vox populi. The key players and the discussions they made to continue the issue into a social media viral had been identified by means of social network theory concepts. Several significant relationships were discovered where a specific commenter continually influenced the discussion into the motives which they preferred. The detection of hubs (nodes to point to many other nodes) and key authorities (nodes that are meant to be from many other nodes) will establish the foundation for identifying the motives of comment behaviours. While this analysis looked at relationship weight and node degree, there is still room for further analysis of the social network by analysing centrality measures such as betweenness, closeness, and PageRank.

Keywords: *Authority, Community Detection, Hub, Social Network Analysis, You Tube comments*

An Integrated Model to Identify Learning Style Using Machine Learning Techniques

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Identifying the Learning style is important for assisting students in retaining lifelong learned information and improving their understanding of the subject matter in detail. One of the main methodologies for identifying the learning style of the learners is by conducting an analysis based on a questionnaire designed according to a particular learning model. But using a questionnaire may not always be a proper mechanism as this gives an additional burden to the learners and may generate inaccurate results if improper responses are received from the learners. Hence, the most current tendency in classifying the learning style is to identify and use behavioural attributes to automatically detect the learner's learning style without bothering the learner while they are engaged in the learning process.

The main intention of the research is to propose an integrated model of Moodle Logs and time spent on academic activities to identify the learning styles of the learners. The proposed model is used to track the student's behaviour during academic activities using Moodle logs and the total time a student spent on each academic activity. To track relevant data, the course content will be designed in Moodle according to the requirement of the Felder-Silverman Learning Style model (FLSM). Data required for the Moodle logs are collected from the logs already available in Moodle, and a plugin will be developed to track the time spent on academic activities. As per the proposed integrated model, a data set will be prepared using both Moodle logs and time tracking. Once the data set is prepared, the machine learning technique is applied to the data to identify the learning style and patterns of the learners.

The results show that the integrated model can be used to categorize each student's learning pattern according to the FLSM. Each student has his own way of using different learning materials. Further, the result shows how the teaching and learning process should be customized for the learners according to the learning pattern of the students.

Keywords: *Felder-Silverman Learning Style, Machine Learning, Learning style, Moodle Logs, Integrated Model*

Comparative Study of the Thermal Properties of Different Grades of Engine Oils at Various Temperatures by Addition of *Fullerene* (C$_{60}$) Nano-Particles

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The quality and properties of engine oil play a crucial role in the case of efficiency of car motors where such oil is involved in lubrication and cooling of internal combustion of engines. The thermal properties of engine oil are the key parameters when selecting engine oil for a vehicle. The objective of this research work was to compare the effect of fullerene-C$_{60}$ (99.5%) nano-particles on the thermal properties of 10W30, 20W40, and 20W50 CALTEX red engine oil. In this study, the effect of nano-particle concentration 0.01 wt% on different grades of engine oils was examined at different temperature values (30 – 120 ℃). The nano-fluid was prepared using the two-step direct mixing method. A magnetic stirrer (40 ℃/200 rpm) and an ultrasonicator (Rocker, SONER 210H, AC, 220V, 50Hz) were used to distribute the nano-particles uniformly in the base fluids. The thermal properties, namely, thermal conductivity, thermal diffusivity and volumetric heat capacity of the base fluids and nano-fluids, were measured using the Flucon LAMBDA thermal conductivity meter (TECHNE UCAL 400$^+$ dry-block calibrator, Germany) while the flash point was measured using the flash point tester (Anton Paar PMA500, Germany). It was concluded that a considerable enhancement of the flash point can be observed. However, the other thermal properties were not shown such enhancements.

Keywords: Engine Oils, Fullerene (C$_{60}$), Nano-fluid, Thermal properties

Investigation of Thermophysical Properties of Transformer Oil Based Nanofluids

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There have been many research efforts dedicated to improving the thermophysical characteristics of heat transfer fluids by suspending nanoparticles in different engineering fields. Various nanoparticles have been used in these research studies, such as organic nanoparticles, metallic nanoparticles, and metal-oxide nanoparticles. The presented research has selected transformer oil as the base fluid, which is responsible for the transformer's cooling and electro-insulation. The experiments were carried out for two different nanofluids of transformer oil to identify the behaviour of several important thermal properties. A multifunctional thermal conductivity meter was used to measure the thermal conductivity and thermal diffusivity using the transient hot wire method from 30 ℃ to 120 ℃. These measured values were used to calculate the volumetric heat capacity. The flash point was measured using the Pensky-Martens closed cup method. Following the two-step method, nanoparticles and base fluid were first mixed, and then magnetic stirring and ultrasonication were carried out for 1 hour and 4 hours, respectively, to prevent the agglomeration of particles from achieving stable nanofluids. In the first experiment, a Fullerene nanofluid sample was created with a $0.1 \ gL^{-1}$ concentration, but the nanofluid did not represent any recognizable improvement in thermophysical properties compared to the base oil. In the second attempt, three TiO_2 nanofluid samples were made at weight concentrations of 0.01 %, 0.03 %, and 0.05 %. Also, CTAB (Cetyltrimethylammonium Bromide) was used as the surfactant to improve the nanofluid sample's stability, according to the literature. However, TiO_2 could improve the thermal properties of transformer oil, and the greatest improvement was observed at the 0.05 % weight fraction; CTAB also positively contributed to enhancing the thermophysical properties.

Keywords: *Nanofluids, Transformer Oil, Thermal conductivity, Fullerene, TiO_2*

Session IV - Graduate Colloquium

Management & Economics

The Impact of Analytics and Collaboration–Based Risk Management on Supply Chain Resilience and Robustness: A Conceptual Model Based on Organizational Information Processing Theory and Relational View

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Global Supply Chains (SCs) are highly vulnerable to unpredictable disruptions, which occur in a greater frequency and with numerous consequences on SCs. However, resilient SCs can recover from disruptions and achieve business continuity in turbulent cases, while robust SCs maintain their planned performance following disruptions. Hence, SCs should be both robust and resilient to combat the inevitable risk innate in the firm's operations. However, there were no substantial studies on the investigation of improving SC resilience and robustness simultaneously during disruptions. Literature favours arguing that proper management of SC risks can prevent, detect, respond and recover supply chains from the impacts of disruptions and enhance SC resilience and robustness. Digital technologies, information, and data analytics help firms manage SC risks through the accurate processing of data and sharing of insightful information. In addition, collaborations with SC partners enable firms collectively deal with SC risks and enhance SC resilience and robustness. However, there is a dearth of sufficient literature on empirical investigations into the effect of analytics-based and collaboration-based supply chain risk management (SCRM) on SC resilience and robustness. Apparel manufacturing is a leading industry in Sri Lanka which encountered significant impacts during the recent Covid-19 disruptions. As this sector is working with some of the most globally connected SCs the resilience and robustness of SCs at disruptions are vital for the country's economic stability. As per the Organizational Information Processing Theory (OIPT), firms should develop the capabilities to gather processes and act on information from the environment to mitigate uncertain ambiguity. According to the extended Relational View (RV), relational capabilities such as communication, corporation, and integration would be helpful for firms to enhance corporative relationships and effective sharing of information between SC partners, which are important to reduce SC risks, particularly during disruptive situations. Hence, drawing on the OIPT and the extended RV, this study develops a conceptual model to examine the impact of analytics and collaboration-based SCRM on supply chain resilience and robustness with special emphasis on apparel manufacturing organizations in Sri Lanka.

Keywords: *Analytics-based Risk Management, Collaboration–based Risk Management, Disruptions, Resilience, Robustness, Supply Chain.*

Impacts of Firm-Specific Factors on Capital Structure and Firm Value: Empirical Evidence from Sri Lankan Listed Firms

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Finance decisions and capital structures play a crucial role in a company's management, and different forms of financing result in distinct capital structures, which may have different effects on firm value. Most studies left out the implications of adjusting firm-specific variables on capital structure and firm value. This study explored the impact of firm-specific factors on capital structure and firm value and used a sample of 90 companies listed on the Colombo Stock Exchange. The secondary data were gathered from annual reports using panel data for a period of eight years, from 2013 to 2020. Ratios of long-term debt to equity and market price of a share to book value were used to measure the capital structure and firm value, respectively, while profitability, tangibility, growth opportunity, firm size, liquidity, and earning volatility were taken as firm-specific factors. Analysis tools such as bivariate correlation and linear regression were used to evaluate the econometric model, hypothesis test, and relationships. The study found that tangibility has a significant impact on capital structure. Tangibility and firm size have a significant impact on firm value. This study reveals that tangibility determines both capital structure and firm value. This study confirms the mediating role of capital structure between tangibility and firm value. Tangibility correlates positively with capital structure and negatively with firm value. The finding suggests that investing in non-current assets will result in long-term financing, borrowings and a drop in the market price of a share. This study has revealed contradictory findings compared with previous empirical evidence obtained from published data. Therefore, a further study should be conducted to enhance the credibility and validity of the findings by investigating chief financial officers via structured questionnaires for the same constructs and variables.

Keywords: *Capital structure, Colombo Stock Exchange, Firm-specific factors, Firm value*

Challenges of Mainstream Co-Management in Small-Scale Fisheries Development

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The contribution of small-scale fisheries (SSF) to nutrition, food security, employment generation, and poverty eradication in the developing world is substantial. Co-management, which is a participatory management approach involving the fishers, state, other stakeholders, and relevant external agents, is endorsed by many practitioners as an effective strategy to address major issues in SSF caused by the increased dependence on ecosystem services, economic globalization, and climate change. In this paper, a systematic literature review with content analysis of selected case studies was employed to explore the challenges to mainstream co-management in the process of SSF development. Lessons learned from four countries, i.e., Uruguay, Zambia, Timor Leste, and Sri Lanka, have been evaluated. The key objective of this paper is to propose suitable measures to do away with the challenges affecting co-management. The results indicate that number of governance, institutional and socio-economic factors affect the installation and functioning of co-management platforms. The lack of appropriate policies and legal frameworks to support community engagement and the non-recognition of customary laws of communities by the state is the key governance issues. Institutional issues include feeble community setup, corruption in local organizations that hampers the prevention of illegal and destructive fishing activities, the non-participation of fishers in critical management activities such as the preparation of regulations, monitoring, and environmental management, and the inability of community organizations to adequately represent the interests of communities. Issues such as long-standing conflicts between small-scale fishers and government agencies and between small and large-scale fishers, a lack of instant tangible benefits for fishers, and unsatisfactory adaptation to changing socio-economic and environmental circumstances have been identified as the major socio-economic challenges. Implementing the Voluntary Guidelines for Securing Sustainable Small-scale Fisheries (SSF Guidelines) adopted by the Food and Agriculture Organization (FAO) in 2014 is recommended as a key strategy to address major challenges to co-management.

Keywords: *Co-management, Community participation, Small-scale fisheries, challenges, sustainable management*

A Life Cycle Assessment-Based Methodological Framework to Evaluate the Environmental Impacts of the Building and Construction Industry in Sri Lanka

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Globally, the building and construction industry is one of the main contributors to adverse environmental impacts (EIs) due to the extensive utilization of resources and energy during the life cycle phases. The building and construction industry in Sri Lanka is significantly accountable for approximately 50% of energy usage, 40% of raw material usage and 30% of the solid waste generation of the country. Therefore, the relationship between the building and construction industry and EIs should be thoroughly examined in a close association in each life cycle stage to mitigate the EIs at the national level. Accordingly, Life Cycle Assessment (LCA) which is globally known as a robust tool for measuring EIs, has emerged and is acknowledged as a significant technique incorporated into the decision-making process of the building and construction industry globally and in Sri Lanka. Even though the LCAs in the building and construction industry have been broadly discussed in the international arena, it is not much considered in the Sri Lankan context due to the lack of country-specific life cycle inventory data sets, data intensity, expensiveness, the requirement of expertise and complexity in conducting LCAs. Accordingly, this study presents a user-friendly LCA-based framework customized to the Sri Lankan context. The data used to develop the methodological framework were collected through the literature review, including international standards and expert interviews. The proposed methodological framework performs as an early design phase decision-making model which predicts and evaluates EIs throughout the life cycle of a building complying with the requirements presented in ISO 14040:2006 and 14044: 2006 Standards. The proposed framework is validated by the industry and academic experts in the fields of LCA to assert its pertinence in evaluating life cycle EIs and supporting environmentally friendly decision-making. The proposed framework will provide provisions for environmentally friendly decision-making with scenario analysis and promote sustainable construction practices by identifying hot spots, the geographical distribution of EIs, and EI footprints in a user-friendly manner.

Keywords: *Building and Construction Sector, Environmental Impacts (EIs), Life Cycle Assessment (LCA), Sri Lanka*

Factors Affecting the Going Public Decision of Private Companies in Sri Lanka

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Listing companies on the stock exchange offer many benefits for the companies, investors and the economy. However, few companies have gone public in Sri Lanka. This study explores the reasons and factors affecting the go-public decision of companies in Sri Lanka. Further, it investigates how IPO activities respond to macroeconomic dynamics in Sri Lanka. This study employs the sequential exploratory design with multiple triangulation. Based on the benefit-cost trade-off theory of going public decision, the phenomenological analysis is performed on the transcript interview and IPO prospectus in the study's first phase. The interviews were conducted with those directly involved in the listing process and shared their experiences. Based on the first phase result, we designed a questionnaire that collects primary data from finance professionals and accountants working in listed and qualified unlisted companies. The characteristics of the respondents' company, their opinion about the motives/benefits and costs/constraints of the going public decisions, and their perception of stock market characteristics and behaviours towards going public decisions were collected through the questionnaires. This study utilizes 283 questionnaire responses as the final sample in the second phase. The analysis reveals that raising capital for long and short-term growth and building corporate image and governance structure are the main reasons for going public. The factor analysis, logistic regression and structured equation modelling found that 1) financing for future growth and lowering the cost of capital, 2) corporate image and liquidity, and 3) loss of ownership are the significant factors affecting going public decisions in Sri Lanka. Furthermore, firm size also has a significant impact on the decision. The autoregressive distributed lag (ARDL) analysis of macroeconomic factors reveals that return on investment significantly impacts IPO activity in the long run. While the factors, trade openness & banking sector development, and return on investment significantly impact IPO activities in the short run.

Keywords: Benefit-cost tradeoff, CSE, Going public, IPO, Listing decision

Assessing Household Vulnerability to Climate Change: A National Index for Agriculture Sector in Sri Lanka

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A number of different methods and approaches have been used to assess household vulnerability. The vulnerability index is the most commonly applied method to assess vulnerability quantitatively based on a specific set of proxy indicators. This paper focuses on developing a vulnerability index using publicly available and periodically updated official statistics and census data in Sri Lanka to assess household vulnerability to climate change in the agriculture sector. Further, the Intergovernmental Penal on Climate Change framework has been used as the basis for this assessment. This framework consists of three key elements of vulnerability to climate change and variability, namely exposure, sensitivity, and adaptive capacity. The key assessment approaches for this study include socio-economic, biophysical (impact assessment), and integrated assessment. The development of the tools was performed in multiple stages: (1) three major hazards were prioritized using 'DesInventar', a database maintained by the Disaster Management Centre, Sri Lanka; (2) computation of the exposure, sensitivity, and adaptive capacity was done through data screening approach through publicly available statistics and census data, and around 500 indicators were selected for review; and (3) the review of the selected indicators against three determinants of vulnerability. The data was then normalized and merged to develop sub-indexes for exposure, sensitivity, and adaptive capacity, and thereby climate vulnerability index was determined for each district. The publication of such a periodic climate vulnerability index targeting the agriculture sector for all the districts in Sri Lanka will help implement policy decisions at national and sub-national levels. It will further support the development planners to prioritize adaptation strategies and rationalize resource allocations in the agriculture sector.

Keywords: *Climate Change, Vulnerability Index, Vulnerability Assessment, Social Vulnerability*

An Exploratory Multiple Case Study on Mechanical Harvesting Adoption in The Corporate Sector Tea Plantation in Sri Lanka

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The mechanization of field practices has been recognized by tea sector experts to solve worker scarcity and to reduce the cost of production in tea plantations. However, the adoption of mechanization is lower than expected. According to the review of the literature, there has been very little research on this subject, either internationally or nationally. This study examines the possible driving factors in the adoption of Mechanical Harvesting (MH) of tea in selected tea plantations. To understand the adoption of MH, this exploratory study employed a qualitative multiple-case approach. Data collection was done by face-to-face interviewing of Estate Managers & staff in tea plantations using a semi-structured interview schedule. Interviews were transcribed through an intelligent verbatim in order to produce filtered interview transcripts. The results of this study demonstrate that multiple themes emerged as the factors that determine the adoption of MH. In the majority of cases, themes emerged as MH-enhancing determinants. Gender appears to have an impact on machine operators' performance and adoption. The performance of the continuous MH appears to be different from the general perception that has been established in the plantation sector. The results demonstrate that continuous MH improves green leaf quality while lowering harvesting costs. One of the key determinants in the adoption process is the employee's mindset. The findings show that harvesting machine technology needs to be improved further in order to facilitate the adoption. The results of this multiple case study contribute to the body of knowledge on how technology is utilized in the tea industry. Additionally, results suggest areas for additional research. This study shows that there are important factors connected to the adoption process that can be considered when trying to implement MH. This study precisely highlights adopters' practical experiences that will be beneficial to new users.

Keywords: *Corporate sector, Mechanization, Mechanical Harvesting, Technology adoption, Tea plantation*

Session V - Graduate Colloquium

Applied Sciences

Titanium Dioxide Nanostructures Produced Using Geogenic Ilmenite for Photovoltaic Applications

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Nano-structured materials have become a prominent research topic in recent years due to their numerous distinguishing characteristics. Among all the transition metal oxides, TiO_2 is a compound of great importance due to its remarkable catalytic and distinctive semiconducting properties. Nano TiO_2 can be used as a strong oxidizing agent with a large surface area which implies high photo-catalytic activities. Some extensive research studies on the modification, preparation, and characteristics of nanomaterials have been published, allowing us to keep track of progress in this sector. In the case of the synthesis of pure TiO_2, the two main procedures, such as sulfate and chloride processes, are employed where both require concentrated corrosive acids and extreme temperatures, such as 1000 °C, in open operations, which resulted in significant expenses and pollution. Recently, a closed method has been developed, including rotary autoclaving, refluxing, and stationary solvothermal treatment of ilmenite below 170 °C, which can be used to reduce costs and environmental effects. The as-synthesized product is 100% pure titanium dioxide in its amorphous state (24% crystallinity). This can be converted into over 99% pure anatase phase with 90% crystallinity and 100% pure rutile phase nanorods with 98% crystallinity by calcining at 350 and 650 °C, respectively. The direct band gaps of the three materials are 3.40, 3.60, and 3.15 eV, respectively. So, the new method can be used to modify the previously existing technology by using newly established processes for three phases in rutile, anatase, and amorphous state. As the world is progressing towards more ecologically friendly and sustainable energy, this procedure might be applied to the synthesis of pure TiO_2, where the substance can be employed in solar cell fabrication because solar cells are still encountering scientific and technological challenges in their commercialization.

Keywords: Ilmenite, Nanostructures, Photovoltaics, Solar cell, Titanium dioxide

A Literature Review on a Comparison of Mental Stress Between Physical Education and Non-Physical Education Teachers Working at National Schools in Sri Lanka

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This paper gives an overview of reviews from a set of research papers based on the topic of "a comparison of mental stress between physical education and non-physical education teachers". The researcher reviewed 70 articles, and 24 of them were highly related and referred carefully. For this study, the researcher identified the key features of natural literature reviews of mental stress and physical education and the negative aspects of mental stress and physical changes of stress, as well as the brain stimulation of physical activities. According to the studies, stress is a feeling of emotional or physical tension. It can come from any event or thought that makes you feel frustrated, angry or nervous. Stress is a body's reaction to a challenge or demand. In general, teaching has recently been considered one of the most stressful professions. Exercises increase teachers' overall health and their sense of well-being. Physical education consists of many different sports and activities, giving students the ability to compete in and learn a variety of games. Physical activities may help to bump up the production of teachers' brain's feel-good neurotransmitters, called endorphins. Involving physical education classes makes the teacher's effective stress reduction because physical activities pump up human endorphins. This synthesis of current research will be helpful to people to reduce stress through physical activities.

Keywords: Endorphins, Health, Physical Education, Stress

Evaluation of Physical and Sensory Properties of Encapsulated Dandila (*Dioscorea Alata*) Anthocyanin as a Natural Food Colourant

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Anthocyanins, a group of water-soluble, low-toxic substances with a wide range of colours, are one of the widespread natural pigments used in colouring foods. However, they are highly unstable and easily susceptible to degradation. Encapsulation is an effective way of protecting anthocyanin pigments from degradation while extending the shelf life. Still, certain anthocyanins produce unacceptable sensations in food products. Therefore, this study focused on assessing the physical and sensory properties of encapsulated Dandila anthocyanins to find out the potential of these pigments to use as a natural food colourant. As physical properties, dissolution, Water Solubility Index, and Water Absorption Index of encapsulated Dandila anthocyanins were measured using recommended procedures. An ice cream incorporated with encapsulated Dandila anthocyanins was used to determine the sensory properties of the encapsulated pigments. The formulation of ice cream consisted of 500 ml fresh milk, 8 g gelatin, 24 g corn flour, 12 g milk powder, 150 g white sugar, 250 ml water, and 60 g encapsulated Dandila pigment powder for the production of 1 l of ice cream. A panel of 30 untrained tasters evaluated the ice cream for colour, taste, texture, aroma, and overall acceptability using the five-point hedonic scale to determine consumer acceptance. Data were analyzed with the Minitab 19 statistical software. Dissolution, Water Solubility Index and Water Absorption Index of encapsulated pigment powder were recorded as 23.3±1.5 s, 89.5±1.0 %, and 1.4±0.15g, respectively, which were the preferable level. Median hedonic ratings for colour, aroma, taste, texture and overall acceptability of ice cream were recorded as 4.0 (Moderately like). According to the comments of the sensory panel, the addition of natural colourant had not produced any unacceptable sensation towards the panellists. Therefore, encapsulated Dandila anthocyanins consist of appropriate physical and sensory properties to be used as a natural food colourant for colouring ice cream. Further, this colourant has the potential as a natural colourant for foods stored under frozen conditions.

Keywords: Anthocyanin, Dandila, Dioscorea alata, natural colourant

Dung Beetle Communities Change Across Different Land Uses in the Upper Walawe Basin Area

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Environmental quality varies across different land-use types. As a result, available species communities and their functions also change across different land-uses, even within a single climatic zone. Community responses to land-use variations are best reflected by indicator taxa. This specific study focuses on how the well-known indicator dung beetle communities respond to land-use changes. We identified dung beetle species compositions across five environmentally distinctive land-uses (large forests, forest fragments, Pinus plantation forests, home gardens, and tea plantations). Trapping was conducted from November 2021–July 2022 in the Upper Walawe basin area. A non-destructive live trapping method was used to collect dung beetles. The research design allowed a total of 90 pitfall traps were left in the field for 48 hours. A total of 723 beetles belonging to 29 morph-species and representing three genera of the subfamily Scarabaeinae were recorded. The highest and the lowest species richness were recorded in the large forest (22) and plantation forest (10) consecutively. The forest patch recorded the highest individual species count (189). Also, the highest Shannon-Wiener index was recorded in large forest areas, indicating the richest diversity. In large forests, the most dominant species is *Onthophagus favrei* (dominancy index - 12.9%). In-home gardens and tea plantations, the most dominant species is *Onthophagus unifasiatus* (dominancy index: 26.5% & 28.4%), because it mainly relies on human and domestic animal feces. It was noted that the different land-uses consist of different species diversity due to other conditions in that location; anthropogenic activities (chemical usage for agricultural and domestic animals entering the forest). The Upper Walawe basin consists of a mosaic of land-uses with different large mammal availability, resources, and anthropogenic activities. Dung beetle communities show a distinct variation across the different land-uses but with some degree of overlap due to mixed vegetation in adjacent land-uses.

Keywords: Abundance, Community composition, Indicator species

Effectiveness of Different Reproductive Hormones and Their Dosages on The Breeding of *Ompok Ceylonensis* (Butter Catfish) Under Captive Conditions.

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Ompok ceylonensis is an endemic food fish distributed in the dry zone of Sri Lanka and has been a good protein source for rural fishing communities. Selective fishing pressure, habitat losses and many anthropogenic reasons are blamed for their declining populations in natural habitats. Stock enhancement of *O. ceylonensis* through induced breeding may not only pave the way for species conservation but also secure a sustainable protein source for the rural poor in Sri Lanka. However, different hormones and concentrations have been tried in freshwater fish breeding with varied success rates. Hence, it is confusing for small-scale fish breeders and conservationists on what type and concentration should be ideal for the breeding of butter-catfish. This study, therefore, aimed to evaluate the best hormone and concentration for captive breeding for *O. ceylonensis* using two different hormones, LHRH-a and GnRH. A sexually mature female and two males each were transferred into seven separate cages in cement tanks, and a water flow throw system was arranged. GnRH was injected at 0.3, 0.4 and 0.5 ml/kg rates for females and 0.2 ml/kg for males in three separate tanks. A similar procedure was practised to induce LHRH-a for fish in three other tanks with 20, 25 and 30 μg/kg. One tank was kept without fish being injected. After a latency period of 8 - 12 hrs, eggs were spawned in 5 tanks, but not in the concentration of GnRH 0.3 ml/kg and without hormone administrated tank. Water quality parameters were measured during the period of breeding and embryonic development period as temperature $29.5^oC \pm 0.49\ ^oC$, dissolved oxygen at 6.85 ± 0.32 mg/l, and pH at 7.34 ± 0.42. The highest relative fecundity, 143.9 eggs per/g of body weight and the highest hatchability, 84% was, recorded as the best performing concentration of hormone LHRH-a at the 25ug per kg of body weight of *O. ceylonensis*.

Keywords: GnRH, LHRH-a, Induced breeding, Ompok ceylonensis, Latency period

Effect of Dietary Inclusion of Black Soldier Fly (*Hermetia Illucens* L.) Larvae Meal on Sensory Attributes of Broiler Chicken Meat

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The price of crude protein (CP) sources like fishmeal used in the current poultry feed industry has been hastened. Hence, it is urged to trace cost-effective, alternative CP sources under the existing economic settings. Meanwhile, the current commercial broiler production emphasizes meat quality assurance since several factors, particularly organoleptic properties, influence consumers' buying decisions. The black soldier fly (*Hermetia illucens* L.) larvae (BSFL) have been successfully incorporated into broiler diets replacing expensive CP sources, but evaluation of its sensory properties is highly limited in the studies conducted in the past. Therefore, the present study aims to evaluate the organoleptic properties of meat obtained from broiler chickens fed full-fat (FF) BSFL meal and de-fatted (DF) BSFL meal at different inclusion levels (2.5%, 5%, 7.5%, and 10%) to replace cost-demanded fishmeal. Two-hundred and sixteen 14-day-old unsexed Cobb 500 broiler chickens (BW±SD: 343±13g) were randomly assigned to 36 battery cages (04 replicates per treatment, six birds/replicate). *Pectoralis major* (breast) muscles of 35-days-old broiler meat were collected fresh and were frozen below -18°C. The deboned breast meat was cut into 10 g (2 cm^3 cubes) pieces and oven cooked at 200°C until the internal core temperature reached 75°C. Cooked meat was evaluated for sensory properties by 37 untrained panellists using a pre-designed 6-point hedonic scale questionnaire. Evaluated sensory properties include tenderness, aroma, colour, juiciness, flavour and overall acceptability. The data from the sensory test was statistically analysed using the Friedman test in SPSS. The highest mean score for meat tenderness was recorded from the birds fed 7.5% BSFL FF meal and 10% BSFL DF meal incorporated diets. Meat from the birds fed 10% BSFL on an FF basis resulted in maximum juiciness. Notably, the birds fed a 5% BSFL FF meal incorporated diet performed the highest scores for all the rest of the sensory properties. Moreover, the BSFL meal, which is characterized by a peculiar flavour, can be used as an alternative fat source to the existing knowledge. The overall results envisaged that the sensory profile of meat was not affected by BSFL meal incorporation up to a 5% inclusion level into the diet, which is technically feasible, and the product is acceptable as compared to the conventional diet.

Keywords: Black soldier fly larvae, Broiler, Fishmeal, Sensory properties

Impact of Biofertilizer on the Growth of Winged Bean (*Xanthosoma sagittifolium*)

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Soil phosphorus (P) loss from agricultural systems in Sri Lanka limits food production. Phosphorous is mainly removed from the soil with the harvested portion of the crop. Triple Super Phosphate (TSP) is one of the main inorganics of P for cropping systems. Plant-available forms of phosphorus in topsoil are required for plant growth and productivity. Although the Eppawala Rock Phosphate (EPR) is a natural P source found in Sri Lanka, P in it is less readily available to crops than that in TSP. This study focuses on increasing the plant availability of phosphorus from EPR using three different biofertilizers. Three different biofertilizers were prepared using soil microbes from Pine Forests (PFB), Lower Montane Forest (LMB), and bamboo bushes (BBF). Control was only with the topsoil collected from the farm, and the other treatment was the same potting media without biofertilizer. Gliricidia leaves, cow dung, brown sugar, and natural water were used for culturing microbes. Potting media containing a mixture of compost (30%), biochar (5%), EPR (5%) powder, and farm soil (15 kg) was used for the experiment. Five treatments, together with the control, were arranged in a randomized complete block design (RCBD). Winged Bean (*Xanthosoma sagittifolium*) was planted as the indicator crop. After a two-month period, a significant increase in the above-ground biomass of Winged Bean was observed in PFB and LMB. A significant increase in no of pods has resulted from PFB and BFB in Winged Bean. Thus, it was evident that PFB is effective in increasing the growth and productivity of winged Beans (*Xanthosoma sagittifolium*).

Keywords: *Biofertilizer, Eppawala Rock Phosphate (EPR), Phosphorus*

Session VI - Faculty of Medicine Colloquium

Impact of Covid 19 on Medical Students and Their Needs to Adjust to the New Normal: Students' Perspectives on the Challenges, Coping Strategies, and Expected Support

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Medical students faced numerous challenges during the COVID-19 pandemic. Their experiences in overcoming this unprecedented disaster will be useful for addressing similar incidents in the future. We studied students' perspectives on the challenges, coping strategies, and expected support as part of a larger study on the impact of the COVID-19 pandemic on medical students. We obtained ethics approval and conducted a descriptive cross-sectional study at the Faculty of Medicine, SUSL. The study period was between December 2021 and March 2022. All first (n=110), second (n=75), and third-year students (n=70) were enrolled. The study was conducted electronically using a self-administered questionnaire via Google Forms. A thematic analysis of the responses was performed to examine the students' perspectives on the challenges they would face, coping strategies, and expectations of staff support. The response rates were 74.5% for the first year, 97.3% for the second year, and 61.4% for third-year students. There were five major themes in terms of the challenges they expect with the resumption of academic activities: facing multiple exams that had been postponed, adapting to the new university environment and routines, coping with the increased workload, time management to meet the demands, and adapting a restricted lifestyle due to the fear of contracting COVID. The primary coping strategies identified were utilizing effective study methods, socializing, seeking help from staff and friends, scheduling time for relaxation and entertainment, and time management strategies. Expected support from university staff was adapting interactive teaching-learning methods, providing psychological support, arranging social functions, organizing extracurricular activities and religious activities, improving lecture schedules, and providing guidance for studies. These findings highlight several major challenges students anticipate with the resumption of academic activities. Challenges such as multiple exams, restricted lifestyles, and fear of contracting the virus were probably rare prior to the pandemic. The innovative strategies used to meet such challenges could be strengthened by the university to further assist the needy. The students also identified several measures within and outside the curriculum that could facilitate a smooth transition when returning to work. These would be useful for consideration by the university that is keen on student wellbeing.

Keywords: *Medical students, Coping strategies, Support, Covid-19, Challenges, Pandemic*

06th December 2022, Sabaragamuwa University of Sri Lanka, Belihuloya

Psychological Distress Among Medical Students During the COVID 19 Pandemic: A Quantitative Study

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Medical students had to cope with numerous challenges during the COVID-19 pandemic. Such challenges are known to result in significant psychological distress and psychiatric disorder. We conducted a quantitative study among the first three batches of medical students from the Faculty of Medicine, Sabaragamuwa University of Sri Lanka, as part of a larger study on the impact of the COVID-19 pandemic on medical students. The study period was from December 2021 to March 2022 and was conducted electronically using a self-administered questionnaire, Kessler Psychological Distress Scale (K10) and a visual analogue scale delivered via Google Forms. All first (n=110), second (n=75), and third-year students (n=70) were requested to participate. The response rates were 74.5 % (82) for the first year 97.3 % (73) for the second year, and 61.4 % (43) for third-year students, totaling 198. 66.2 % (131) of responders were females. 56.1% (111) agreed/strongly agreed that the pandemic had an adverse effect on their studies. 53.6 % (106) reported difficulties in adapting to online teaching and learning, 36.9 % (73) reported a lack of facilities for online learning, and 48 % (95) reported poor internet reception. Social media was a distracter for studies in 61.6 % (122). 18-25% of the sample reported psychological distress most of the day during the pandemic in the form of depressive and anxiety symptoms. Kessler Psychological Distress Scale (K10) revealed that 109 (55%) of the sample was in distress at the time. 59 (30%) scored five and below on the visual analogue scale for happiness. No significant association was found with the year of study, previous illness or gender. Our results highlight significant psychological distress endured by students during faculty closure and when they return to the University, thus highlighting the need to establish systems to offer psychological support.

Keywords: Medical students, Psychological distress, Covid-19, Pandemic, University

Cultural Adaptation and Validation of Sinhala Version of Spiritual Needs Assessment for Patients (S-SNAP) Questionnaire: Results of a Pilot Study

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Determining spiritual needs is an essential requirement of the holistic assessment of palliated cancer patients. This study presents the results of a pilot study performed during the validation of the Sinhala version of the Spiritual Needs Assessment for Patients (SNAP) questionnaire. The original SNAP was translated into Sinhala language (S-SNAP) by two translators conversant in both languages, blinded to each other. The two translations were combined and translated back to the source language by two separate translators. S-SNAP was assessed for content validity, clarity and unambiguity by a panel of 6 specialists (including four clinicians involved in palliative care) and the final version was administered to 27 palliated cancer patients. The participants found the questionnaire easy to understand and unambiguous. The average time to complete the questionnaire was 5 min. The overall Cronbach alpha was 0.92, while the item-total correlations of the 22 items ranged from 0.40 to 0.78. The Cronbach alpha values of three subcomponents; psychological needs, spiritual needs and religious needs, were 0.86, 0.88 and 0.90, respectively. We found the S-SNAP to have adequate reliability and psychometric properties. The questionnaire needs to be further assessed through a proper validation study.

Keywords: *Spirituality, of Spiritual Needs Assessment for Patients questionnaire. Palliative care, Cancer*

Identification of *Hypnale Zara* (Hump-nosed Pit Viper) Using the Nuchal Colour Bands

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Hump-nosed pit vipers (HNV) of the genus *Hypnale* are medically important because they are the commonest cause of venomous snakebites in Sri Lanka. There are three species of HNV, namely *H. hypnale*, *H. zara* and *H. nepa* from which the latter two are endemic. The presence of 'hump' is the key identifying feature of HNV. All *Hypnale* species are lookalike to the naked eye. The objective of this study was to describe and differentiate the identification features of *H. zara* from the other two species. Specimens of HNV brought by snakebite patients to hospitals were collected from all over the country from February 2018 to January 2022. Their morphology, including gender, lengths, scale counts, and colour variations, were recorded. Killed specimens were preserved in 10% formalin, and live snakes were released to their natural habitat. Data analysis was done using SPSS version 21. Seventy-one specimens were studied, from which 45 were *H. hypnale*, 20 were *H. zara* and 6 were *H. nepa*. Out of *H. zara*, 13 (65%) were killed specimens, and 7 (35%) were live snakes. Twelve (60%) were males, and 8 (40%) were females. The lengths ranged as total length 229-425mm (mean 349, SD 63), snout to vent length 201-380mm (mean 300, SD 57), head length 14-30mm (mean 21, SD 4), and tail length 27-65mm (mean 49, SD 10). The number of scale counts were ventrals-148 (IQR 142-150), subcaudals-41 (IQR 37- 45), and mid-dorsal scales-17 (IQR 15-17). Characteristic colour bands were observed in all specimens of *H. zara* on either side of the neck compared to the other two species. These bands are thick and short, deep brownish in colour, three or more in number and the first is longer than the others. *H. zara* can be identified from the nuchal colour bands from the other two species of the genus. This is a characteristic feature of identifying *H. zara*.

Keywords: *Hump-nosed pit viper, Hypnale zara, Nuchal colour band, Snakebites*

Microbiological Contamination of Mobile Phones and Mobile Phone Hygiene Practices Among Undergraduates of a Selected Higher Education Institute

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Mobile phones have been identified as a potential global public health risk for disease transmission. Recently, mobile phone manufacturers revised their user support guidelines and stated that the exterior surfaces of phones could be disinfected. Mobile phone usage has become a vital part of students' lives for communication and accessing vital information for education. This study aims to assess the mobile hygiene practices adopted by undergraduates, and the microbiological contamination of mobile phones at a selected higher education institute. A cross-sectional study was carried out. A pre-validated questionnaire was distributed among the undergraduates of KAATSU International University of Sri Lanka. Descriptive statistics were used to analyse the data. Swab samples were collected and cultured on nutrient agar from randomly selected 50 participants' mobile phones. The number of colony types produced by each device was used to determine the level of bacterial contamination. A total of 353 undergraduates participated in the study. Two hundred and thirty-three (66%) students knew that phone surfaces can get contaminated with pathogens, and 34% weren't aware of this. Two hundred and five (58%) students have shared their mobile phones with others. Two hundred and fifteen (61%) have used mobile phones while eating. Hundred and seventy-three (49%) students were using mobile phones in washrooms, and 208 (59%) used them during laboratory sessions. Two hundred and eighty-six (81%) students stated that they clean their phones. Of these, 25.5% were cleaning their mobile phones regularly, 41% were occasionally cleaning, and 15% were rarely cleaning. Sixty-four (18%) students have not cleaned their mobile phones at any time. Around 124 (35%) have used more than one method to clean their phones. Two hundred and forty-four (69%) students used normal tissue/dry cotton cloth to wipe the phones, 235 (67%) used wet tissues, 219 (62%) used cotton cloth with alcohol-based products; and 30 (8.5%) used cotton cloth with water. Twenty-five (7%) mobile phone users used Dettol® products to wipe their phones. Of the 50 swab samples collected, 48 (96%) showed contamination with one or more types of bacteria: 24 (48%) had three colony types, 14 (28%) had two types, 6 (12%) had one type, and 4 (8%) had four types. Despite most undergraduates' claims of cleaning their devises, a considerable level of microbial contamination is cause for concern.

Keywords: *Contamination, Mobile phones, Phone hygiene practices*

Molecular Evidence of Other Viral and Bacterial Pathogens Associated with Lower Respiratory Tract Infection in SARS Cov-2 Suspected Patients in District Rathnapura in Sri Lanka.

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Acute respiratory tract infection (RTI) is the most widespread type of acute infection in adults and children and causes significant mortality and morbidity worldwide. However, aetiology remains underdetermined in more than 50% of cases. The main causal agents of community-acquired pneumoniae (CAP) are viruses, bacteria and fungi, out of which viruses are the most common pathogens. Currently, the clinical diagnosis of respiratory tract infections is mostly restricted to a few pathogens, and there are limited data available on etiological agents causing RTIs in Sri Lanka and no data on the involvement of other respiratory viruses in District Rathnapura. A total of 24 nasopharyngeal swabs that were submitted to (from both adults and children who presented with flu-like illness) Teaching Hospital Ratnapura between July and October 2022 were analyzed using RespiFinder assay, which is based on the multiplex ligation-dependent probe amplification (MLPA) technology. Viral RNA was extracted using the QIAamp® MinElute Virus Spin Kit according to the manufacturer's instructions. It followed SARS CoV-2 RT-PCR and RespiFinder assay. Overall, none of the patients was confirmed positive for SARS-CoV-2. Entero/Rhino (25.0%), Influenza B (8.3%), Respiratory Syncytial Virus type B (4.1%), *Chlamydophila pneumoniae* (4.1%). One specimen showed molecular evidence of coinfection with Rhino/Entero and influenza B. Remarkably, our study showed for the first time the molecular evidence of *Chlamydophila pneumoniae* in Sri Lankan setting. This study adds up to current scars data on RTIs in Sri Lanka.

keywords: Influenza B, Enterovirus, RTIs, SARS CoV-2

Metabolic Stress Triggers CD36 Activity in Tumour Initiation in Oral Submucous Fibrosis

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Metabolic stress at the cellular and organismal level may play a significant role in oncogenesis. Lipid-dependent metabolic stress in the extracellular matrix (ECM) has been linked with tumour initiation and metastasis. Previous work has identified the involvement of certain lipid raft molecules like Caveolin-1 in educating sites for metastasis. The fat receptor CD36 in lipid rafts similarly interacts with several ECM molecules, including integrins and is a key upstream regulator in lipid metabolism and collagen degradation leading to the pathogenesis of CD36-mediated signalling that disrupts ECM homeostasis. Oral Submucous Fibrosis (OSF) is a debilitating, potentially malignant condition of the mouth with 7-13% transformation rate, which is frequently found in South Asia and in the Western-Pacific. It is caused by Areca-nut chewing, which progressively restricts mouth opening that contributes to diet-related metabolic stress leading to anaemia and vitamin and protein deficiencies. OSF is marked by epithelial atrophy and fibrosis with accumulated type I collagen in the submucosa undergoing inflammation and reactive immune responses but little is known about the process of malignant transformation. We hypothesized that dysregulated fat metabolism might be a key denominator in the malignant transformation of OSF and CD36 as a fat biosensor may play a pivotal role in the intracellular and extracellular signalling pathways. We analysed patient data with quid chewing frequency and restricted mouth opening and found that the clinical presentation of malignant transformation was strongly associated with the number of betel quids (7-12 or more) used per day. Epithelial thickness increased in 3 folds with the development of oral cancer compared with OSF and OSF-dysplastic stages predominantly characterised by atrophy. Immunohistochemistry with CD36 in OSF showed localization with epithelial cell nuclei adjacent to the basement membrane, while a remarkable elevation of CD36 was seen across tumour cell cytoplasm in the invading islands. Taken together, these suggested how a functional shift in CD36 may result in the malignant transformation of those cells undergoing metabolic stress. Further studies will validate how CD36-dependent cancer initiation favours tumour cell survival and metastasis under metabolic stress conditions.

Keywords: OSF, Malignant transformation, Metabolic stress, CD36

Session VII

Undergraduate Poster Presentations

Value Addition and Quality Evaluation of Pasta Formulated Using Chickpea (*Cicer Arietinum*) Flour

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Consumer awareness and commercial demand for healthy foods is increasing nowadays. And, also there is a good potential for pasta with higher nutritional value in Sri Lanka. The aim of this study was to formulate nutritionally improved pasta compared to the regular durum wheat pasta (*Triticum durum*) using chickpea flour (*Cicer arietinum*). The product was formulated by changing the percentages of chickpea and durum wheat flour to obtain pasta with the highest chickpea proportion along with optimum organoleptic and cooking quality. Evaluation of powder characteristics for both flours showed that there were significant differences ($P<0.05$), and chickpea flour had lower bulk (365.88 ± 3.89 kgm^{-3}) and tapped density (652.33 ± 12.41 kgm^{-3}). Nine-point hedonic scale test and cooking quality test identified the most preferred formulation of pasta and it was 95% chickpea flour and 5% corn flour added pasta. The cooking quality test revealed that formulated chickpea pasta had a lower optimum cooking time (8.83 ± 0.3 min) with a significant difference ($p<0.05$), while higher values obtained for cooking loss ($7.95\pm0.59\%$), swelling index (2.86 ± 0.08), increase in volume ($272.77\pm0.47\%$) and a significant difference was observed in each of these qualities ($p<0.05$). The proximate result of chickpea pasta was moisture ($9.43\pm0.06\%$), crude fat ($8.35\pm0.27\%$), crude protein ($21.73\pm1.57\%$), ash ($1.52\pm0.01\%$) and carbohydrate ($49.36\pm1.42\%$). Moreover, these values (except carbohydrate) are higher than durum wheat pasta, and it showed a significant difference ($p<0.05$). Crude protein and crude fiber content in chickpea pasta are 1.5 and 3 times higher compared to durum wheat pasta, respectively. Texture profile analysis results showed that there were no significant differences ($p>0.05$) in hardness, cohesiveness, springiness, gumminess, and chewiness. Greater colour change (ΔE^*) was observed in chickpea pasta (9.09) due to cooking than in durum wheat pasta (3.03). Storage study revealed that no yeast and mould count and lower total plate count (less than the detection limit) were observed during the 6-week period. And changes in moisture content were also in acceptable level during this study period. Accordingly, the final product has high nutritional significance than the regular durum wheat pasta.

Keywords: Chickpea pasta, Cohesiveness, Durum wheat pasta, Springiness

Impact Assessment of Clear-Cutting in a Pinus Plantation in the Nonpareil Area of Belihuloya, Sri Lanka

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Clear-cutting can be recognized as an economical way of timber harvesting in terms of profit and time-saving. Simultaneously, the rapid change within any ecosystem caused by the removal of entire vegetation causes serious environmental problems. Thus, the study was carried out to determine the key consequences of a post-clearcutting scenario (on aspects such as regeneration, soil erosion, and carbon storage). The study area, "Perawaththa Pinus Plantation", underwent a clear-cut during the period from 2014 to 2016. The study area is a sloppy land in the Nonpareil area in Belihuloya within the Mid country, the Southern Intermediate zone of Sri Lanka. After the clear-cutting, the Forest Department has planted native plant species together with an exotic Eucalyptus sp. with the intention of converting the needle-leaf Pinus plantation forest into a broadleaf forest. However, the study found that the natural regeneration of the exotic Pinus caribaea (as the original stand) outperformed the supported attempt at restoring native broadleaf species, resulting in P. caribaea dominating the area (90% of regenerating plants) after five years of clear-cutting. The growth rate of P. caribaea was calculated as 1.68cm in diameter per year based on the DBH increment. Plot data represents 15 plant species regenerating in the area after the clear-cut belonging to 10 plant families, representing eight introduced species (incl. Eucalyptus sp.) and seven species that are regenerating naturally (incl. P. caribaea). The mean annual soil erosion was calculated by employing the InVEST SDR model, and it has increased from 3.1 tons·ha^{-1}·yr^{-1} to 423.8 tons·ha^{-1}·yr^{-1} in the post clear-cut scenario. The mean value of carbon storage, determined using the InVEST carbon model, also changed dramatically from 253.7 tons·ha−1 to 27 tons·ha−1, respectively, between the years 2013 and 2017. The findings of the study provide on-the-ground impacts of clear-cutting, which should be validated with multiple sampling sites and used for decision and policy-making in forest plantation management.

Keywords: *Clear-cutting, InVEST Carbon, InVEST SDR, Nonpareil, Regeneration, Soil Erosion*

Binding of Amoxicillin to Haemoglobin

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Haemoglobin is responsible for transporting oxygen throughout the body. Because of the enormous molecular weight and the structure of haemoglobin, there could be a possibility that the drug will not be reversibly released from the Hemoglobin molecule once bound. Because of its size, such a Hemoglobin bound drug will form a complex that will be unable to diffuse through blood arteries. As a result, the free concentration of the drug may be affected. The goal of this study is to determine the Amoxicillin binding capacity to Hemoglobin and to predict the free drug availability for pharmacological action. Equal volumes of amoxicillin (0.8 mg/mL) and Hemoglobin (4 mg/mL) in pH 7.4 buffer were mixed and incubated at 37 °C for 1,2,3 and 6 hours. 1 ml of the incubated reaction mixture was dialyzed (14-12 kDa) against pH 7.4 buffer solution for three hours. The concentration of Amoxicillin in the dialysate was measured using High-Performance Liquid Chromatography. The concentration of amoxicillin in the dialysate was constant from 1 to 6 hours, indicating that the amount of amoxicillin bound to the Hemoglobin was maximum at 1 hour and was a constant throughout. Since the initial drug concentration was sufficient to saturate the Hemoglobin, the ratio of the bound drug to the unbound drug was 1: 13. Further computations of the moles of bound drug and initial mols of haemoglobin revealed that two Amoxicillin molecules were bound to one Hemoglobin molecule confirming that Hemoglobin has two binding sites for amoxicillin.

Keywords: *Amoxicillin, Drug binding, Haemoglobin*

Identification and Control of the Fungal Contaminants in *Vitro* Cultures of *Heuchera hybrida* (Coral Bells)

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Heuchera hybrida, also called "coral bells," is a versatile perennial with attractive foliage and bell-shaped flowers. To meet the increasing demand for commercial scale cultivation, tissue culture protocols have been developed. There is a necessity to suppress the growth of fungal contaminants that were present in the original explant or introduced as laboratory contaminants without causing an adverse effect on tissue-cultured plantlets. The goal of this study was to identify fungal contamination in *in vitro* propagated *H. hybrida* and control those using fungicides. Complete Randomized Design (CRD) was used to conduct the experiment. One-way, two-way (Analysis of Variance) ANOVA, and linear regression analysis methods were used. The contaminated fungi were isolated from tissue culture media and cultured on Potato Dextrose Agar and incubated at 25°C for one week. The identification of fungus were carried out by using macroscopic and microscopic examinations depending on the colony color, shape, hyphae, conidia, conidiophores and arrangement of spores. For the molecular identification of the contaminated fungus, the extracted fungal DNA was amplified by PCR using a specific internal transcribed spacer primer (ITS1 / ITS4). Six fungicides (Carbendazim®, Topsin M 70®, Chlorothalonil®, Mancozeb®, Antracol®, and Homai®) were tested. The effectiveness of fungicides was evaluated using the inhibition zones produced by fungicides against fungal contaminants. Four different types of fungicides were chosen for *in vitro* screening and incorporated into the MS medium at rates of 75%, 50%, 25%, and 10% of its recommended dosage. Three fungal contaminants were identified as *Penicillium spp*., *Phlebia acerina,* and *Cladosporium spp* based on both microscopic and macroscopic features and molecular confirmation. Topsin M 70® showed strong fungicidal effects on *Penicillium spp* and *Cladosporium spp.,* while having a fungistatic effect on *Phlebia acerina*. All the fungicide-treated samples did not have any fungal contamination during the multiplication period of *H. hybrida*. Topsin M 70® in tissue culture medium stimulated *H. hybrida* growth without causing visual toxicities in plantlets. The results of the experiment revealed that a 100 ppm concentration of Topsin M 70® effectively controlled the identified fungal contamination in *H. hybrida*, avoiding annual production losses due to fungal contamination.

Keywords: *Fungal contaminants, Fungicides, Heuchera hybrida, in vitro propagation*

Agricultural Drought Monitoring Using Multispectral Satellite Data: A Case Study of North Central Province in Sri Lanka

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Agriculture is the main field of the economy that brings profit to Sri Lanka, and Sri Lanka is also considered as the grain storage of South Asia. Sri Lankan agriculture mainly depends on crops like paddy, tea, etc. Therefore, it is vital to identify the problems that can cause damage to the field of agriculture. One such problem is agricultural droughts, which are caused by the shortage of water for agricultural purposes. There have been many indices developed for the monitoring of the phenomena related to the agricultural fields in remote sensing. This research is mainly focused on monitoring agricultural droughts with the use of soil moisture and some selected vegetation indices that were derived from Landsat multispectral data. It has chosen the Soil Moisture Index (SMI) and some vegetation indices that have an influence to the growth of plants. SMI was computed using the relationship between the Normalized Difference Vegetation Index (NDVI) and the Land Surface Temperature (LST) and can measure the soil moisture of the top layer of soil. SMI and the Delta index values were compared with the Standardized Precipitation Index (SPI) values taken from the Department of Meteorology Sri Lanka, which have been currently used for drought monitoring purposes. Both indices showed different correlations with the SPI values, and SMI showed the highest correlation of 0.39 with the SPI – 1-month data of the study area. Then with the vegetation indices, SMI showed high correlation with Land Surface Water Index (LSWI) than the Enhanced Vegetation Index (EVI) and the Soil Adjusted Water Index (SAVI). The regression model between the vegetation indices and the SMI gave the R squared value of 0.63. And the regression model also emphasizes that the SMI shows a high correlation with the LSWI index in the North Central Province, as the regression coefficient for that index was higher than others. Hence, it was evident that soil moisture alone cannot be used for agricultural drought monitoring, and there are other parameters that can affect crop production.

Keywords: Agriculture, Droughts, Remote sensing, SMI, Vegetation indices

Comparison of Accuracies Between Different Levels of PPP

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Precise point positioning can be considered as an alternative solution for the traditional GNSS positioning techniques with the use of a single GNSS receiver. Precise Point Positioning (PPP) has started to make positioning utilizing undifferenced carrier phase and pseudo-range observations. The main objective of this research was to examine the accuracy variation between Different levels of PPP solutions such as Ultra-rapid(observed half), Rapid and Final, which are provided by the International GNSS service .so in this study, five GNSS observation points were established in Sabaragamuwa University of Sri Lanka premises. After Data were collected as three-hour observations for all five points, The collected data were processed using the RTK LIB and CSRS PPP According to the result obtained, CSRS PPP and RTK LIB results showed a significant difference, so after the same data were processed using the DGNSS method in order to further confirm which platform is best one. For further assessment, Distance and Height differences between points were measured. However, in the end, CSRS PPP showed the best performance for the three PPP product levels. It was concluded that centimeter-level accuracy could be achieved in static mode while Final Product showed better accuracy than others. Rapid and Ultra Rapid products showed almost equal accuracy horizontally. Accuracy for the Up direction was led by the Ultra-rapid (observed half) product, followed by the Final and Rapid products, respectively.

Keywords: *Accuracy, CSRS PPP, GNSS, PPP*

The Spatiotemporal Urban Expansion in Greater Kandy Development Area (GKDA)

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In recent decades, Kandy city—the central capital of Sri Lanka—has exhibited rapid urban growth. Until the late nineteenth century, the urban landscape of the city was limited to this narrow basin where the centre of the present city is located. Later, in response to the increasing demand for urban space in the area, the city expands to the hillsides of the valley by damaging environmentally sensitive areas. Recently, the government authority has established 'The Greater Kandy Development Area (GKDA)', covering Kandy city and its surroundings to manage the adverse effects of rapid urban expansion. In such a context, monitoring the urban expansion in GKDA becomes very important for effective urban planning initiatives. The present study monitors the LULC of GKDA from 2005 to 2020 using remote sensing data and geospatial approaches. The results revealed that GKDA's built area changed from 17% to 40%, while the non-built area declined from 88% to 59% from 2005 to 2020. This shows the progressive expansion of built-up has taken during the reduction of non-built-up in the area in the last decades. Specifically, the eastern part of the GKDA exhibits more noticeable LULC variations where the Pallekale industrial zone is located. Mainly urban expansion has taken place along the main transport corridors, which linked the main growth nodes in the area. The finding of this study provides valuable directions for sustainable urban development of the area.

Keywords: Remote Sensing, Urban Expansion, Sustainability, LULC

Association Between Alcohol Consumption and Trauma Incidents Among Patients Admitted to General Surgical and the Orthopedic Wards in the *Teaching Hospital – Rathnapura.*

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Alcohol related injuries are a leading cause of hospital admissions. The objective of this study was to determine the association between alcohol use and trauma among patients admitted to general surgical wards and orthopedic wards in the Teaching Hospital Ratnapura. This was a descriptive cross-sectional study done, among 150 trauma patients over 18 years of age admitted to Surgical and Orthopedic wards from 29th of September to 15th of October using interviewer administered questionnaire, Alcohol Use Disorders Identification Test (AUDIT), Injury severity score (ISS) and National Statistics Socio-economic Classification (NS-SEC). Data were analyzed using SPSS software. According to the results a positive association between alcohol use and prevalence of trauma injuries were noted with a 58%, percentage of alcohol consumption among the sample and no possible association was observed between ISS scores and AUDIT scores. Highest amount of alcohol consumption was noted in the age group between 26-35 years (40.7%) and among social class 7 in NS-SEC (52.7%). Commonest type of injury among individuals under the influence of alcohol at the time of incident was falls from height (44.4%). The commonest time of the day for such incidents to occur was between 6:00 PM to 6:00 AM (66.66%). No alcohol use was noted among the female subjects. Alcohol use is prominently associated with trauma in this sample, especially among young males. Interventions to reduce alcohol consumption among young males could potentially reduce trauma incidents and save costs for the health care system. Further studies involving larger samples, longer time frames and more reliable measures of alcohol could add more knowledge into this association. In conclusion, alcohol consumption has a significant association with patients hospitalized due to trauma incidents in Ratnapura area.

***Keywords:** Alcohol, AUDIT, ISS, Rathnapura, Trauma*

The Alvarado Score in Appendicitis: Can It Enable Antibiotic Therapy, Reducing the Need for Surgical Treatment?

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This study aimed to evaluate the Alvarado Score (AS) in increasing the diagnostic accuracy of appendicitis and assess the possibility of antibiotic therapy, reducing the need for surgical treatment. A cross sectional study was carried out on all patients between 16 to 60 years of age who underwent appendicectomy in the Teaching Hospital Rathnapura, from 21st September to 15th October 2022.The AS were calculated and compared with the histopathological diagnoses. The indices used for validating a diagnostic test and the Receiver Operating Characteristics (ROC) curve were obtained. Sixty-one patients had appendicectomies and acute appendicitis and minimal inflammation was reported in 47 and 14 patients respectively (100% accuracy of the clinical diagnosis). Using acute appendicitis as a positive diagnosis and minimal inflammation as a negative diagnosis, the ideal cut off AS for these patients, obtained by a ROC curve, was 5.5. Using a cut off of 6, the diagnostic accuracy was 85.2% (95% CI 73.8% to 93.0%). In the 14 patients who had minimal inflammation, the AS ranged from 3-9 (mean 5.4, SD 1.6), and 10 patients had AS between 3-5. The characteristic clinical feature of tenderness in the right iliac fossa, by itself, had very good sensitivity but very low specificity. Reducing the cut off of AS to 6 was suitable for the patients studied. Since 10 out of the 14 patients who had only mild inflammatory changes had AS between 3-5, they could be offered antibiotic therapy without urgent appendicectomies. However, at a cut off value of 4.5 (as reported to be the best cut off value by a study carried out at Peradeniya), the specificity in the current study was only 22%. Reducing the cut off of the Alvarado Score to 6, and offering antibiotic therapy to patients with AS between 3-5 could be considered.

Keywords: *Alvarado score, antibiotic therapy, appendicitis, diagnostic accuracy, surgical treatment*

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