UNI - IN ALLIANCE 2025

"Empowering Sri Lanka through Innovation, Science and Sustainability"

11th Undergraduate Research Symposium

Organized by Society of Industrial Scholars.

Proceedings Book of the 11th Consecutive Annual Undergraduate Research Symposium

"UNI-IN ALLIANCE 2025"

Faculty of Applied Sciences

University of Sri Jayewardenepura, Nugegoda, Sri Lanka

27th August 2025

Organized by

Society of Industrial Scholars

B.Sc. (Honours) Degree in Applied Sciences

Organized by the Society of Industrial Scholars of B.Sc. (Honours) Degree in Applied Sciences, Faculty of Applied Sciences, University of Sri Jayewardenepura

27th August 2025

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B.Sc. (Honours) Degree in Applied Sciences

Faculty of Applied Sciences

University of Sri Jayewardenepura

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Message from Senior Prof. Pathmalal M. Manage
Vice Chancellor
University of Sri Jayewardenepura

It gives me great pleasure to extend my warmest greetings to all participants of the 11th UNI-IN ALLIANCE Undergraduate Research Symposium, organized by the Society of Industrial Scholars, University of Sri Jayewardenepura. This annual event continues to serve as an important platform for nurturing a culture of research, innovation, and academic excellence among undergraduate students in Sri Lanka.

The theme of this year's symposium, "Empowering Sri Lanka through Innovation, Science, and Sustainability," aptly captures the essence of the transformation our country needs today. In an ever-evolving global landscape, the integration of scientific research, innovative thinking, and sustainable practices has become more crucial than ever. These three pillars, when harnessed effectively, have the potential to empower communities, address national challenges, and lead Sri Lanka towards a more resilient and equitable future.

As a leading institution in the country, the University of Sri Jayewardenepura takes immense pride in promoting undergraduate research and encouraging the intellectual curiosity of our youth. We firmly believe that empowering young minds through opportunities like this symposium will not only drive individual growth but also contribute significantly to the national development agenda.

I take this opportunity to congratulate all students who are presenting their research, as well as the dedicated academic and organizing teams who have worked tirelessly to bring this event to life. Your contributions are paving the way for a new generation of innovative thinkers and future leaders.

I wish the 11th UNI-IN ALLIANCE Undergraduate Research Symposium every success and look forward to witnessing the impactful ideas that will emerge from this forum.

Thank you.

Message from Prof. Upul Subasinghe
Dean
Faculty of Applied Sciences
University of Sri Jayewardenepura

It is a pleasure to extend my warm wishes to the Society of Industrial Scholars and the organizing committee of the 11th UNI-IN ALLIANCE Undergraduate Research Symposium. This event stands as a testament to the unwavering dedication, intellectual curiosity, and innovative spirit of our undergraduate community. The theme for this year, "*Empowering Sri Lanka through Innovation, Science and Sustainability*," is both timely and meaningful. As we face increasingly complex national and global challenges, the role of science and innovation in creating sustainable solutions cannot be overstated. It is through rigorous academic inquiry, interdisciplinary collaboration, and the nurturing of young scientific minds that we can pave the way toward a resilient and prosperous Sri Lanka. This theme resonates with the faculty's core objective - preparing young minds to serve society through impactful research and meaningful innovation.

This symposium provides an invaluable platform for undergraduate researchers to share their work, engage in meaningful academic exchange, and develop confidence as future scientists, professionals, and leaders. The quality and diversity of research presented here reflect the strong foundation laid by the Faculty of Applied Sciences in encouraging a research-driven mindset among our upcoming researchers. I believe that the research showcased here will not only inspire innovation but also ignite a more profound commitment to responsible and sustainable scientific practice. I extend my appreciation to all students for their commitment to research and to the academic supervisors for their mentorship and dedication, which are the pillars that guide these young researchers. I also appreciate the organising committee for their exceptional dedication in bringing this event to fruition. Your collective efforts not only enrich the academic environment of the faculty but also inspire a deeper culture of innovation and knowledge-sharing that benefits society at large.

May your efforts continue to foster a culture of excellence within the faculty and beyond, marking another milestone in our collective journey of academic and scientific growth. I wish this symposium every success and hope it continues to grow as a platform that uplifts the voices and visions of young scholars.

Message from Prof. Pahan Godakumbura
Coordinator
B.Sc. (Honours) Degree in Applied Sciences
Faculty of Applied Sciences
University of Sri Jayewardenepura

It is with immense pride and heartfelt joy that I extend my warm wishes to the Society of Industrial Scholars of the B.Sc. (Honours) in Applied Sciences Degree Program on the successful organization of the 11th UNI-IN ALLIANCE Undergraduate Research Symposium and the 2nd Consecutive FUTURUM 2.0 – AI Innovation Competition. The continuation of this symposium for over a decade is a remarkable achievement that reflects the determination, vision, and collective effort of our undergraduate community. This event has evolved into a distinguished academic platform where young scholars present their research, exchange knowledge, and gain the confidence to pursue scientific inquiry in greater depth. It stands as a symbol of the values we uphold as the degree program, nurturing critical thinking, fostering innovation, and guiding students toward becoming future-ready professionals and leaders. I am particularly delighted to note the inclusion of FUTURUM 2.0 – AI Innovation Competition**,** now in its second consecutive year, which enriches the symposium by embracing the transformative potential of Artificial Intelligence. This initiative not only showcases the creativity and innovative capabilities of our students but also demonstrates their readiness to address the challenges and opportunities of a rapidly evolving technological landscape. It is heartening to see our undergraduates embracing these frontiers of knowledge with such enthusiasm and originality.

I extend my sincere appreciation to the students whose tireless commitment and intellectual curiosity bring life into this event, and to the academic supervisors whose guidance and mentorship serve as a foundation for their success. I also wish to commend the organizing committee of the Society of Industrial Scholars for their exceptional dedication in ensuring the smooth and impactful realisation of this symposium. Their efforts continue to strengthen the academic culture of our degree program. As the Degree Coordinator, it brings me great pride to witness the continued success of our students and the Society of Industrial Scholars. I am confident that this symposium and competition will inspire many more milestones in the years to come, while further cementing the role of research, innovation, and sustainability in building a brighter future for Sri Lanka.

I wish the 11th UNI-IN ALLIANCE Undergraduate Research Symposium and FUTURUM 2.0 – AI Innovation Competition every success, and I look forward with great anticipation to the outstanding contributions of our undergraduates who embody the spirit of innovation and excellence.

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The organizing committee of the 11th Undergraduate Research Symposium "UNI-IN ALLIANCE 2025" would like to express our sincere gratitude to all individuals and groups whose guidance, commitment, and generous support made this event a remarkable success. The symposium represents a collective achievement, and we extend our sincere appreciation for the following contributions.

- Senior Prof. Pathmalal M. Manage, Vice Chancellor of the University of Sri Jayewardenepura,
- Prof. Upul Subasinghe, Dean of the Faculty of the Applied Sciences, University of Sri Jayewardenepura,
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- All the Reviewers and Evaluators of the Symposium Sessions,
- President, Mr. Hasitha Ranjan, Secretary, Ms. Sanduni Nikethani, Junior Treasurer, and all the office bearers and members of the Society of Industrial Scholars for the year 2024/25,
- Assistant Registrar, Assistant Bursar, and all the Staff of the Office of the Dean, FAS,
- The generous Support of Our Sponsors and the dedicated efforts of J'pura Media in providing excellent media coverage,
- Senior students from previous batches of the B.Sc. (Honours) Degree in Applied Sciences,
- Non-academic staff members of the Faculty of Applied Sciences.

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"UNI-IN ALLIANCE – 2025"
27th August 2025

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08:15-08:25	Lighting the Oil Lamp and University Anthem
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08:40 - 08:45	Video Presentation (Introduction to Symposium)
08:45 - 08:50	Address by Snr. Professor. Sudantha Liyange, Former Vice Chancellor of USJ
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BIOLOGICAL SCIENCES

Empowering Sri Lanka through Innovation, Science and Sustainability.

ID 11

A PHARMACOGNOSTIC STUDY TO IDENTIFY THE ROOTS OF *Rotheca serrata* (LAMIACEAE) AND *Clerodendrum indicum* (LAMIACEAE) FOR ITS USAGE AS SUBSTITUTES FOR SIRITHEKKU

Suwanya A. G. G.[1], Munasinghe M. L. A. M. S.[1, *], Jeewandara J. M. P.[2]

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Ensuring the effectiveness of traditional herbal medicine requires proper identification and substitution of genuine plant materials. Sirithekku, traditionally used in Sri Lankan Ayurveda, is often imported from India as *Rotheca serrata*. Due to rising costs and limited availability, this study explores the potential of using locally available *Rotheca serrata* (Kanhenda) and *Clerodendrum indicum* (Wal Sirithekku) roots as substitutes. Pharmacognostic evaluation included macroscopic and microscopic studies, physicochemical tests (moisture, ash, Ethanol and water extractive values), phytochemical screening, TLC, FT-IR spectroscopy, and DPPH antioxidant assays. Results showed anatomical differences and different phytochemical profiles between the imported Sirithekku and locally grown *Rotheca serrata*. *Clerodendrum indicum* also showed comparable yet distinct properties. Findings suggest that the imported Sirithekku is not true *Rotheca serrata*, which can be cultivated locally. This highlights the need for accurate identification to promote sustainable, cost-effective traditional medicine.

Keywords*: Lamiaceae, pharmacognostic, physicochemical, thin-layer chromatography, microscopic*

ID 26

ASSESS THE SUITABILITY OF THE BIOFLOC SYSTEM FOR OUTDOOR NURSERY REARING OF SANDFISH (*Holothuria scabra)* JUVENILES

Kumarasiri T. I.[1], Dissanayake D. C. T.[1, *], Adikari A. M. A. N.[2]

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Sandfish (*Holothuria scabra*) aquaculture is a growing industry in Sri Lanka with promising socio-economic potential. However, the nursery phase remains a critical bottleneck due to poor growth and survival rates, largely attributed to limited infrastructure and the lack of standardized, research-based rearing protocols. This study investigates the effectiveness of Biofloc Technology (BFT) as a sustainable nursery system by comparing three treatments: a biofloc-only system (T1), a biofloc system with a sediment layer (T2), and a conventional sediment-only system (T3). The experiment was conducted from February to May 2025 at the National Aquatic Resources Research and Development Agency (NARA). Juvenile sandfish (1–2 g) were stocked at a density of 10 individuals/m² in triplicate tanks per treatment. Biofloc incorporated treatments were maintained with no water exchange while the treatment 3 tanks were subjected for a weekly water exchange. Growth and survival were monitored weekly over six weeks, while water quality parameters (temperature, dissolved oxygen, salinity, pH) were measured every other day. Total ammonia nitrogen (TAN) and nitrate levels were recorded weekly. Additionally, microbial analysis was carried out in biofloc-based systems. Results showed that juveniles in the T2 treatment exhibited significantly higher performance with a weight gain of 68.34%, length gain of 47.46%, and a specific growth rate of 2.74%/ per day. This was notably superior to T1 (12.64%, 13.53%, 0.35%/day) and T3 (19.76%, 34.07%, 0.99%/day) ($p < 0.05$; ANOVA). All treatments achieved 100% survival, indicating that survival is not compromised under well-managed conditions. T2 also maintained more stable water quality, with pH values between 7.8–8.0, DO levels at 8.1–8.5 mg/L, and a consistent temperature of ~29.3 °C. TAN remained low (0.1–0.2 mg/L), and nitrite levels stayed around 0.1 ppm, reflecting effective nitrogen assimilation. Microbial analysis revealed dominant *Bacillus* spp. in T1 and T2, while T3 showed a higher presence of *Vibrio* spp. The results underscore the potential of BFT integrated with natural sediment (T2) as an efficient, low-impact, and scalable solution for juvenile sandfish culture. Its ability to maintain stable water quality without water exchange makes it particularly suitable for resource-constrained hatcheries. This study contributes to the development of environmentally sustainable and economically viable aquaculture systems in Sri Lanka.

Keywords: *Sandfish, biofloc technology, juvenile growth, outdoor hatchery innovation, low-impact aquaculture*

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CHALLENGES AND PROSPECTS OF *IN VITRO* PROPAGATION OF *Cleistanthus collinus*: INFLUENCE OF PHYTOCHEMICALS ON TISSUE CULTURE OUTCOMES

Bhagya D. D. A. N.[1], Abeykoon S. A. P. M.[1], Thambugala K. M. [1, *], De Silva W.[2, *], Sagarika T. B. D.[2]

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Cleistanthus collinus, commonly known as "Gaja Madara" in Sinhala, is a rare medicinal plant of the family Euphorbiaceae. While traditionally known for its toxic properties, recent research has highlighted its promising therapeutic potential, particularly in the treatment of cancer, HIV, gastrointestinal disorders, and as an antidote. These pharmacological properties are largely attributed to its rich phytochemical profile, including flavonoids, tannins, saponins, and polyphenols. However, the same secondary metabolites may exert cytotoxic effects *in vitro*, posing challenges for plant tissue culture due to oxidative browning. The natural propagation of *C. collinus* is constrained by poor seed viability and a hard pod coat, emphasizing the need for biotechnological approaches such as tissue culture for its conservation and large-scale propagation. This study aimed to establish a reliable *in vitro* micropropagation protocol using leaf, nodal, and seed explants. Results indicated that all leaf explants were contaminated, while nodal segments initially showed green tissue development but failed to sustain growth. Conversely, seed explants exhibited better survival and maintained viability over extended culture periods. Phytochemical analysis of *Cleistanthus collinus* leaf extract confirmed the presence of major secondary metabolites, and chromatography using a hexane: chloroform: ethanol (1:1:0.1, v/v) solvent system produced well-separated banding patterns, supporting the presence of bioactive compounds such as flavonoids, tannins, saponins, and polyphenols. Overall, the study demonstrates that *in vitro* propagation of *C. collinus* is significantly limited by contamination and phenolic-induced browning. These findings highlight the impact of phytochemical composition on tissue culture outcomes, providing a basis for refining future propagation protocols and conservation strategies for *C. collinus* in Sri Lanka.

Keywords: *Chromatographic profiling explants, in vitro micropropagation, phenolic browning*

ID 48

COMPARATIVE PHARMACOGNOSTIC EVALUATION OF STEM BARK AND ROOT BARK OF *Senna auriculata* L.

Abeyrathne R. A. H. M. S. T.[1], Nimasha S. H.[1], Herath H. M. A. A.[1], Jeewandara M. P [2, *], Edirisinghe E. A. B.[2]

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Senna auriculata, commonly known as "Ranawara" in Sri Lanka, is a shrub with cinnamon-brown bark and bright yellow flowers, belonging to the Fabaceae family. This plant is widely used in Ayurveda and Siddha medicine. Its roots and bark are especially valued for treating skin disorders, leprosy, asthma, and other ailments due to their therapeutic properties. This primary study employs simple analytical methods to explore the chemical comparability between the root bark and stem bark of *S. auriculata*, addressing the threat posed by unsustainable root harvesting. Fresh root and stem bark samples of *S. auriculata* were collected, dried, and then subjected to organoleptic evaluation, microscopic analysis using double-stained transverse sections, and morphological assessment. Preliminary phytochemical screening *of S. auriculata* root and stem bark was conducted using standard qualitative tests to detect major bioactive groups. The screening confirmed the presence of alkaloids, anthraquinones, saponins, terpenoids, tannins, and phlobatannins through Mayer's test, Borntrager's test, foam test, Salkowski test, ferric chloride test, and hydrochloric acid test, respectively. Thin-layer chromatography (TLC), performed with toluene: ethyl acetate (7:3), was visualized under UV light, iodine bath, and anisaldehyde-sulfuric acid, revealing distinct chemical banding patterns. The stem bark of *S. auriculata* appears blackish with furrows, has a yellowish inner colour, an acrid taste, and no distinct odour, while the root bark has a loosely attached cork, greyish-yellow inner colour, an acrid taste, and a characteristic odour. Microscopic analysis demonstrated that the root bark contains 15–20 layers of brown cork cells, compared to 8–10 layers in the stem bark. Phytochemical analysis showed that both root and stem barks contain flavonoids, saponins, terpenoids, and tannins, while anthraquinones and phlobatannins are present only in the root bark. TLC analysis identified five distinct bands in the root bark with iodine bath, whereas six compounds were observed in the stem bark using anisaldehyde-sulfuric acid reagent. The study revealed that *S. auriculata*'s root and stem bark are anatomically and phytochemically distinct; notably, the root bark has more cork layers and contains compounds such as anthraquinones and phlobatannins. Additionally, the TLC spots in the root bark exhibited greater diversity after iodine bath, indicating the need for further detailed chemical and biological investigations before any conclusions can be drawn about their comparability or potential for substitution.

Keywords: *Comparative assessment, pharmacognostic, bark, phytochemical, thin layer chromatography*

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ASSESSMENT OF PHYSICOCHEMICAL PARAMETERS OF SRI LANKAN BEE HONEY FROM DIFFERENT SOURCES

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Bee honey is a natural liquid produced by honeybees through the enzymatic transformation of floral nectar. Bee honey has different nutritional and medicinal properties. This study aimed to compare the physicochemical parameters of wild, harvested, and market honey samples to evaluate their quality and authenticity based on the standards defined by SLS 464:2016. All the wild and harvested honey samples were collected from bee combs in different areas in Sri Lanka. The market bee honey samples were purchased from retail outlets and local markets. A total of twelve honey samples were collected, with four samples of each type of honey. Each sample underwent analysis of moisture percentage, total reducing sugar percentage, sucrose percentage, and total ash percentage. The moisture percentage was determined by using a digital refractometer. The sucrose percentage and the total reducing sugar percentage were determined by using Fehling's titration method. The total ash content was measured by incinerating the honey samples in a muffle furnace at 550 ^{0}C and calculating the residue as a percentage of the original sample weight. The results revealed that the physicochemical analysis of wild, harvested, and market honey samples revealed noticeable differences in quality and composition. Harvested honey had the highest average moisture percentage (22.4%), followed by wild honey (22.8%). Market honey had the lowest average moisture percentage (18.6%). In the analysis of total reducing sugar, wild honey recorded the highest average (72.07%), followed by harvested honey (70.79%) and market honey (67.24%). Sucrose percentage was highest in harvested honey (7.38%), suggesting direct or indirect adulteration. Wild and harvested honey had 5.10% and 5.76% of mean of sucrose percentage, respectively. The mean total ash percentage was highest in wild honey (0.681%), and it exceeded the 0.5% maximum limit of SLS, suggesting the presence of impurities in bee honey while collecting. The harvested and market honey had 0.293% and 0.081% of the mean total ash percentage, respectively. Wild and harvested honey samples are generally better than market samples, indicating higher reducing sugar content and lower sucrose levels. Further, the results also provide guidance for checking whether market honey meets the recommended parameters. However, if these values fall outside the recommended range, it could be a sign of adulteration or poor processing.

Keywords: *bee honey, physicochemical, wild honey, harvested honey, market honey*

ID 96

IDENTIFICATION AND CHARACTERISATION OF FUNGAL PATHOGENS AFFECTING THE COLLAR REGION OF *Aquilaria crassna* (AGARWOOD) AND PATHOGENICITY ON *Hevea brasiliensis* (RUBBER) IN SRI LANKA

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Aquilaria crassna (Agarwood) is an evergreen tree that belongs to the family Thymelaeaceae, naturally inhibits in Southeast Asia. It produces a highly valued aromatic resin called agarwood, used in traditional medicine, incense, and perfumery. This study aimed to identify and characterize the fungal pathogens impacting the collar region of *A. crassna* from four different locations (Kurunegala, Kalutara, Rathnapura, and Gampaha) in Sri Lanka and to evaluate their cross-infectivity on *Hevea brasiliensis* (Rubber). Fungal identification was based on macroscopic and microscopic characteristics, along with pathogenicity testing. Two fungal isolates were identified from the infected collar region of *A. crassna. Botryodiplodia* sp. was isolated from all four regions with high relative abundance (60-80%), high growth rate (9.00 ± 0.00 cm in 7 days), and typical morphological characters, such as dark-pigmented, fast-spreading colonies and abundant conidia, indicating its prevalence and aggressiveness. *Fusarium* sp. isolated only in Kurunegala, was slower in growth and lower frequency, indicating less competitive than *Botryodiplodia* sp. *Botryodiplodia* sp. was identified as the primary pathogen in pathogenicity tests on *A. crassna* seedlings, with the Kurunegala isolate causing extremely severe collar rot symptoms. The remaining regional isolates caused moderate to mild symptoms. *Fusarium* sp. was interpreted as non-pathogenic, as it did not induce disease symptoms or tissue discoloration in *Aquilaria crassna* seedlings, showing no significant difference from the control treatment. Cross-inoculation tests on the collar region of *H. brasiliensis* revealed that *Botryodiplodia* sp. was not pathogenic to *H. brasiliensis,* with no disease symptoms or significant differences in tissue condition or pathogenicity scores between inoculated and control seedlings. Statistical analysis confirmed these results ($p > 0.05$), validating the lack of cross-infectivity. In conclusion, *Botryodiplodia* spp. was identified as the major fungal pathogen of collar rot of *A. crassna* with varying regional virulence. Its inability to infect *H. brasiliensis* suggests that the *Aquilaria-Hevea* intercropping system can be safely implemented without exposing rubber trees to increased disease risk. These findings contribute to the development of targeted disease management strategies and promote sustainable agroforestry practices involving agarwood cultivation.

Keywords: *Botryodiplodia sp., Fusarium sp., cross-infection, pathogenic*

BUSINESS AND MANAGEMENT STUDIES

Empowering Sri Lanka through Innovation, Science and Sustainability.

ID 15

THE CHALLENGES AND BARRIERS OF IMPROVING FINANCIAL PERFORMANCE OF STATE-OWNED ENTERPRISES (SOEs) IN SRI LANKA

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Many Sri Lankan State Owned Enterprises (SOEs) consistently underperform financially, wasting public resources and limiting their contribution to economic development. This study addresses the challenges and barriers affecting the perceived financial performance of state-owned enterprises in Sri Lanka. The main objective is to identify the existing challenges and barriers of improving the financial performance of state-owned enterprises in Sri Lanka. The quantitative and qualitative mixed-methods approach was used for the study. Quantitative data were gathered through a structured questionnaire from 40 strategically important SOEs. Five hypotheses were formulated to examine how perceived corruption, political interference, skills of employees, labour union actions, and digital transformation influence perceived financial performance. The data were analysed using Smart PLS software. Qualitative insights were obtained through interviews with top and middle management, analysed via thematic analysis. Results from the quantitative analysis found that four of the null hypotheses were not accepted due to the significant relationship with perceived financial performance. One of the null hypotheses was accepted due to no significant relationship on perceived financial performance. Skills of employees, labour unions' actions, and digital transformation have a significant positive relationship on perceived financial performance. Political interference has a significant negative relationship on the perceived financial performance. Perceived corruption, its direct impact on perceived financial performance was not statistically significant. The qualitative findings confirmed that major barriers such as skills of employees, labour unions' actions, digital transformation, and political interference exist, and also identified. In addition to infrastructure, legal and regulatory issues, sales and marketing challenges, and financial difficulties were also confirmed. Based on these findings, the study proposed a framework to improve the financial performance of SOEs, emphasising strategic actions, government reform efforts, labour union collaboration, and digitalisation. Future studies could yield better results through comparative studies between state-owned enterprises and private sector organisations in Sri Lanka.

Keywords: *State-owned enterprises, financial performance, challenges, barriers*

ID 25

ANALYSIS OF EMPLOYEE PERCEPTIONS OF ADOPTING A UNIFIED SOUTH ASIAN CURRENCY IN THE SRI LANKAN HOTEL AND BANKING SECTORS

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This study examines the attitude of employees in Sri Lanka's hotel and banking industries towards the adoption of a unified South Asian Currency. As more South Asian countries consider regional economic integration, a common currency has been presented as a potential catalyst to trade, tourism and financial integration. However, the effective implementation of this initiative depends heavily on the attitude and readiness of the employees who are most involved with service and financial transactions. So, this study examined the attitude of employees in Sri Lanka's hotel and banking industries towards the adoption of a unified South Asian Currency. The study investigates how several key factors employee confidence, awareness, perceived usefulness, and stakeholder perception influence employee perception regarding a unified South Asian currency. Additionally, financial literacy and digital financial jargon are examined as mediating variables. The records were collected from a sample of 213 employees with an adapted version of a five-factor numerically scaled Likert-format questionnaire. The collected data was analyzed using appropriate statistical techniques, such as correlation analysis and regression analysis, to identify the key factors influencing employee perception on unified South Asian currency. The data was then imported into statistical analysis software for detailed examinations (IBM SPSS Statistics 25 - Statistical Package for the Social Sciences) and MS Excel was used for data analysis. The findings confirmed a significant impact of all independent and mediating variables on employee perception and, according to open ended questions, majority of employees in both sectors are willing to adopt this since it increases transaction simplicity. The results are expected to provide useful information to policymakers, financial institutions, and industry players by seeking their views on how internal factors such as confidence and awareness along with external factors such as stakeholders' attitudes and financial literacy can impact employee acceptance of macroeconomic reform. Ultimately, this research aims to contribute to decision-making and strategic considerations for aligning conditions for regional monetary integration in South Asia.

Keywords: *Awareness, confidence, digital financial jargon, employee perception, financial literacy*

ID 27

EXPLORING THE FACTORS AFFECTING INTENTION TOWARDS SUSTAINABLE CONSUMPTION BEHAVIOUR: A STUDY AMONG YOUNG CONSUMERS IN THE WESTERN PROVINCE OF SRI LANKA

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The growing phase of global environmental, economic, and social challenges caused by unsustainable production and consumption patterns emphasises the importance of promoting sustainable consumption behaviour. Although awareness is growing, a significant gap remains between Sri Lankan consumers' sustainability knowledge and their actual behaviour, especially in balancing economic growth with sustainable development, highlighting the need for more research focused on the psychological and contextual factors affecting their behaviour. This study focuses on young consumers, a formative and influential group that can shape long-term, sustainable consumption habits and drive future market transformations. Relying on the Theory of Planned Behaviour and the Norm Activation Model, the research examines five primary predictors of intention regarding sustainable consumption behaviour: environmental concern, perceived behavioural control, attitude toward the behaviour, subjective norms, and personal norms. It also explores the mediating role of perceived consumer effectiveness along with the moderating effects of social media influence and sustainable consumption policies. A quantitative design with a structured questionnaire collected data from 160 young consumers aged 15 to 29 in the Western Province of Sri Lanka. Statistical analyses were performed using IBM SPSS Statistics. The implications of the findings indicate that environmental concern, perceived behavioural control, attitude, subjective norms, and personal norms have a statistically significant positive influence on the intention towards sustainable consumption behaviour. Among these, Personal norms and perceived behavioural control have the largest effects. Furthermore, perceived consumer effectiveness mediates the relationship between intention and attitude towards behaviour. Social media influence significantly moderates the relationship between intention and subjective norms, but sustainable consumption policies do not moderate the relationship between intention and environmental concern. These results highlight the importance of integrating digital, psychological, and normative influences to effectively motivate youth to adopt sustainable consumption behaviour. This study highlights the limited impact of sustainable consumption policies, points to gaps in policy awareness or enforcement, and suggests future research on long-term behaviour change, the role of education and digital media, and broader regional studies, thereby contributing to both academic knowledge and policy strategies that support Sustainable Development Goal 12: responsible consumption and production.

Keywords: *Sustainable consumption behaviour, young consumers, behavioural intention, theory of planned behaviour, norm activation model*

ID 31

THE MEDIATING EFFECT OF GREEN HUMAN RESOURCE MANAGEMENT WITH ITS DRIVERS AND EMPLOYEE JOB PERFORMANCE: A STUDY OF A SELECTED BANK IN SRI LANKA

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This quantitative study, the mediating effect of Green Human Resource Management with its drivers and employee job performance: a study of a selected bank in Sri Lanka examines the mediating effect of Green Human Resource Management (GHRM) on the relationship between leadership, organizational culture, extensive training, and employee job performance in a leading private bank in Sri Lanka. The research objectives are to assess the impact of leadership, organizational culture, and extensive training on GHRM and to evaluate the effect of GHRM on employee job performance and to determine the mediating role of GHRM in the relationships between leadership, organizational culture, extensive training, and employee job performance. Green HRM is the incorporation of HRM methods into organizational objectives of environmental sustainability. (Iddagoda et al., 2020). As defined in Iddagoda et al. (2021) employee job performance, is employee's contribution to fulfill the tasks and jobs to make a positive work environment while eliminating negative or harmful act. Leadership is inspiring, guiding and influencing people when it is necessary (Iddagoda 2021). Organizational culture has been defined as the "normative glue" that holds an organization together (Tichy, 1982). Extensive training consists of knowledge, skills and attitudes of employees continuously with the intention of covering a boarder scope without restricting to the one job. (Iddagoda et al., 2022). Sampling Technique was non-probability convenience sampling technique. A structured questionnaire was used to collect data from a sample of 100 employees, and the study tested seven hypotheses using descriptive statistics, correlation, multiple regression, and Sobel mediation analysis. Results indicate that leadership, organisational culture, and extensive training each have a significant positive impact on GHRM. GHRM, in turn, has a significant positive effect on employee performance. Mediation analysis reveals that GHRM strongly mediates the relationship between extensive training and job performance, moderately mediates the effect of organisational culture, and has a limited mediating effect on leadership. The findings support the Ability–Motivation–Opportunity (AMO) and Social Exchange Theory frameworks, suggesting that GHRM enhances employee abilities, motivation, and opportunities, thereby improving performance.

Keywords: *Green human resource management, employee job performance, leadership, organisational culture, extensive training*

ID 32

FACTORS INFLUENCING SUSTAINABLE HOME RENOVATIONS READINESS: SPECIAL REFERENCE TO HOMEOWNERS IN COLOMBO DISTRICT

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Buildings are a major source of greenhouse gas (GHG) emissions and contribute 25-40% of the global energy consumption. About 27% of world total energy consumption comes from the residential sector. In Sri Lanka, buildings contribute 1.82 million metric tons of GHG emissions, and the residential sector accounts for 30.3% of total energy consumption. In this context, eco-friendly home renovations have become important solutions to lessen environmental impacts. Despite their significance, sustainable home renovations are still rarely implemented in practice, particularly in developing countries. In Colombo, which is known as Sri Lanka's economic and residential hub, the adoption of sustainable home renovation practices is still underutilised. The purpose of this study was to identify the key behavioural, social, and financial factors influencing the readiness for sustainable home renovations among homeowners in the Colombo district. The study proposed a conceptual framework based on the Theory of Planned Behaviour (TPB) and some elements of the Diffusion of Innovations (DOI) theory. Attitude towards sustainable renovations, perceived behavioural control, subjective norms, relative advantage, and initial investment feasibility were key independent variables to predict readiness for sustainable home renovations. Perceived complexity, perceived performance risk and green loan accessibility were chosen as moderating variables to examine their effects on the relationships between independent variables and readiness for sustainable home renovations. A quantitative research approach was employed using a cross-sectional survey distributed to homeowners in the Colombo District. The sample was selected using convenience sampling and the sample size was 165. A structured questionnaire survey with a five-point Likert scale was used to collect data and statistical methods like descriptive statistics, correlation, multiple regression, and moderation analysis were used to analyse data. According to the key findings of the study, all five independent variables had a significant positive impact on readiness, with perceived behavioural control and initial investment feasibility being the strongest predictors. The study found that perceived complexity significantly and negatively moderates the relationship between perceived behavioural control and readiness while perceived performance risk significantly and negatively moderates the relationship between relative advantages and readiness. The study revealed no significant moderating impact of green loan accessibility on the relationship between initial investment feasibility and readiness. In addition to presenting key insights into the factors influencing sustainable housing renovations, the study emphasises the necessity for educational, regulatory, and financial initiatives to support homeowners and minimise perceived risks.

Keywords: *Sustainable home renovations, homeowner readiness, theory of planned behaviour, diffusion of innovations, urban housing*

ID 34

FACTORS AFFECTING SWITCHING BEHAVIOUR TO BUY GREEN COSMETICS: SPECIAL REFERENCE TO YOUNG EMPLOYED FEMALE CONSUMERS IN COLOMBO DISTRICT, SRI LANKA

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Global environmental changes have significantly influenced consumers' purchasing behaviours in recent years. Amid growing global concerns for ecological sustainability, the cosmetics industry is witnessing a significant switch toward green products. Though Green consumerism has emerged as a worldwide trend, there is a dearth of studies in the Sri Lankan context on green consumer behaviour. Sri Lanka has shown limited adoption of green cosmetics, as reflected in the declining market share of natural cosmetics over recent years. The objective of this study is to identify the factors influencing switching behaviour to buy green cosmetics. This study examines the influence of key factors, Price Sensitivity, Brand Trust, Green Awareness, and Electronic-Word-of-Mouth (EWOM), on consumer green switching behaviour, with Environmental Concern and Health Consciousness serving as moderating variables, and Celebrity Endorsement acting as a mediating variable. This research study employed a quantitative approach. A total of 156 respondents' data was collected through a structured questionnaire, with Likert scale questions. The target population for this study comprises young employed female consumers in the Colombo District, aged between 16 and 29 years. The Convenience sampling technique was used for data collection. The data analysis for this research was conducted using IBM SPSS Statistics version 27.0. According to the results Brand trust is the most influential factor pushing young employed female consumers to switch to green cosmetics. Price sensitivity significantly affects switching behaviour, showing that sustainable choices must also be economically viable for consumers. Green awareness and EWOM alone are not enough to drive switching behaviour. Celebrity endorsement is shown to mediate the relationship between brand trust and switching behaviour. Health consciousness boosts the impact of EWOM, indicating that health-driven messaging can better motivate green cosmetic adoption. Environmental concern did not meaningfully influence the relationship between green awareness and switching behaviour to green cosmetics. These findings indicate that successful adoption of green cosmetics in Sri Lanka requires holistic strategies focused on building authentic brand trust, offering clear value, and leveraging health-oriented messaging. The insights provide actionable recommendations for industry stakeholders and contribute to understanding sustainable consumer behaviour in emerging markets.

Keywords: *Green cosmetics, switching behaviour, brand trust, price sensitivity, celebrity endorsement,*

ID 36

THE IMPACT OF WFH POLICIES ON EMPLOYEE PRODUCTIVITY: A STUDY IN DIALOG AXIATA PLC., SRI LANKA

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The COVID-19 pandemic transformed work-from-home (WFH) arrangements from a niche concept to a leading worldwide standard. In Sri Lanka's telecom scene, Dialog Axiata PLC has been a game-changer, driving digital transformation while also helping its own team embrace remote and hybrid work with ease. This study aimed to evaluate how WFH policies influence employee productivity by examining a range of contributing factors: work-life balance, technology feasibility, performance monitoring systems, personality type, and other opportunities. Furthermore, the study investigated the mediating roles of managerial support and self-discipline in shaping productivity outcomes. A quantitative research design was applied, using an online structured questionnaire disseminated among 100 employees with prior WFH experience. The survey responses were analysed using descriptive statistics, Spearman's rank correlation, ordinal regression, and factorial ANOVA, with reliability tests ensuring construct validity (Cronbach's alpha ≥ 0.70). The results showed a strong positive correlation between technology feasibility and WFH enablement ($r = 0.485$, $p < 0.001$), and between personality traits and self-discipline ($r = 0.511$, $p < 0.001$). The observed negative correlation between technological adequacy and perceived productivity ($r = –0.443$, $p < 0.001$) indicates that merely providing access to technology does not ensure enhanced efficiency. This may stem from excessive complexity or a mismatch between the tools and the specific demands of job roles. Ordinal regression indicated that hybrid arrangements significantly improved productivity ($\beta = 1.580$, $p = 0.002$), while fully remote models did not perform statistically significant effect. Departmental differences were also evident, with Sales and Technical Operations reporting lower productivity compared to IT department. A factorial ANOVA confirmed significant major effects of WFH support ($F = 102.97$, $p < 0.001$), personality traits ($F = 11.59$, $p < 0.001$), and self-discipline ($F = 4.16$, $p = 0.019$), with significant interaction effects between department and arrangement, and support and personality. The findings highlight that productivity in remote work is shaped by a complex interaction between individual characteristics, managerial behaviour, technological infrastructure, and organisational context. Therefore, companies like Dialog Axiata should adopt differentiated, department-specific WFH strategies and invest in supportive structures that acknowledge personal, technological, and functional subtleties in workforce management.

Keywords: *Work-from-home, employee productivity, managerial support, self-discipline, hybrid work*

ID 41

MEDIATING EFFECT OF EMPLOYEE ENGAGEMENT AMONG NURSES: AN EMPIRICAL STUDY AT GALLE NATIONAL HOSPITAL, SRI LANKA

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Employee engagement is a fundamental factor in the healthcare sector that affects overall organisational performance and patient experiences. The nurses' role is to provide patient care, particularly within the context of Sri Lankan government hospitals, which are resource-constrained and overcrowded. Such conditions contribute to burnout and stress among clinical staff. The purpose of this study was to examine the mediating effect of employee engagement on the relationship between leadership, rewards, and job performance among nurses at Galle National Hospital, Sri Lanka. The study examined four key variables: leadership and rewards as independent variables, employee engagement as the mediating variable, and job performance as the dependent variable. Employee engagement was evaluated concerning its physical, emotional, and cognitive factors. Leadership was defined as how supervisors offer motivation and direction, while rewards included both monetary and non-monetary incentives. Job performance was assessed through the fulfilment of tasks, level of professionalism, and service quality. Despite the growing global interest in factors that enhance employee engagement and job performance, there is a lack of empirical research on how leadership and reward systems influence these outcomes in Sri Lankan government hospitals. To address this gap, a quantitative research approach was used to investigate the relationships among the variables. Data were collected from 166 nurses employed at Galle National Hospital using a self-administered questionnaire. The researcher developed six hypotheses to be tested in this cross-sectional study. Results of correlation and regression analyses showed significant positive relationships between leadership and employee engagement ($r = 0.518$, $\beta = 0.397$, $p < 0.001$), rewards and employee engagement ($r = 0.338$, $\beta = 0.305$, $p < 0.001$), as well as employee engagement and job performance ($r = 0.420$, $\beta = 0.218$, $p < 0.001$). Mediation analysis, conducted through the Sobel test, confirmed that employee engagement significantly mediates the relationships between leadership and job performance (Sobel $Z = 6.862$, $p < 0.001$) and between rewards and job performance (Sobel $Z = 6.572$, $p < 0.001$). These findings emphasize the critical role of healthcare administrators in enhancing leadership capabilities and implementing effective reward systems to motivate nursing staff and improve organizational outcomes.

Keywords: *Employee engagement, leadership, rewards, job performance*

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ONLINE CLOTHING BUYING ADDICTION WITH SPECIAL REFERENCE TO GENERATION Z IN URBAN AREAS IN SRI LANKA

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Online clothing buying behaviour is an increasing behaviour, especially among Generation Z. In the South Asian context, studies focusing on this online clothing behaviour remained limited. Therefore, this study explores whether online clothing buying behaviour of generation Z constitutes addiction and identifies key factors that contribute to such behaviour. Research design was quantitative, and primary data was collected from generation Z working professionals in urban areas of Gampaha, Kandy and Galle in Sri Lanka through an online structured questionnaire using a non-probability convenience sampling technique. Sample size was 100. Key variables of impulsive buying, trend sensitivity, procrastination and social media addiction were examined with the online clothing buying addiction. While financial status was examined as a mediator digital marketing intensity was examined as a moderator. Descriptive statistics, Pearson correlation, multiple regression, moderation and mediation analysis techniques were used in the analysis process. The study found that online clothing buying behaviour is prevalent but does not meet addiction level in the target population (n=100),(mean=2.8860, p=0.932), because p value is considerably higher than the significant level of 0.05. Analysis revealed that impulsive buying showed a strong and statistically significant direct impact (r=0.980, p=0.000). A moderate positive correlation was demonstrated by procrastination, and it exerted a significant direct impact (r=0.656, p=0.000). Trend sensitivity exhibited a strong positive correlation and showed a highly significant direct impact (r=0.788, p=0.000). Social media addiction showed weak positive correlation and highly statistically significant direct impact (r=0.408, p=0.000). While financial status significantly influences the relationship between impulsive buying and trend sensitivity with online clothing buying behaviour, digital marketing intensity did not meaningfully moderate the relationship between procrastination and social media addiction with online buying behaviour. In conclusion, although Generation Z working professionals exhibit frequent online clothing buying behaviour, it does not reach an addiction level. These findings highlight the importance of promoting responsible digital marketing practices and financial literacy programs among young consumers in Sri Lanka. Hence future research could explore financial literacy levels and lifestyle in affecting unconventional or aggressive buying behaviours of Generation Z consumers with the influence of family background.

***Keywords**: Online, addiction, impulsive buying, trend, procrastination*

ID 46

IMPACT OF DIGITAL MARKETING STRATEGIES ON STUDENTS' ENROLMENT DECISION IN PRIVATE HIGHER EDUCATIONAL INSTITUTES IN WESTERN PROVINCE

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Sri Lanka's higher education landscape is characterised by intense competition, particularly due to the limited capacity of state universities. This has led to a surge in demand for private higher education institutions. In response, these institutions have increasingly adopted digital marketing strategies to attract prospective students. However, the effectiveness of such strategies in shaping student enrolment decisions remains underexplored within the Sri Lankan context. This study fills this gap by evaluating the impact of digital marketing strategies on enrolment decisions among students enrolled in private institutions in the Western Province. Using a mixed-methods approach, data was collected through a structured, self-administered questionnaire from 140 students enrolled in both degree and non-degree programs. The survey included both closed-ended and open-ended questions, with quantitative data analysed using SPSS. Analytical techniques included descriptive statistics, correlation, regression, and mediation analysis, moderation analysis, supported by validity and reliability testing (e.g., Cronbach's Alpha, KMO, Bartlett's Test). The research investigated the influence of specific digital marketing techniques: Social Media Marketing, Website User Experience, Search Engine Optimization, and Email Marketing. The findings indicate that social media marketing significantly influenced enrolment decisions in both program types. Search engine optimization had a significant impact on degree program enrolment decisions, while website user experience was a key factor for non-degree program enrollees. Opinions on private institutes significantly mediated the relationship between search engine optimization and enrolment decisions, whereas email marketing and trust in social media platforms showed no significant effect. The study offers critical insights for private higher educational institutes and policymakers in developing countries by highlighting the need for engaging digital content and intuitive websites to attract students effectively**.** The study provides practical insights for private institutions seeking to enhance their digital engagement and student recruitment strategies in a developing country context.

Keywords: *Digital Marketing, private higher educational institutes, enrolment decision making, social media marketing, search engine optimisation*

ID 51

THE EFFECT OF CONSUMER KNOWLEDGE AND WILLINGNESS TO LEARN ON WILLINGNESS TO PAY A PREMIUM FOR DEGRADABLE FMCG PRODUCTS: THE MEDIATING ROLE OF TRANSPARENCY AND PURCHASE INTENTION

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The environmental impact created by the non-degradable packaging from Fast-Moving Consumer Goods (FMCG) such as foods, personal care products and household cleaners is serious problem for Sri Lanka, wherein the piling up of waste strain into the ecosystem. Consumers have increased awareness of sustainability; however, their willingness to pay a premium for degradable FMCG (fully, moderately or non-degradable) remains inconsistent, partly due to the lack of knowledge on the levels of degradability and partly because of skepticism on environmental claims. This study examines the influence of consumer knowledge on willingness to learn on sustainable FMCG direct consumer behaviour and how transparent communication leads to enhanced trust and the actual decision to purchase. A quantitative and descriptive study was designed to survey eighty-three adult household decision makers residing in the Western Province of Sri Lanka selected by simple random sampling. Data were gathered combining a set of structured questionnaires. Statistical analysis tested a total six hypotheses about knowledge, willingness to learn and also transparency and purchase intention to pay a premium, both directly and through other influencing factors. Descriptive and inferential statistics were used for the analysis. Results show that consumer knowledge significantly predicts willingness to pay a premium ($p= 0.005$, $r=0.308$) and willingness to learn has positive effect. Purchase intention partially mediates the relationship between knowledge and willingness to pay premium ($p= 0.001$, $r=0.415$) and between willingness to learn and willingness to pay premium ($p< 0.005$, $r=0.380$). Transparency strongly effects both relationships, particularly for willingness to learn ($p= 0.000$, $r=0.505$). Overall, consumer knowledge and willingness to learn have a significant indeed moderate positive effect on willingness to pay a premium for degradable FMCG products. Purchase intention was found to partially mediate the relationship between knowledge or willingness to learn and willingness to pay a premium. Results revealed consumer knowledge was a significant predictor for willingness to pay a premium and transparency was clearly strong factors influencing willingness to pay a premium. Future researches should expand the study to the other regions of Sri Lanka or comparing urban and rural consumers may reveal geographical and demographic variations in willing to pay premium for degradable FMCG.

Keywords: *Consumer knowledge, degradable FMCG, transparency, purchase intention, willingness to pay a premium*

ID 55

MEDIATING EFFECT OF JOB SATISFACTION WITH ITS DRIVERS AND EMPLOYEE JOB PERFORMANCE: A STUDY OF ABC BANK PLC

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Employee job performance is a critical success factor for organisations and is influenced by leadership and rewards. While job satisfaction is recognised as a key determinant of employee performance, there is a lack of empirical evidence on its mediating effect between leadership, rewards, and job performance in the Sri Lankan banking sector. This study aims to bridge the population gap and empirical gap by investigating the mediating effect of job satisfaction on the relationship between leadership, rewards, and employee job performance at ABC Bank PLC. This study focuses on five objectives: (1) to identify the impact of leadership on job performance, (2) to identify the impact of rewards on job performance, (3) to identify the impact of job satisfaction on job performance, (4) to identify the mediating effect of job satisfaction on the relationship between leadership and job performance, (5) to identify the mediating effect of job satisfaction on the relationship between rewards and job performance. The study is theoretically built on General Systems Theory (GST), which implies that the variables are an interrelated system, and Social Exchange Theory (SET), which defines the exchange between variables. A quantitative, correlational, and cross-sectional research design was conducted with minimal researcher interference in non-contrived study settings. The unit of analysis was individual employees; the target population consisted of employees working at ABC Bank PLC branches in the Western and Southern province. A sample of 84 employees was selected using simple random sampling techniques. Data was collected using a self-administered questionnaire in a Likert-scale format. Five hypotheses were tested using the SPSS 25 statistical tool to validate the relationships among the variables and Sobel test was applied to analyse the significant effect of job satisfaction. The findings of this contribute to the existing literature by providing evidence that leadership and rewards impact job performance. Moreover, job satisfaction significantly mediates the relationship between leadership, rewards, and employee job performance. The findings offer practical insights for HR professionals and bank managers to enhance employee job performance through leadership practices, fair reward systems and job satisfaction strategies.

Keywords: *Job satisfaction, leadership, rewards, employee job performance*

ID 59

A STUDY OF SMALL AND MEDIUM-SIZED ENTERPRISES' AVOIDANCE OF BRANDING IN COLOMBO

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The majority of businesses in Sri Lanka are Small and Medium-sized Enterprises (SMEs), and they play a crucial role in the country's economy. Even though branding contributes to shaping business identity and building trust and long-term competitiveness, most SMEs in Colombo still avoid branding strategies. The purpose of the study is to find out the significant factors that affect the extent of non-branding in SMEs in Colombo. Specifically, identifying the relationships between factors is; lack of awareness, lack of clear strategy, business location, financial resources, profit intention and the extent of non-branding. Furthermore, the study explores two mediating effects: how intent to progress influences the relationship between awareness or strategy and non-branding extent, and how owner mindset mediates the relationship between profit intention and extent of non-branding. For this study, a quantitative research approach was adopted, and data was collected through a standardized questionnaire from a random sample of 54 SMEs in Colombo. Then the collected data was analyzed using the SPSS statistical analysis tool. Findings revealed that lack of awareness ($r = 0.882$, $\beta = 0.483$, $t = 6.232$, $p < 0.001$) and lack of clear strategy ($r = 0.872$, $\beta = 0.462$, $t = 6.227$, $p < 0.001$) are significant factors affecting the extent of non-branding in SMEs, while business location ($r = -0.460$, $\beta = -0.049$, $t = -0.778$, $p < 0.001$), financial resources ($r = -0.502$, $\beta = -0.036$, $t = -0.633$, $p = 0.001$), and profit intention ($r = -0.435$, $\beta = -0.043$, $t = -0.690$, $p = 0.001$) show comparatively weaker effects and therefore do not significantly affect the extent of non-branding. Furthermore, the owner's intent to progress can significantly mitigate the lack of awareness towards branding. In conclusion, the lack of awareness of branding and lack of a clear branding strategy prevent SMEs from developing their brands, and it is possible to improve the awareness of branding if the owner intends to progress. These findings suggest a need for interventions to improve branding awareness and strategic knowledge among SMEs in Colombo. Further research should investigate the effect of such interventions to minimize the avoidance of branding among SMEs in Colombo.

Keywords: *Colombo, awareness, branding, small and medium, strategic planning*

ID 63

A STUDY OF WORK LIFE BALANCE, JOB PERFORMANCE, STRESS AND ORGANISATIONAL COMMITMENT IN A SELECTED APPAREL INDUSTRY

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This study focused on relationships between work life balance, organizational commitment, job performance and stress which take place within a selected apparel industry and is based on operational level employees working at ABC (Pvt) Ltd, which is a leading apparel-manufacturing firm in Sri Lanka. The apparel industry in Sri Lanka presents a challenging work environment with high stress levels and intense work demands, making it difficult for operational employees to maintain a healthy work-life balance. So this study aimed to determine the following five things: (1) To identify the impact of work life balance on organizational commitment. (2) To identify the impact of organisational commitment on job performance. (3) To identify the mediating effect of organisational commitment on the relationship between work life balance and job performance. (4) To identify the moderating effect of stress on the relationship between work life balance and job performance. (5) To identify the impact of work life balance on Job performance. A quantitative, cross-sectional methodology was employed using a self-administered survey distributed to 143 randomly selected operational level employees. The sample size was determined according to Roscoe rule (1975) as cited in Sekaran, (2003). Simple random sampling was used to ensure representativeness. Data were analyzed using SPSS, including correlation, regression, mediation (Sobel test), and moderation analysis. Based on results, work life balance has a significant positive effect on organizational commitment and job performance. Also organisational commitment has a positive effect on job performance. Moreover, organizational commitment mediates the relationship between work life balance and job performance. Stress does not have a significant moderation effect over the relationship between work life balance and job performance. This study highlights the crucial role of work-life balance in enhancing employee performance and commitment within the apparel industry. Findings confirm that when employees experience a healthy balance between work and personal life, their emotional connection to the organization strengthens, leading to improved job performance. The mediating role of organizational commitment emphasizes the importance of fostering a supportive work environment. Although stress did not significantly moderate the work-life balance performance link, the overall results underscore the need for organizational policies that prioritize employee well-being. These insights offer valuable guidance for HR practitioners aiming to improve workforce productivity and retention through targeted interventions.

Keywords: *Work life balance, job performance, organizational commitment, stress*

ID 69

EXPLORING TOURISTS' WILLINGNESS TO ENGAGE IN ENVIRONMENTAL CORPORATE SOCIAL RESPONSIBILITY INITIATIVES PROMOTED BY HOTELS IN SRI LANKA

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As sustainability becomes a key component in global tourism, tourists' active engagement in environmental Corporate Social Responsibility (CSR) initiatives is gaining prominence. This study examines the contextual and behavioural factors influencing foreign tourists' willingness to engage in environmental CSR initiatives promoted by hotels in Sri Lanka - a developing nation with significant tourism potential but few stakeholder-inclusive sustainability practices. Grounded in the Theory of Planned Behaviour (TPB), the research investigates the influence of attitudes, subjective norms, perceived behavioural control, and the additional variable of perceived authenticity. It also examines the moderating effect of environmental awareness on the relationship between attitude and willingness. Using a quantitative survey design, data were collected from 90 international tourists across major Sri Lankan destinations (Colombo, Kandy, Galle, and Nuwara Eliya) through structured questionnaires using five-point Likert scales. The scales demonstrated acceptable reliability (Cronbach's $\alpha > 0.70$) for all constructs. Correlation and multiple linear regression analyses revealed that attitudes ($\beta = 0.454$, $p = 0.001$) and perceived behavioural control ($\beta = 0.444$, $p < 0.001$) significantly predicted tourists' willingness to engage in environmental CSR initiatives, jointly explaining 51.3% of the variance. However, subjective norms and perceived authenticity did not exhibit statistically significant effects, suggesting that social influence and perceived CSR credibility may be less influential in this context. Moderation analysis further showed that environmental awareness did not significantly alter the attitude-willingness relationship. Despite these non-significant findings, barriers such as limited CSR visibility and unclear communication were identified by qualitative feedback, which could account for the limited role of social and contextual variables. These findings highlight the need for context-sensitive CSR strategies in developing countries and challenge the assumption that all TPB variables equally predict sustainable behaviour in tourism. This study contributes to the growing body of research on sustainable tourism and pro-environmental behaviour in the hospitality industry and suggests future research on integrating eco-certification, local sustainability policies, and targeted behavioural interventions to enhance tourist participation in CSR initiatives.

Keywords: *Environmental CSR, willingness to engage, sustainable tourism, theory of planned behaviour, perceived behavioural control*

ID 77

IMPACT OF SCREEN TIME ON PHYSICAL HEALTH AWARENESS AMONG G.C.E. ORDINARY LEVEL (2025) STUDENTS IN GAMPAHA DISTRICT, SRI LANKA

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The purpose of this study is to explore the relationship between screen time and awareness of physical health risks among G.C.E. Ordinary Level (2025) students in the Gampaha District of Sri Lanka. Gampaha District was selected due to the rise of digital engagement, according to a collaboration done with ICTA and District Digital Transformation Committee – Gampaha. Therefore, assessing students' awareness provides valuable insights into how these students manage the health risks of screen time (eye strain, headaches, sleep disorders, and poor posture). The objective of this study was to determine if students were aware of these health hazards associated with screen time and if social media addiction, parents' influence, and their current health condition had a part in it. According to our main objective one hypothesis was developed between our independent variable - screen time and dependent variable - physical health awareness. Also, another hypothesis was developed for the moderate variable, physical health conditions and 2 more hypotheses for mediating variables which are parental influence and social media addiction. A descriptive cross-sectional study employed both quantitative and qualitative aspects with a sample of 120 students selected from tuition classes of the district. Data were collected through random sampling using a standardized survey and quantitative data were analysed using descriptive statistics, correlation, and multiple regression analysis, while qualitative responses were examined thematically. Overall, among four developed hypotheses, only one significant relationship acknowledged, where the other three hypotheses have lacked statistical significance. This study found that screen time alone did not significantly impact students' awareness of physical health risks. Furthermore, the relationship between screen time and students' awareness of physical health risks was not significantly mediated by social media addiction. And the relationship between screen time and students' awareness of physical health risks was not significantly mediated by parental influence. However, it revealed that the relationship between screen time and physical health awareness was significantly moderated by physical health condition. Future studies could extend beyond the Gampaha District to include comparisons with students across other provinces in Sri Lanka to understand regional differences in awareness and screen time habits and a more detailed study to assess the reasons for the insignificance of relationships tested in this study.

Keywords: *Screen time, physical health awareness, parental influence, social media addiction, health conditions*

ID 79

TOURIST DISSATISFACTION IN SRI LANKA: THE ROLE OF MARKET CONDITION, INFORMATION ASYMMETRY, AND DIGITALISATION AMONG BUDGET TOURISTS

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Tourist dissatisfaction remains a critical impediment to Sri Lanka's post-crisis tourism recovery, particularly among independent, budget-conscious international travellers who, despite high reliance on digital tools, often encounter inconsistent service quality, fragmented infrastructure, and limited institutional support. This study investigates the influence of market conditions including accommodation, food services, transportation, customer service intention, and safety on both pull-related (destination-based) and push-related (psychological) dissatisfaction, while examining the mediating role of information asymmetry and the moderating role of improved digitalisation services. Grounded in SERVQUAL, Expectancy–Disconfirmation Theory, Information Economics, and the Technology Acceptance Model, the research adopts a quantitative approach with quantitative data from 155 low-budget international tourists, collected through structured questionnaires and qualitative insights from open-ended responses. Data were analysed using correlation, mediation, moderation, and moderated-mediation models via SPSS and PROCESS macro, with thematic coding applied to qualitative data. Results reveal that poor market conditions significantly increase both push- and pull-related dissatisfaction ($p < 0.05$), information asymmetry does not significantly mediate these relationships ($\beta = 0.0029$ and 0.0212; 95% CIs include 0), and improved digital tools such as booking apps, maps, and real-time peer communication significantly reduce dissatisfaction arising from poor market conditions and information gaps ($p < 0.05$). Qualitative findings highlight tourists' reliance on informal peer networks, transportation challenges, and a preference for authentic local experiences despite hygiene and pricing concerns, underscoring that while digital services enhance resilience, they cannot replace the need for reliable infrastructure and consistent service quality. The study concludes that systemic inefficiencies must be addressed through policy reform, transparency, and integrated digital information ecosystems, particularly in the informal tourism sector. Future research could address these limitations by employing longitudinal designs across multiple tourist segments and destinations, incorporating larger and more diverse samples, and expanding the range of digitalisation variables to include emerging technologies and their behavioural adoption patterns, thereby enabling a more generalisable understanding of how market conditions and information asymmetry influence tourist dissatisfaction over time.

Keywords: *Tourist dissatisfaction, market condition, digitalisation, information asymmetry, budget tourism*

ID 80

FACTORS AFFECTING THE FEASIBILITY OF MILK POWDER AND AUTHENTIC BREAKFAST FOODS AMONG PARENTS OF SCHOOL-AGED CHILDREN IN *EMBILIPITIYA*, *HALVITIGALA*, *HANWELLA* AND *YAKKALA* AREAS IN SRI LANKA

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In Sri Lanka, parents prefer milk powder over traditional, authentic breakfast foods (*fermented* rice [*diya bath*] and herbal rice porridge [*kola kenda*]) in rural (*Embilipitiya*, *Halvitigala*) and suburban (Hanwella, Yakkala) areas. To determine consumer taste preferences and consumption patterns of milk powder and authentic foods, this study looks at economic, cultural, logistical, and marketing factors at three different stages: purchasing, preparation, and consumption. Both descriptive and inferential statistics, including linear regression and repeated measures ANOVA, were used to analyse the data. Besides the known health concerns like oxidized cholesterol (Reinagel, 2020), milk powder is more popular due to convenience ($\beta = 0.72$, $p < .001$), affordability, and longer shelf life. A quantitative survey of 121 parents of school-aged children (5-18 years) revealed that 59.8% consume milk powder daily, while only 3.6% choose traditional foods, citing lack of time (66.1%) and complexity of preparation. The regression analysis of surveyed data confirmed convenience as the strongest predictor (adjusted $R^2 = 0.48$), with marketing (46.5% agreement) having a moderate influence. Despite having many health benefits (rich in probiotics and antioxidants), traditional Sri Lankan foods are becoming less popular because they are hard to prepare and have limited market availability. These findings show how busy lifestyles in both rural and suburban areas of Sri Lanka cause convenience to take precedence over nutritional value in households with parents of school-age children. Reviving the consumption of more traditional Sri Lankan breakfast foods requires several actions, such as making fresh produce or pre-processed ingredients available. To strike a balance between convenience and nutrition, policy frameworks that support pre-processed traditional authentic food and subsidies for fresh alternatives should be put into place. The proposed solution's significant effect is supported by statistical analysis ($F(4,556) = 28.98$, $p < 0.001$, $n2 = 0.17$), and the best predictor of consumer choice for milk powder is ease of preparation.

Keywords: *Milk powder, authentic foods, consumption, convenience, parents*

ID 81

THE EFFECT OF QUEEN BEE SYNDROME ON YOUNG FEMALE EMPLOYEES' PROFESSIONAL GROWTH IN THE BANKING SECTOR

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Queen Bee Syndrome (QBS) is a phenomenon where senior women in a male-dominated workplace dissociate themselves from and undermine the junior women who work under their leadership. This behaviour is a significant barrier for junior women to grow their careers in the field. Consider the QBS phenomena have been deeply studied in Western world country than South Asian Countries. Away from that focus the QBS in the banking sector is stay on the lesser level. Somehow in here try to complete the gap relate the QBS in the banking sector. In here investigate how the behaviour of QBS women leader exhibiting the QBS characteristics mainly influenced the professional career development of the employee. The main objective of this study was to examine the impact of the QBS on women leaders and how it affects career development, motivation, and professional well-being of the junior employees in Sri Lanka's private banking sector. This is a quantitative type of research, and here the data was collected by using a structured questionnaire as in a Google Form type. From there, 102 responses were collected. The data collected from young employees who work in the banking sector aged range in 20 – 35 years old. The results confirmed that QBS has a strong, statistically significant negative effect on the professional growth of junior female employees, as evidenced by the regression analysis which showed a positive correlation between QBS behaviours and career growth ($\beta = 0.534$, $p < 0.01$). Using SPSS'25, the study employed regression analysis, correlation, and descriptive statistics. According to the responses of the study, was found that the women leaders lack emotional distance and mentorship, and favouritism towards male employees. Those factors affect to reduce confidence, job satisfaction, and increasing the turnover intention among junior women in the banking industry. The important point of the study is the organisational culture affected as moderately to QBS and job desire occur mediates affection to the QBS behaviour and career outcomes. But in there the few responded who involve the open senior women leaders were stronger motivation and lower negative impact. The strategies followed by the junior women to avoid the impact of the senior women leaders were seeking mentorship from outside the organisation, avoiding unnecessary contact with toxic leaders and some are considering changing jobs also. In conclusion, this study highlights QBS effect in a significant manner to junior women in the Sri Lankan private banking industry. From QBS particularly damages the junior young women's motivation, confidence, and long-term professional commitment. To address this issue, the industry requires inclusive leadership training, transparent promotion policies, and stronger support systems to prevent isolation and bias. As well as through this research can explore as consider the impacts and compare QBS behaviour in public and private banks in Sri Lanka.

Keywords: *Queen bee syndrome, female leadership, career development, organisational culture, banking sector*

ID 98

AN IMPACT OF SUSTAINABLE BUSINESS PRACTICES ON PERCEIVED ORGANISATIONAL PERFORMANCE IN OIL PALM INDUSTRIES IN SRI LANKA; SPECIAL REFERENCE TO ABC PALM OIL PROCESSING (PVT) LTD.

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This study investigates how sustainable business practices affect perceived organisational performance in Sri Lanka's palm oil sector, with a focused case study on ABC Palm Oil processing (Pvt) Ltd. The study was conducted through three dimensions of sustainability (Environmental, Economic and Social). Each dimension has key variables. Quantitative approach was employed using a self-administered questionnaire. About 89 valid responses (an 88% response rate) were obtained from a random stratified sample of 101 employees. The objectives were to identify existing sustainable practices, classify these practices under sustainability dimensions, and assess their influence on organisational performance. Five fundamental sustainability practices were examined under the three dimensions of sustainability: Managing Waste, Production efficiency, Social Infrastructure, Employee Training and Fairness. SPSS software and PLS-SEM SmartPLS software was used as a data processing tool. The findings show that managing waste, production efficiency, social infrastructure and employee training have a significant positive impact on perceived organisational performance. But fairness did not significantly affect perceived organisational performance as expected, indicating that organisational or cultural characteristics unique to the Sri Lankan palm oil industry may mitigate its impact. These insights provide practical guidance for enhancing sustainability and improving business outcomes within the palm oil sector.

Keywords: *perceived organisational performance, managing waste, production efficiency, social infrastructure, employee training*

CHEMICAL AND ENVIRONMENTAL SCIENCES

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ID 07

BIODEGRADABLE HYDROGEL FORMULATION AS A SLOW-RELEASE FERTILISER: A SUSTAINABLE ALTERNATIVE FOR ENHANCED FLOWERING AND CROP YIELD IN SHORT-TERM CROP CHILI (*Capsicum Annuum)*

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The escalating global population necessitates enhanced food production, intensifying the extensive use of fertilisers in agriculture. However, conventional fertilisers are often plagued by the low nutrient use efficiency (NUE) and significant environmental risks they pose, including soil degradation and pollution. To address these challenges, sustainable and efficient fertiliser delivery systems are urgently required. This study explored the development of a novel slow-release fertiliser hydrogel (SRFH) based on a biodegradable matrix of sodium alginate-carboxymethyl cellulose (SA-CMC), designed to improve delivery of macronutrient potassium (K), micronutrient zinc (Zn) and plant growth hormone naphthalene acetic acid (NAA) to minimise environmental impact. Experimental design encompassed encapsulation of zinc oxide nanoparticles (ZnO NPs), potassium chloride (KCl), and plant growth hormone NAA, targeting the flowering and fruiting stages of chili (*Capsicum annuum)* a short-term crop. ZnO NPs were synthesised via a surfactant-assisted co-precipitation method and characterised via PXRD, SEM, and FTIR techniques. The SRFH beads were similarly analysed by SEM and FTIR to confirm their structural integrity and successful encapsulation. Swelling capacity study revealed its peak value of 202% on day 14, supporting sustained nutrient release. Biodegradability assessments demonstrated nearly complete degradation of hydrogel beads by day 20, with a weight loss of 99.98%, which was visually confirmed through optical microscopic images, indicating environmental compatibility. Nutrient release profiles were evaluated using atomic absorption spectrometry, showing controlled and gradual release of K and Zn for 21 days. UV-Vis spectrophotometry confirmed efficient encapsulation (92.53%) and slow, sustained release of NAA for 21 days, with release kinetics during the exponential phase (20-450 minutes) fitting the Higuchi model ($R^2 = 0.97$), indicating a diffusion-driven release. A plant growth study was conducted on chili using six treatment groups, including the controls and the synthesized SRFH. Each treatment consisted of six replications ($n = 6$), and the parameters evaluated were plant height, number of branches, flowers and pods, and yield at the first harvest. Statistical analysis via ANOVA ($p \leq 0.05$) revealed significant improvements in flowering and yield, attributed to the synergistic effects of the encapsulated agrochemicals of SRFHs. Overall, the SRFH's swelling, biodegradability, and nutrient release properties demonstrate its promise as a sustainable alternative to conventional fertilizers for short-term crops; however, scaling up faces challenges including environmental variability, production costs, application consistency, and regulatory compliance.

Keywords: *Biodegradable, SA-CMC hydrogel, slow-release fertilizer, Zinc oxide nanoparticles, flowering and crop yield*

ID 12

METHOD DEVELOPMENT AND OPTIMISATION OF EFFICIENT EXTRACTION TECHNIQUES FOR THE QUANTITATIVE ANALYSIS OF MAJOR CANNABINOIDS USING GAS CHROMATOGRAPHY - FLAME IONISATION DETECTION (GC-FID)

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Cannabis is an illegal narcotic drug in Sri Lanka under the Poisons, Opium, and Dangerous Drugs Ordinance of 1935; therefore, accurate identification and quantification of cannabinoids are essential for forensic investigations. This research aims to develop and optimise efficient extraction techniques for the quantitative analysis of major cannabinoids using gas chromatography-flame ionisation detection (GC-FID) for the quantitation of Δ^9-tetrahydrocannabinol (THC), cannabidiol (CBD), and cannabinol (CBN) in cannabis samples. This study undertakes the comparative evaluation of ten solvent systems (single and binary) to identify the most effective medium for the extraction of major cannabinoids (THC, CBD, and CBN). Within these solvent systems, a 9:1 mixture of acetonitrile and chloroform demonstrated the highest recovery efficiency and reproducibility across a wide range of cannabis samples. The obtained percentages of THC, CBD, and CBN across samples were ~ 40 %, 7% and 50%, respectively. This optimised solvent system displayed balanced polarity and maximised cannabinoid recovery at the expense of unwanted co-extraction of plant compounds such as chlorophyll and waxes, thus ensuring accuracy and reproducibility. Furthermore, four extraction techniques, such as 15-minute sonication, triple extraction, 6-hour extraction with hourly vortexing, and 24-hour maceration, were tested to determine the optimal balance between crude extract yield and cannabinoid percentage. The 6-hour extraction with hourly vortexing repeatedly provided higher cannabinoid concentrations, despite lower crude extract weights, signifying selective and efficient recovery of target analytes. The resulting solvent system and the extraction technique were applied to 50 different cannabis samples to assess their real-world applicability and performance. Results confirmed the consistent retention times, high sensitivity, and no detector saturation, confirming the robustness of the method and suitability for diverse cannabis matrices. Potential challenges, which include sample heterogeneity, matrix effects, and co-extraction of non-target compounds, were identified, and recommendations for quality control measures were discussed. Ultimately, this research presents an optimised extraction technique using GC-FID for the reliable quantification of major cannabinoids. The findings are significantly important for forensic laboratories, which offer a standardised workflow to support regulatory enforcement and evidence-based investigations involving cannabis.

***Keywords**: Cannabinoids, solvent systems, extraction techniques, quantitative analysis, gas chromatography-flame ionisation detection*

ID 23

OPTIMISATION OF GAS CHROMATOGRAPHY-MASS SPECTROMETRY PARAMETERS FOR THE EFFECTIVE DETECTION OF MDMA IN STREET SAMPLES

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The increasing prevalence of MDMA (3,4-methylenedioxymethamphetamine) in street drugs poses significant forensic and public health challenges due to its widespread abuse, frequent adulteration, and variable purity in illicit preparations. Reliable identification of MDMA requires optimised analytical conditions to ensure sensitivity, selectivity, and efficiency. This study focuses on the systematic optimisation of Gas Chromatography-Mass Spectrometry (GC-MS) parameters to enhance the detection of MDMA in seized street samples. A series of experimental trials was conducted to evaluate the influence of key instrumental parameters on chromatographic performance. Variable GC parameters, including inlet temperature (150 - 280 °C), oven temperature programming, carrier gas flow rate (1.0 - 2.0 mL/min), and injection volume (1.0-2.0 µL), were systematically evaluated for their impact on chromatographic performance. The optimised conditions were identified as an inlet temperature of 230°C, an initial oven temperature of 100°C (held for 1 minute), ramped to 280°C at 15°C/min, with a Helium flow rate of 1.2 mL/min and a 2 µL injection volume in splitless mode. Methanol was used as an extraction solvent due to its high extraction efficiency. The optimised GC-MS method significantly improved the detection capability and reliability of MDMA analysis in complex street-level drug samples. The optimised GC-MS method yielded enhanced peak sharpness, consistent retention times, and improved chromatographic resolution, thereby facilitating the reliable identification of MDMA in complex illicit drug samples. These findings prove a strong basis for future method validation and contribute to the development of rapid, reliable, and cost-effective analytical tools for forensic drug analysis.

Keywords: *MDMA, GC-MS, method optimisation, forensic drug analysis, illicit drugs*

ID 50

CONGO RED DECOLORISATION POTENTIAL OF SOIL FUNGI ISOLATED FROM TEXTILE DYE CONTAMINATED RHIZOSPHERE SOIL

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Congo Red (CR) is commonly used as a synthetic dye in the textile and paper industries. It has complex molecular structure, especially the presence of azo groups, makes it highly resistant to natural biodegradation processes. As a result, CR tends to persist and accumulate in the environment, leading to various environmental and health-related issues. While chemical and physical treatment methods are available for dye removal, these approaches are often costly and require the use of large amounts of chemicals, raising sustainability and safety concerns. In response to this, scientists have developed biological treatment strategies, especially fungal-based methods, which offer an eco-friendly and less expensive alternative due to the reduced need of chemicals. The objective of this study was to assess the dye decolourisation capability of rhizosphere fungi isolated from a textile dye-contaminated area in Sri Lanka, where the Batik industry is practised. The fungal strains were isolated from rhizosphere soil samples, and their potential in CR decolourisation was determined using a live mycelium-based spectrophotometric assay. The decolourisation experiment was conducted in a modified Czapek Dox medium containing 50 mg/L CR, maintained at room temperature (26 ± 2 °C) and pH 5.0, under static conditions. Spectrophotometric measurements were taken at a wavelength of 491 nm initially and after a 6-day incubation period. After six days, out of the six fungal isolates tested in this study, three isolates, F6, F2, and F4, exhibited the highest CR decolourisation efficiencies, with percentages of 98.58%, 98.25%, and 96.30% respectively. The isolates, F2, F4, and F6, were morphologically identified as Aspergillus spp. at the genus level. These CR decolourisation values were notably higher than the decolourisation percentage shown by the positive control, *Aspergillus niger* (85.55%). The results demonstrate that fungi isolated from dye-contaminated rhizosphere soils have a remarkable ability to degrade textile dyes under the tested conditions. This ability of tested fungal spp. may be due to prolonged exposure to environmental stress and enhanced adaptability. These findings underscore that dye-contaminated rhizosphere soils are good sources for isolating fungi with strong CR decolourisation potential. Although the spectrophotometric analysis proved effective, its time-consuming nature highlights the need for faster, high-throughput methods in future research. Overall, this study lays a solid foundation for the potential of employing fungi in low-cost, eco-friendly dye remediation systems in Sri Lanka.

Keywords: *Congo red decolourisation, Rhizosphere fungi, azo dye biodegradation, eco-friendly wastewater treatment*

ID 70

DEVELOPMENT OF A UV-VISIBLE SPECTROPHOTOMETRIC METHOD FOR METHAMPHETAMINE QUANTIFICATION USING DEIONIZED WATER AS SOLVENT

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Methamphetamine is a potent psychostimulant with high abuse potential, requiring reliable quantification methods for forensic investigations. Conventional techniques often use methanol as a solvent, which is volatile and may lead to absorbance inaccuracies and operational challenges in high-throughput settings. This study aimed to develop a reproducible, accurate, and time-efficient UV-visible spectrophotometric method for the quantification of methamphetamine in forensic case samples at the Government Analyst's Department by identifying a less volatile alternative solvent. Deionised water was identified as a viable alternative to methanol due to its low volatility and stable absorbance profile. Methamphetamine hydrochloride standard solutions were prepared at six concentrations (100 ppm, 200 ppm, 400 ppm, 600 ppm, 800 ppm, and 1000 ppm) in deionised water. Absorbance measurements were carried out using a Shimadzu UV-1900i spectrophotometer equipped with a photomultiplier tube detector and an ASX-560 autosampler. The absorbance spectra revealed a distinct maximum absorption peak (λmax) at 257 nm for methamphetamine dissolved in deionised water. Absorbance values for each concentration were recorded at λmax, and a calibration curve was constructed over the tested range. The resulting calibration curve exhibited excellent linearity across the 100 - 1000 ppm range, with a coefficient of determination (R^2) of approximately 0.999, confirming strong compliance with Beer–Lambert law. These findings demonstrate that deionised water effectively eliminates volatility-related errors associated with methanol while providing reliable and consistent absorbance measurements. When using deionised water as the solvent, the developed method provides a straightforward, cost-effective, and practical approach for rapid methamphetamine quantification in forensic laboratories. This method enhances efficiency in forensic casework while eliminating the need for hazardous organic solvents, contributing to a safer and more sustainable laboratory environment. Unlike previous UV spectrophotometric methods that rely on volatile, hazardous solvents such as methanol, this study is the first to demonstrate a validated, water-based cost-effective approach for methamphetamine quantification, tailored to the operational and environmental needs of Sri Lankan forensic laboratories.

Keywords: *Methamphetamine, UV-Visible spectrophotometry, deionised water, λmax, calibration curve*

ID 71

EVALUATING THE THERAPEUTIC POTENTIAL OF SCHIFF BASE LIGAND AND ITS TRANSITION METAL COMPLEXES AS NOVEL ANTIBACTERIAL AND ANTIFUNGAL AGENTS

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Schiff base ligands and their transition metal complexes have shown promising applications in diagnosing microbial infections. A Schiff base ligand, salicylidene-4-nitroaniline, and its Cu (II) complex [Cu (4-nitroaniline-2-hydroxybenzaldehyde)$_2$] were successfully synthesised and characterised. The completion of the reaction was confirmed by Thin Layer Chromatography (TLC), and then it was characterized by using FT-IR analysis, which indicated characteristic absorption bands corresponding to C=N and O–H functional groups at 1612 cm^{-1} and 3443 cm^{-1}, UV-visible spectroscopy, which revealed intra-ligand charge transfer peaks at 346 nm and, further structural confirmations of the ligand was obtained by 1H NMR spectroscopy (400 MHz, $CDCl_3$) δ 12.57 (s, 1H), 8.64 (s, 1H), 8.32 (t, 2H), 7.45 (t, 2H), 7.38 (t, 2H), 7.05 (t, 1H), 6.99 (m, 1H). Cu (II) complex was characterised by FT-IR analysis, which showed shifts in C=N and O–H stretching frequencies, exhibiting bands at 1608 cm^{-1} and 3452 cm^{-1}. UV-visible spectroscopy displayed ligand-to-metal charge transfer transition bands at 352 nm, confirming metal coordination. Elemental analysis confirmed the composition of the complex by giving expected elements percentages (C-57.01%, N-10.06% and H-3.47%). In the preliminary studies, the antimicrobial activities have been studied in vitro against standard bacterial and fungal strains, including two gram-positive bacteria (*Enterococcus faecalis* and *Staphylococcus aureus*), a gram-negative bacterium (Pseudomonas *aeruginosa*), and a fungus (*Candida albicans*). The ligand and its Cu (II) complex were screened for their antimicrobial activities using the agar well diffusion method against selected bacterial and fungal species. Ligand and its Cu (II) complex demonstrated strong inhibitory effects against *Pseudomonas aeruginosa*. Notably, the ligand demonstrated a pronounced effect on *Enterococcus faecalis* compared to the metal complex. The effects of metal complex and the ligands were negligible for *Candida albicans* and *Staphylococcus aureus*. These findings suggest that the synthesized Schiff base and its Cu (II) complex exhibit selective antimicrobial properties, particularly against gram-negative bacteria. However, to explore the antimicrobial potential of the synthesized ligand and complex, further investigations, including Minimum Inhibitory Concentration (MIC) assays, are necessary.

***Keywords**: Schiff base, copper complex, spectroscopic analysis, antibacterial activity, antifungal activity*

ID 73

GLOBAL WARMING POTENTIAL OF RIBBED SMOKED SHEET (RSS) RUBBER PRODUCTION: THE CASE STUDY FROM SRI LANKA

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Ribbed Smoked Sheet (RSS) rubber production, a key economic driver in Sri Lanka, is energy-intensive, with electric milling contributing significantly to greenhouse gas emissions due to the country's fossil fuel-dependent electricity grid. This study aims to quantify the global warming potential (GWP) of RSS rubber production using electric milling and propose strategies to mitigate emissions. A cradle-to-gate Life Cycle Assessment (LCA) was conducted on three medium-scale factories in Monaragala district, following ISO 14040 and 14044 standards. The functional unit was one tonne of RSS rubber. Primary data on inputs (e.g., fertiliser, field latex, chemicals, firewood, and electricity) and outputs (e.g., wastewater, ash) were collected via field surveys and interviews, with secondary data sourced from the CML-IA Baseline Method V3.11 in SimaPro software and the ecoinvent v3.8 database. The results show a GWP of 2.59×10^3 kg CO_2 eq per tonne, with fertiliser use in cultivation (contributing CO_2, N_2O, CH_4) and firewood combustion during smoke drying as primary hotspots. Electric milling exacerbates emissions due to Sri Lanka's grid, which relies on approximately 50% fossil fuels. Proposed improvements, including solar-assisted smoke dryers, solar panel installation, and reduced fertiliser use, achieved up to a 27% GWP reduction in a combined scenario. These findings highlight the significant contribution of cultivation and electric milling to GWP, driven by fossil fuel-based electricity and firewood use. Adopting renewable energy and optimising fertiliser application can substantially lower emissions, enhancing the environmental sustainability of Sri Lanka's RSS rubber industry and supporting its global competitiveness.

Keywords*: Ribbed smoked sheet (RSS), life cycle assessment, global warming potential, greenhouse gas emissions, sustainable rubber production*

ID 90

CAPPING ASSISTED SYNTHESIS OF HYDROXYAPATITE NANOPARTICLES BASED ON EPPAWALA ROCK PHOSPHATE

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Hydroxyapatite (HA) nanoparticles are extensively used materials in biomedical applications due to their biocompatibility and structural resemblance to bone minerals. This research aimed to develop an eco-friendly and cost-effective method for producing high-purity HA nanoparticles using *Eppawala* Rock Phosphate (ERP), a locally abundant phosphate resource in Sri Lanka, as an alternative to imported synthetic precursors. The study addressed challenges during HA nanoparticles synthesis related to particle size control, morphology, and agglomeration by employing trisodium citrate, EDTA disodium salt, and sodium alginate as capping agents in both natural and chemical synthesis pathways. The synthesised HA nanoparticles were characterised using FTIR, XRD, TGA, SEM, and EDX techniques. FTIR results confirmed the formation of HA from ERP and the incorporation of capping agents onto HA nanoparticles. XRD data showed the formation of the hexagonal HA crystal phase, and the synthesised HA nanoparticles are nanocrystalline. SEM analysis confirmed rod/needle-shaped HA nanoparticles. The addition of capping agents effectively reduced HA particle size and agglomeration, as evidenced by XRD and SEM analyses. Average crystallite sizes decreased from 7.219 nm for pure HA to 5.075 nm with alginate capping, and SEM showed average particle lengths reduced from 72.20 nm for pure HA to 17.73–32.58 nm in capped samples with significant reduction in aggregation. EDTA produced more elongated particles with the highest aspect ratios. EDX analysis showed efficient removal of impurities from ERP, achieving Ca/P ratios near the ideal 1.67. TGA/DSC showed high thermal stability in all samples. Two bacterial strains, *Escherichia coli* (Gram-negative) and *Bacillus cereus* (Gram-positive), were utilised in antibacterial assays to represent the two main bacterial classes with different cell wall structures. Antibacterial assays demonstrated that HA nanoparticles synthesised with capping agents, especially with sodium alginate, exhibited enhanced antibacterial activity compared to pure HA nanoparticles and HA nanoparticles synthesised with citrate and EDTA, suggesting potential use in infection-resistant biomedical applications. The findings demonstrate that ERP can be effectively converted into high-purity HA nanoparticles using capping-assisted synthesis. This approach not only adds value to the ERP deposit but also supports the development of low-cost, high-purity, and environmentally friendly biomedical nano materials and has the potential to generate foreign revenue for Sri Lanka.

Keywords: *Hydroxyapatite nanoparticles, Eppawala rock phosphate, capping agents, antibacterial activity, biomedical applications*

ID 103

STUDYING THE PHYSICOCHEMICAL PARAMETERS OF THE TEN TRADITIONAL VEGETABLES FROM AREAS OF DIFFERENT CLIMATES

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This study investigated the physicochemical properties, micronutrient composition, antioxidant capacity, and heavy metal content of ten traditional leafy and tuber vegetables collected from areas of the Kandy District in Sri Lanka. Kandy, a hilly and humid region, offers distinctive agro-ecological conditions that influence plant growth and composition. The vegetables analyzed include *Syngonium angustatum* (Wel kohila), *Lasia spinosa* (Kohila), *Nelumbo nucifera* (Nelum ala), *Blechnopsis orientalis* (Barakoku), *Centella asiatica* (Gotukola), *Centella erecta* (Rata gotukola), *Trianthema portulacastrum* (Heen sarana), *Boerhavia diffusa* (Pitasudu sarana), *Argyreia kleiniana* (Girithilla), and *Xanthosoma sagittifolium* (Kiri ala). Proximate parameters such as moisture, ash, and crude fiber content were determined using AOAC methods. Heavy metals (Pb, Cd, and Cr) and essential micronutrients (Zn, Fe) were analysed by Flame Atomic Absorption Spectrophotometry (FAAS), and antioxidant capacity was evaluated using the DPPH radical scavenging method. Results from Kandy District revealed moisture content ranging from 73.70% to 94.15%, ash content from 5.79% to 24.58%, and crude fiber content from 10.89% to 33.25%. The highest zinc concentration (118.49 µg/g) was recorded in *Lasia spinosa*, and the highest iron content (302.10 µg/g) was found in *Nelumbo nucifera*. While most vegetables showed non- detectable levels of cadmium, concerning levels of lead (up to 3.20 µg/g in Rata gotukola) and chromium (up to 4.31 µg/g in Gotukola) were detected. The most potent antioxidant activity (lowest IC_{50} value) among the Kandy samples was found in Heen sarana. These findings highlight the nutritional and therapeutic significance of Kandy-grown traditional vegetables. The study emphasises the need for continued research and dietary integration of these underutilised crops for enhancing health, preserving biodiversity, and promoting sustainable food systems in Sri Lanka.

Keywords: *AOAC, FAAS, Kandy, leafy vegetables, tuber vegetables*

ID 106

DISADVANTAGES OF USING ALTERNATIVE DYES IN TAQMAN REAL-TIME PCR

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TaqMan chemistry is a technique of real-time PCR which utilises sequence-specific primers and fluorescently labelled probes for the detection and quantification of DNA. Due to its high sensitivity and specificity, it is widely used for quantification of genetically modified organisms (GMOs), with probes labelled with a reporter and quencher dye to detect amplification in real time. In resource-limited settings, cost-saving strategies often involve replacing expensive proprietary dyes with more affordable alternatives that share similar excitation and emission spectra. Hexachloro-fluorescein (HEX) is a common substitute for VIC™, and manufacturers claim it can be detected through VIC's channel without affecting assay performance. However, subtle spectral differences may lead to fluorescence signal overlapping and affect multiplex reactions. This study aimed to evaluate the performance of HEX as a reporter dye in simplex and duplex TaqMan assays targeting the Le (endogenous) and RR (transgenic) genes in GMO soybean event GTS 40-3-2. DNA was extracted from certified reference materials and used in simplex and duplex real-time PCR assays. In all assays, the Le probe was labelled with HEX and quenched with Carboxytetramethylrhodamine (TAMRA), while the RR probe used 6-Carboxyfluorescein (FAM)/TAMRA. Three duplex trials were conducted using different primer/probe concentrations and optical filters (VIC™ and JOE™) to assess compatibility. Amplification efficiencies, slopes, and R^2 values were compared to standard criteria, and multicomponent plots were analysed to evaluate fluorescence behaviour and detect potential crosstalk. These plots provided a detailed visualisation of the changes in fluorescence signal of each dye as time progressed. Results showed that amplification efficiencies in all trials fell significantly below acceptable standards, particularly for HEX-labelled targets. Despite signal generation in expected channels, multicomponent plots revealed abnormal rises and dips in TAMRA fluorescence, indicating optical crosstalk between HEX and TAMRA. Since TAMRA should not emit fluorescence when used as a quencher, the observed signal distortions suggest that HEX was imperfectly detected through filters calibrated for VIC™ or JOE™, leading to inaccurate signal interpretation. Hence, the study confirms that substituting proprietary dyes with alternatives like HEX in multiplex assays can compromise data quality due to crosstalk and filter mismatch. The findings emphasise the need for careful spectral matching and suggest that using dark quenchers or recalibrating instrument filters may improve assay reliability.

Keywords*: TaqMan real-time PCR, reporter dye, fluorescence, HEX, TAMRA*

ID 109

COMPARATIVE ANALYSIS OF THE NUTRITIONAL AND BIOACTIVE COMPONENTS PRESENT IN THREE DISTINCT MORPHOTYPES OF *Hibiscus rosa-sinensis*

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Hibiscus rosa-sinensis flowers contain valuable phytochemicals with promising applications in health, nutrition, and biotechnology. Although several morphotypes exist, research has focused on a single morphotype (HRS1). In Sri Lanka, the Pokuru Wada morphotype (HRS3) is frequently used in traditional medicine, yet its mineral and phytochemical composition has not been thoroughly characterised. This study evaluated three morphotypes of *Hibiscus rosa-sinensis* bearing red colour flowers (HRS1, HRS2, and HRS3). Fully matured flower samples were collected, and the plants were authenticated by Bandaranayaka Memorial Ayurveda Research Institute (account numbers, 3329a, 3329b, 3329c). Proximate parameters such as moisture, ash, and crude fiber content were determined using AOAC methods. Metal content (Ca, Mg, Fe, Zn) was analysed by Flame Atomic Absorption Spectrophotometry (FAAS), and antioxidant capacity was evaluated using the DPPH radical scavenging method. Anthocyanin content was determined using the pH differential method. Total phenolic content was analysed by the Folin-Ciocalteu assay and expressed as gallic acid equivalents. Results revealed that the moisture content ranged between 89.13% and 90.22%, ash content varied from 5.74% to 6.50%, and crude fibre content ranged from 6.67% to 7.15% across the three morphotypes. HRS1 showed the highest magnesium (1693.86 µg/g) and iron (113.98 µg/g) contents, while HRS2 showed the highest calcium (978.81 µg/g) and zinc (189.75 µg/g) contents. However, HRS3 demonstrated the highest levels of anthocyanins (189.49 mg cyd-3-glu/100g) and total phenolic content (0.66 mg GAE/g). HRS1 showed the best antioxidant activity (IC50 = 53.61 µg/mL). Overall, this research expands knowledge on the phytochemical and mineral diversity among flowers of *Hibiscus rosa-sinensis* morphotypes, highlighting their varied potential for medicinal and nutritional applications. The study also emphasises the importance of carrying out further research on the HRS3 morphotype, further investigating its phytochemical constituents and therapeutic potentials.

Keywords: *Hibiscus rosa-sinensis, morphotypes, phytochemicals, minerals*

ENGINEERING, TECHNOLOGICAL SCIENCES AND INNOVATION

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ID 47

PREDICTING BRIDGE DECK CONDITION RATINGS USING MACHINE LEARNING: A MULTI-MODEL APPROACH INTEGRATING PHYSICAL PRINCIPLES AND ENSEMBLE TECHNIQUES

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As infrastructure systems age and traffic demands increase, accurate and scalable methods to evaluate bridge deck conditions become essential for maintenance prioritisation and public safety enhancement. This research developed a multi-model machine learning framework aimed at predicting bridge deck condition ratings by integrating physical engineering principles with ensemble learning algorithms. The study utilised the National Bridge Inventory (NBI) dataset, performing comprehensive pre-processing to engineer and normalise critical parameters such as bridge age, load ratios, truck impact, climate-age interaction, and span-to-width ratios. Four machine learning models, *Random Forest*, *Physics-Informed Random Forest (PI-RF)*, *XGBoost*, and *Physics-Informed XGBoost (PI-XGBoost),* were trained and comparatively evaluated using a stratified 80:20 train-test data split. Results indicated superior performance from the physics-informed ensemble methods, with the *PI-XGBoost* achieving the highest accuracy of 92%. This model demonstrated robust classification capabilities, effectively capturing complex interactions between structural parameters and environmental factors. Additionally, the integration of physically meaningful features significantly enhanced model interpretability, allowing for clearer insight into the factors influencing bridge deterioration. The findings support the incorporation of hybrid predictive systems in transportation asset management, facilitating timely, data-driven maintenance and rehabilitation decisions.

Keywords: *Bridge condition rating, machine learning, random forest, XGBoost, infrastructure health*

ID 58

ANOMALY DETECTION, BOTTLENECK IDENTIFICATION AND PROCESS OPTIMISATION IN APPAREL MANUFACTURING VIA SENSOR-BASED SYSTEM / IOT AND MACHINE LEARNING

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This study was conducted on the development and implementation of a sensor-based IoT system to enhance manufacturing efficiency in an apparel factory by capturing real-time data from both machines and operators. In Apparel plants, industrial engineers have to get details of the piece count of modules, cycle time per person and have to identify bottlenecks. If any machine breakdown happens on the production floor, there would be a breakdown time, which is very time-consuming, and there are fabric laying machines in the plants which take up a huge space. If these data can be captured by an IoT system, it will save time for Industrial Engineers, an anomaly detection system will save additional cost from unplanned machine breakdown to the company, and the production floor will be productive as planned and using laying machines efficiently helps to remove unnecessary machines and save space and cost. This research is to address these gaps and help with data visualisation, which helps with decision-making. Therefore, by accurately identifies the production bottlenecks and monitor key production metrics in the sewing process, such as piece count, and cycle times per operator and capture measures for anomaly detection such as machine run time, idle time, RPM and key metrics in laying process such as laying speed, length of a layer, machine run time, machine idle time for each layer, number of layers and efficiency calculation in laying process of production, and visualize them through interactive dashboards, so the responsible people can respond effectively to inefficiencies on the production floor. The research investigates anomaly detection strategies to reduce unplanned downtime of sewing machines using an XGBoost classifier on sensor data from the InfluxDB database. Due to limited real-world machine failure data, anomalies were synthetically generated using statistical thresholds and validated with stratified sampling to address class imbalance. Hyperparameters were optimised via cross-validation. The model achieved a precision, recall, and F1-score of 1.00 for both classes, with an overall accuracy of 99.94%. The research simultaneously automates production bottleneck identification, predicts machine anomalies, and optimises apparel manufacturing processes through sensor data and interactive data-driven dashboards, simulating an Industry 4.0 approach. The project had practical challenges, with the integration of new data collection methods with existing workflows and legacy machinery, as well as managing large volumes of sensor data. The results of this industrial-based project highlight the potential of IoT-driven approaches in manufacturing.

Keywords: *Industry 4.0, internet of things, anomaly detection, process optimization, real-time databases*

ID 83

FORECAST-DRIVEN CROP PLANNING AND DISTRIBUTION PLATFORM FOR SRI LANKA

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Agriculture in Sri Lanka faces challenges like poor planning, market instability, and miscommunication between farmers and buyers. This research aims to develop a data-driven decision support system integrating crop recommendation, production forecasting, and real-time monitoring to address these issues. Production forecasting compared Polynomial Regression and Autoregressive Distributed Lag (ARDL) models using historical yields. The ARDL model proved most accurate and stable for multi-year forecasts, generating reliable predictions for 2025 and 2026. It achieved R^2 scores of 0.803 for Ash Plantain, 0.855 for Green Chillie, and 0.831 for Tomatoes. For weather forecasting, Prophet and SARIMA models were trained on five years of rainfall, temperature, and humidity data from 25 districts. Model performance was evaluated using RMSE and MAE to select the best model for each weather parameter and district. Weather forecasts for 2024 and 2025 were integrated into a crop recommendation system that matches predicted conditions with a dataset of suitable climates and growing seasons for 95 crops, enabling month-wise, district-specific suggestions. Market price forecasting was also incorporated for selected crops, including Dhal, Cabbage, Banana, Carrot, Red Pumpkin, Papaw, Tomatoes, Brinjals, Red Onions, Snake Gourd, Green Chillie, Potatoes, and Beans, with a forecast horizon of 6 months. Forecasting accuracy was high for most vegetables (e.g., Red Pumpkin $R^2 = 0.94$, Papaw $R^2 = 0.88$), while relatively lower accuracies were observed for items like Dhal and Brinjals. The system consists of three main modules: (1) a real-time production tracking interface using cleaned district-wise data to show crop quantities and locations, (2) a production forecasting dashboard with expected yields and market prices, and (3) a crop recommendation engine in Power BI linked to weather forecasts. Data Analysis Expressions (DAX) formulas enable filtering by the current month and district. The modular architecture supports easy future integration with national digital agriculture platforms. This integrated decision support system enables timely, informed decisions by farmers, buyers, and authorities, promoting transparency, equity, and profitability. Unlike existing tools, it combines weather-based crop recommendations, real-time production tracking, and multi-model forecasting in a district-level framework. As such a system does not currently exist in Sri Lanka, this research provides a practical foundation for its implementation. With the support of authorities, it can be made publicly accessible to address key gaps in agricultural planning and distribution. To further enhance its reliability and practical value, field-level application and validation across multiple cultivation seasons will be essential in future developments.

Keywords*: Production tracking, weather-based crop recommendation, crop price prediction, time series analysis, agricultural planning*

ID 97

REAL-TIME HEART RATE, BLOOD OXYGEN LEVEL, AND ECG MONITORING USING IOT AND AI FOR TELEMEDICINE PRACTITIONERS

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In underserved and distant areas, where diagnosis and treatment are frequently delayed by limited medical infrastructure, access to accurate and ongoing health monitoring is still difficult. Although telemedicine has shown great promise, current systems have problems with inaccuracy in sensor readings, unstable connectivity, restricted scalability, and insufficient data security. By creating an artificial intelligence (AI) and Internet of Things (IoT)-enabled real-time cardiovascular and related parameter health monitoring system tailored for telemedicine applications, this study overcomes all these limitations. Validated biomedical sensors, including the AD8232 for electrocardiogram (ECG), the DS18B20 for body temperature, and the MAX30100 pulse oximeter for heart rate and blood oxygen saturation (SpO_2), are integrated into the suggested system using a NodeMCU ESP8266 microcontroller. To reduce bandwidth consumption and preserve diagnostic value, physiological data is analysed at the edge utilising lightweight AI algorithms for initial anomaly identification. Data is sent to a secure backend via the WebSocket and MQTT protocols. The method used in the research included sensor calibration, adaptive filtering to reduce noise, and thorough accuracy testing in both semi-clinical and laboratory settings. A unique React-based web application was used for improved user experience, scalability, and real-time visualisation, while an early Node-RED dashboard was used for quick prototyping and validation. While the React interface provided responsive, role-based access for patients and healthcare professionals, the Node-RED backend integration allowed for effective data processing, validation, and dissemination. Accuracy analysis of all monitored metrics was part of the evaluation, showing that average error rates could be consistently detected. Further evaluations of the system's performance in terms of dependability, latency, and user experience confirmed its steady functioning, sub-second data updates, and flexibility for multi-patient monitoring. According to the findings, the created IoT-AI health monitoring framework is a practical instrument for remote healthcare delivery since it offers clinically relevant precision, secure connectivity, and real-time responsiveness. This system improves accessibility, efficiency, and care quality in telemedicine settings by fusing scalable architecture, intelligent edge processing, and affordable hardware. More extensive interoperability with electronic health record systems, wearable integration, and advanced predictive analytics are possible future advances.

Keywords: *IoT, AI, telemedicine, real-time health monitoring, remote patient care*

ENVIRONMENTAL AND RESOURCE ECONOMICS

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ID 29

ANALYSING THE DETERMINANTS OF CUSTOMER INTENT TO CONTINUE AND CUSTOMER SATISFACTION IN SUSTAINABLE WASTE MANAGEMENT: A CASE STUDY OF ENCARE'S DOOR-TO-DOOR SANITARY WASTE COLLECTION INITIATIVE IN SRI LANKA

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The management of household sanitary waste is still a significant public health and environmental issue in the urban setting of Sri Lanka. Sisili Hanaro Encare (Pvt) Ltd, the first to introduce a door-to-door sanitary waste collection service in the Sri Lankan context, launched their innovative service with QR-coded tracking and pre-scheduled collection in 2023. Despite the introduction of such an innovative service model, retention and adoption are constrained by affordability, perception on digital systems, perception on project reliability, authenticity, project consciousness. This study explores the major factors impacting on customer satisfaction and subsequently the intention to continue using Encare service. A quantitative research design was employed using 70 urban and suburban users and analysed using descriptive statistics, Pearson correlation, multiple regression, and moderation analysis (SPSS and Excel). Results show that affordability ($\beta = 0.371$, $p < 0.001$) and authenticity ($\beta = 0.340$, $p < 0.001$) are the strongest predictors of customer intent to continue. Whereas perceptions about digital systems, reliability and project recognition showed positive association to satisfaction, they were not found to significantly affect customer intent to continue. Evidently, health concerns emerged as an important moderator ($\beta = 0.581$, $p < 0.001$) in customer satisfaction - intent to continue relationship that highlights the potential for health-oriented messaging to increase commitment to services. The study confirms the critical role of perceived value and trust in service delivery, particularly in sensitive waste contexts. Findings highlight the potential for public health messaging and transparent service models to enhance service adoption and sustainability in developing countries. These insights are valuable for improving the effectiveness and scalability of urban sanitary waste management programs in Sri Lanka and beyond. Evidently, health concerns emerged as an important moderator ($\beta = 0.581$, $p < 0.001$) in customer satisfaction - intent to continue relationship, that highlight the potential for health-oriented messaging to increase commitment to services. The study confirms the critical role of perceived value and trust in service delivery, particularly in sensitive waste contexts. Findings highlight the potential for public health messaging and transparent service models to enhance service adoption and sustainability in developing countries. These insights are valuable for improving the effectiveness and scalability of urban sanitary waste management programs in Sri Lanka and beyond.

Keywords: *Customer satisfaction, intent to continue, sanitary waste, sustainable waste management, affordability*

ID 30

INVESTIGATING THE DETERMINANTS OF SOLAR ENERGY ADOPTION AMONG SRI LANKAN HOUSEHOLDS

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Access to a reliable energy source impacts household well-being and economic opportunity. This study aims to identify household-level factors that determine whether Sri Lankan households rely on solar power, especially as a lighting source. Secondary data from the Sri Lanka Household Income and Expenditure Survey 2019 have been used to develop a binary logistic regression model that predicts whether a household relies on-site solar power or national grid electricity. The analysis was conducted using Python programming language. The district of residence, living in urban, rural, or estate sector, household size, weekly food and non-food expenditures, agricultural and other income indicators, count of durable goods, primary drinking water source, type of sanitary facility, and type of cooking fuel were considered as potential influential factors. Categorical features were transformed by one-hot encoding, and continuous variables were standardized before model fitting. The fitted model attains 84% accuracy, with balanced precision and recall (0.84 each), an ROC AUC of 0.91, and satisfies the requirement of the Hosmer–Lemeshow goodness-of-fit test ($\chi^2 = 7.8$, $p = 0.45$), reflecting acceptable model fit. Its Proportional by Chance accuracy Criterion (PCC) is 72.5% which exceeds the percentage of correct classification, confirming that the predictability of the model is acceptable. Results reveal that households drawing water from public taps ($\beta = -3.71$, $p < 0.01$). Similarly, those using unprotected wells ($\beta = -3.51$, $p < 0.01$) or community-managed taps ($\beta = -2.49$, $p < 0.01$) negatively influence the adoption of solar power. Geographic location is also pivotal: residing in Anuradhapura ($\beta = -3.06$, $p < 0.01$) or Matara ($\beta = -2.58$, $p < 0.01$) has a negative impact, reflecting established coverage in those districts. Conversely, off-grid solar use is positively influenced by cooking on LPG ($\beta = 3.84$, $p < 0.01$) and having a water-seal toilet connected to a sewer system ($\beta = 3.99$, $p < 0.01$), revealing that households with more modern amenities also embrace solar solutions. Moreover, living in Colombo ($\beta = +3.44$, $p < 0.01$), Gampaha ($\beta = 3.39$, $p < 0.01$), and Nuwara Eliya ($\beta = 2.91$, $p < 0.01$) raises the likelihood of solar adoption, revealing areas of higher wealth, newer developments, and remote tourist lodges investing in cleaner lighting. Regions like Nuwara Eliya, known for its hillside remoteness and growing eco-tourism accommodations, positively influence solar adoption. The outcomes emphasise how disparities in basic infrastructure, including water supply, sanitation, and regional grid roll-out, influence lighting choices. Extending piped and protected water systems, facilitating grid expansion, and targeted off-grid solar initiatives are essential in districts where coverage remains limited.

Keywords: *Solar power adoption, binary logistic regression, water and sanitation, energy access*

ID 38

FORECASTING THE FUTURE TRENDS OF BRAZIL'S COTTON LINT EXPORTS USING THE ARIMA APPROACH

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Cotton lint is a basic input in the textile manufacturing process. It is important for stakeholders in global agriculture, the clothing industry, international trade, and economic planning to understand the fluctuation of exports. Recent international trade statistics reveal that Brazil is among the world's top cotton exporters. The objective of the study was to investigate the historical trends of cotton exports in Brazil and to provide a data-driven forecast of future cotton exports, offering practical guidance for marketers and policymakers. This study addresses the gap in the application of ARIMA models to agricultural export markets, with a particular focus on forecasting Brazil's cotton lint exports, which remain underexplored. Annual data on cotton exports, from 1961 to 2023, were obtained from the FAOSTAT database. The E-Views software package was used for analysis. Considering the historical trends, exports showed an upward trend with periodic fluctuations. An Auto-Regressive Integrated Moving Average (ARIMA) model was used for forecasting. Orders of Auto-Regressive (AR) and Moving Average (MA) components were identified using autocorrelation (ACF) and partial autocorrelation functions (PACF). The ARIMA (1,1,2) model was recognised as the best model, using the Akaike Information Criterion (AIC). The absence of autocorrelation in residuals was confirmed by the Ljung-Box test. Jarque-Bera test confirms that the residuals are normally distributed (Jarque-Bera statistic = 0.57, $p > 0.05$). Theil inequality coefficient (0.108) and bias proportion (0.010) confirm the accuracy of the forecast. The export value was forecasted from 2024 to 2030, using the selected ARIMA model. The forecast reveals that exports will decrease in 2024, followed by an increase in 2025. Brazil will experience an increasing trend in its cotton lint exports beyond 2025, suggesting continued strength in the international cotton and textile markets. Outcomes are useful for policymakers in designing adaptive agricultural and trade policies, ensuring sustainable growth and competitiveness, and for exporters to optimise production and investments, and develop market expansion strategies. Future research could incorporate external variables like exchange rates, drought indices, and trade tariffs, accounting for global and environmental uncertainties, and conduct comparative analyses across leading cotton-exporting countries to enhance international benchmarking.

***Keywords**: ARIMA, Brazil, cotton lint, exports, time series analysis*

ID 76

TETRA PAK WASTE MANAGEMENT PRACTICES: A CASE STUDY FROM THE WESTERN PROVINCE OF SRI LANKA

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The increasing manufacturing and consumption of composite packaging, such as Tetra Pak, are creating significant environmental issues due to improper disposal and inadequate waste management. Tetra Pak recycling in Sri Lanka is still in its preliminary stages. This study examines the current state of Tetra Pak waste management in the western province of Sri Lanka through field observations, consultations with waste management authorities, and data collection from INSEE Eco Cycle. Findings reveal that the existing recycling facility at Eco Maximus operates on a project basis and is limited to recovering only the paper component of Tetra Pak packaging by a manual hydra pulping method. This paper pulp is combined with elephant dung to produce handmade stationery. The residual poly-aluminum is used in cement kiln co-processing. Hence, it is not a closed-loop recycling system. It utilises low technology and yields limited material recovery. According to the waste management authority database of the Western Province, no formal records or dedicated systems exist for the collection or monitoring of Tetra Pak waste. It is categorised as general combustible paper waste. Most local authorities dispose of this waste at the Karadiyana landfill site, while some manage it through the waste-to-energy power plant in Kerawalapitiya. Between January 2023 and March 2025, approximately 200 metric tons of Tetra Pak waste were collected and diverted from selected districts, primarily by INSEE Eco Cycle. The contribution of the informal waste pickers towards collection has not been quantified due to the unregulated nature of these activities. Future studies should focus on quantifying this contribution and identifying the associated challenges. There are no source segregation methods for Tetra Pak waste available in most public areas. These results highlight significant gaps in material recovery, data management, and systemic coordination. The study recommends formalising collection efforts, integrating the informal sector, and expanding infrastructure to recover all material layers of Tetra Paks. These improvements are vital for advancing sustainable waste management and circular economy practices in Sri Lanka.

Keywords: *Tetra pak, waste collection, recycling, waste management*

ID 104

ANALYSIS OF THE INFLUENTIAL FACTORS OF THE BLACK TEA EXPORT PERFORMANCE OF KENYA AND THEIR DYNAMIC INTERACTIONS

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Kenya has long been recognised as a dominant force in the global tea market, particularly in the export of black tea. The main objective of this study is to examine the dynamic interactions between Kenya's black tea export performance and key internal and external factors, including domestic production levels, bilateral exchange rate movements, and the export-linked production dynamics of China and Sri Lanka. Kenya plays a key role in the global black tea industry, as the leading exporter with a market share of 23%. Annual data on Kenya's black tea export quantity, tea production of Kenya, tea production of China, the exchange rate of Kenya, and the exchange rate of China were obtained from the FAOSTAT and the World Bank databases, for the period from 1961 to 2023. The EViews software package was used for the data analysis, and a Vector Autoregressive model of order 2 was estimated. As revealed by the results of the Wald test, the tea exports of the previous periods ($F = 50.89$, $p < 0.05$), the tea production of Kenya ($F = 14.99$, $p < 0.05$), the exchange rate of Kenya ($F = 17.51$, $p < 0.05$), and the tea production of China ($F = 7.65$, $p < 0.05$) and Sri Lanka ($F = 40.27$, $p < 0.05$) influence the tea exports of Kenya. According to the results of the Granger-causality test, uni-directional causality exists from the tea production of Kenya (Chi-square = 11.6943, $p = 0.0029$), the exchange rate of Kenya (Chi-square = 19.9864, $p = 0.0000$), and the tea production of China (Chi-square = 7.5869, $p = 0.0225$) and Sri Lanka (Chi-square = 34.5988, $p = 0.0000$) to tea exports of Kenya. As revealed by the Impulse Response Function, the response of the tea exports of Kenya to a shock given to the tea production and exchange rate of Kenya and the production of the competitors is considerable, and it varies throughout the future period considered. The results show that external production shocks from Sri Lanka have a clear and lasting negative effect on Kenya's tea export performance. This highlights Kenya's exposure to global supply-side competition, where Sri Lanka's strong brand and quality perception allow it to gain market share at Kenya's expense. The forecast error variance is mostly explained by the tea exports of Kenya in the short run. In the long run, there is a considerable contribution from the other variables, especially from the tea production of Sri Lanka, with a contribution of 18–19%. The Portmanteau autocorrelation test confirmed the absence of serial autocorrelation among the residuals. The outcomes of the study highlight that the tea production and exchange rates of Kenya and its competitors play an important role in the tea export sector in Kenya.

Keywords: *Kenya, black tea, exports, vector autoregression, exchange rates, tea production*

FOOD SCIENCE AND NUTRITION

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ID 40

CONSUMER PERCEPTION AND BUYING BEHAVIOUR TOWARDS TURMERIC POWDER AMID ADULTERATION CONCERNS

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The study examines the intersection between consumer behaviour and food safety, focusing on how individuals make purchasing decisions regarding turmeric powder amid growing concerns about adulteration with synthetic dyes. The research aims to understand the public's level of awareness, trust, and preferences in choosing between branded and non-branded turmeric powders available in the local Sri Lankan market, particularly in the Wijerama Grama Niladhari Division. A total of 198 adult participants, those primarily responsible for grocery shopping, were surveyed through both online Google Forms and face-to-face interviews to ensure a representative sample across age groups and access levels. The structured questionnaire was standardised, and it covered five key sections: socio-demographic data, turmeric consumption patterns, product selection factors, preferences for organic or conventional turmeric, and awareness of food safety issues. Findings revealed that the most influential factors in turmeric purchasing decisions were brand reputation (63%), price (58%), and organic labelling (35%), followed by colour and origin. Although most respondents (198) expressed a high preference for the selection of turmeric with a brand reputation, they (126) were often unaware of the harmful synthetic dye adulteration. A major concern highlighted in the study is the lack of consumer awareness regarding artificial dye-related health risks, such as allergic reactions, behavioural issues in children, and potential carcinogenic effects. This lack of knowledge leads many consumers, especially those purchasing from informal markets or smaller vendors, to prioritise affordability and appearance over safety and certification. The survey also revealed misconceptions about labelling, where consumers often assumed that a turmeric product labelled as "organic" or "natural" automatically met safety standards, despite the absence of official certifications or regulation enforcement in many cases. Furthermore, despite Sri Lanka having national food safety guidelines aligned with international standards, the enforcement in retail settings, especially for non-branded products, was found to be weak. This study underscores the importance of integrating food safety education, clearer packaging and labelling regulations, and community awareness programs into public health policy. It recommends that the government and relevant agencies collaborate to conduct awareness campaigns targeting both consumers and vendors. Moreover, promoting certified branding and conducting routine inspections of turmeric products could enhance trust and ensure safer choices for Sri Lankan households.

Keywords: *Turmeric adulteration, consumer awareness, buying behaviour, synthetic dyes, food safety*

FORESTRY AND AGRICULTURE

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ID 57

FLORISTIC COMPOSITION AND STRUCTURAL DIVERSITY OF NON-SERPENTINE VEGETATION IN USSANGODA NATIONAL PARK, SRI LANKA

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Ussangoda National Park, located in the southern dry zone of Sri Lanka, represents a geologically unique ultramafic landscape where serpentine and non-serpentine habitats coexist in a mosaic pattern. This study focused on assessing the floristic composition and vegetation structure of non-serpentine shrub and woodland communities spatially associated with serpentine soils. The main objectives were to evaluate species richness, canopy stratification, regeneration potential, and ecological stability of these communities in relation to their surrounding edaphic conditions. Non-serpentine regions, though adjacent to nutrient-poor serpentine soils enriched in magnesium and iron and often toxic in heavy metals, support a distinct assemblage of dry zone flora adapted to challenging conditions. Vegetation sampling was conducted using random 3-line transects (up to 40 meters long and 6 meters wide), with individuals of DBH ≥ 5 cm recorded. Seedlings and saplings were sampled using 2 x 2 m and 1 x 1 m quadrats, respectively. Heights were measured using a laser rangefinder, and GPS was used for geo-referencing. Vegetation profile diagrams were created, and community structure was assessed using the Shannon Diversity Index (H′), evenness (J′), dominance values, and species richness. Results revealed a stratified canopy dominated by *Psydrax dicoccos* var. *dicoccos*, *Huberantha korinti*, *Casearia zeylanica*, and *Senegalia caesia*. The mature shrubland exhibited balanced diversity (H′ = 1.6769), high evenness (J′ = 0.9359), and low dominance (0.0641), species richness 12, indicating a structurally stable and well-balanced community. Although seedling diversity was moderate (H′ = 1.602), sapling diversity was low (H′ = 0.5983), suggesting limited recruitment beyond the seedling stage. The consistently high evenness across life stages reflects minimal species monopolisation and a relatively stable ecological composition. These findings suggest that non-serpentine vegetation in Ussangoda supports a resilient and ecologically significant plant community. However, the reduced diversity at the sapling stage may point to recruitment constraints, possibly linked to anthropogenic pressures or underlying edaphic limitations. Future research incorporating detailed plant-based soil analyses is recommended to better understand the floristic-edaphic interactions, population growth, and to guide conservation and restoration efforts of the plant community in this sensitive ultramafic environment.

Keywords: *Non-serpentine vegetation, floristic diversity, Ussangoda national park, community structure, ultramafic landscapes*

ID 84

IDENTIFICATION OF ALTERNATIVE HOST PLANTS FOR THE *Citrus tristeza* VIRUS IN SRI LANKA

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Citrus Tristeza Virus (CTV), one of the most destructive citrus pathogens worldwide, causes severe yield losses in Sri Lanka and other citrus-growing regions. While CTV primarily infects *Citrus* species and close relatives, the identification of non-Rutaceae hosts would have significant implications for disease epidemiology and management. To investigate potential reservoirs, diverse weed and non-Rutaceae species across Sri Lanka's major citrus-growing areas were surveyed during November 2024 to May 2025. Approximately 120 plants were sampled, including ten individuals of *Spermacoce latifolia* (Rubiaceae) from five sites. All samples were screened for CTV using Triple Antibody Sandwich Enzyme-Linked Immunosorbent Assay (TAS-ELISA) (Agdia, USA) targeting the CTV coat protein and reverse transcription-polymerase chain reaction with primers CTV-AR18F and CTV-AR18R, amplifying a 511 bp fragment of the gene. Samples were considered CTV-positive only if they exhibited absorbance values >3× the negative control mean in TAS-ELISA (405 nm) and produced the expected 511 bp amplicon in PCR; all others were classified as negative. Positive results were confirmed through repeated independent testing and mechanical inoculation on *Citrus reticulata*. Among all screened plants, only one *S. latifolia* sample tested positive for CTV via both assays. All other *S. latifolia* plants and non-Rutaceae species were negative. The positive sample was consistently confirmed in repeated tests. The absence of detection in other *S. latifolia* replicates and the lack of symptom development in inoculated citrus suggest CTV infection in this species is exceedingly rare or occurs at low titers. This finding has critical epidemiological implications: if validated, *S. latifolia* could act as a cryptic reservoir for CTV, enabling aphid vectors to spread the virus between orchards in the absence of citrus hosts. This may prolong the environmental persistence of CTV and complicate disease containment efforts.

Keywords: *Citrus tristeza virus, alternative host, tas-elisa, pcr*

INFORMATION TECHNOLOGY AND COMPUTING

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REAL-TIME DEFECT AND COLOUR QUALITY MONITORING SYSTEM FOR APPAREL MANUFACTURING IN SRI LANKA

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In this study, LOOMQA (Loom Quality Assurance), an intelligent computer vision-based quality monitoring system, was developed and deployed to support the moulded cup section in the Sri Lankan apparel manufacturing industry. The system automates defect detection and colour measurement, reducing the time and subjectivity of manual inspections while meeting Industry 4.0 standards. The approach involved training and testing three YOLO (You Only Look Once) model variants, YOLOv5s, YOLOv8s, and YOLOv11s, on a dataset of 621 high-resolution images captured under controlled lighting using both embedded cameras (OV5640 ESP32-CAM) and mobile phone cameras to ensure hardware diversity. Data was split into 70% training, 20% validation, and 10% testing, without cross-validation. A homemade light box ensured uniform lighting during data collection. Among the models, YOLOv8s achieved the highest performance, with a mean Average Precision (mAP50) of 0.8931, precision of 0.9036, and recall of 0.8752, outperforming the other two models and existing manual inspection in terms of detection speed and consistency. For colour quality monitoring, LAB colour space conversion and Delta E (ΔE) formulas in OpenCV were used, with a configurable acceptance threshold of $\Delta E \leq 2.0$ for production approval. This enabled accurate colour matching and deviation detection across different surfaces. The integrated LOOMQA desktop application, built in Python with Tkinter, offers a user-friendly GUI, worker authentication, and batch-level processing. Real-time results are stored in an AWS-hosted MySQL database, with R scripts and Microsoft Power Automate handling automated reporting. Dashboards in React.js and Microsoft Power BI provide real-time visualisation for the Quality Control, Merchandising, and Executive teams. The system led to increased quality consistency, reduced human error, and improved operational visibility. While the current dataset size limits the scope for generalisation across all apparel categories, LOOMQA demonstrates strong potential for adaptation to other textile and manufacturing sectors, offering a significant upgrade over traditional manual inspection methods.

Keywords: *YOLO, computer vision, deep learning, apparel manufacturing, quality assurance*

MATHEMATICS AND APPLIED STATISTICS

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ID 13

COMPARATIVE ASSESSMENT OF FEATURE SELECTION TECHNIQUES FOR SINGLE-CELL RNA SEQUENCING IN MULTI-CANCER DATA

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scRNA seq has the potential to provide high-resolution profiling of single cells, but due to its high dimensionality, it is important to identify the most important features for interpretation. This study evaluates five feature selection methods: Triku, Scanpy, Seurat, Variance Threshold, and Pearson Residual on a multi-cancer single-cell RNA seq dataset comprising 801 cells from breast, colon, kidney, lung, and prostate cancers. After standard pre-processing steps involving quality control, normalization and PCA based dimensionality reduction, the performance of each method was evaluated in terms of clustering by Normalized Mutual Information (NMI), Adjusted Rand Index (ARI) and Silhouette Score and in terms of Gene Ontology (GO) enrichment for biological relevance and the ribosomal gene fraction for technical performance. Triku consistently exceeded other methods, achieving the highest Silhouette Score (0.6501), robust NMI (0.9781), and ARI (0.9734), while identifying biologically meaningful genes with low ribosomal contamination (0.006). Although Pearson Residual and Variance Threshold provided adequate clustering results, in terms of accuracy, robustness, and biological relevance, Triku was still the best method. Seurat and Scanpy showed moderate performance across metrics. Additionally, we incorporated true class labels to assess cluster purity across folds; with Triku producing highly pure clusters (mean purity ≈98%) and only one fold showing partial class overlap (68%). These results highlight the importance of selecting appropriate feature selection strategies in scRNA-seq workflows and identify Triku as a robust and biologically meaningful approach for analysing heterogeneous cancer datasets. This work contributes to optimising single-cell RNA sequencing pipelines for precision oncology research. Future work will apply these methods to larger and more diverse datasets to validate and extend these findings.

***Keywords**: Clustering, dimensionality reduction, precision oncology, triku*

ID 17

A MODEL TO ASSESS COSTS AND BENEFITS OF OCCUPATIONAL HEALTH AND SAFETY MEASURES IN SRI LANKA

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Sri Lankan industries face challenges in maintaining effective occupational health and safety (OHS) due to outdated regulations, weak application, and limited resources. Many organisations treat OHS investments as compliance costs because they lack a systematic approach to evaluating the financial value of safety measures. The objective of the research is to develop a linear programming model that identifies the optimal allocation of limited resources across various OHS measures while minimising accidents and costs. The model contains nine key OHS measures, such as OHS training, personal protective equipment, safety inspections, workplace hazard control, emergency preparedness, regulatory compliance, health monitoring, ergonomic improvements, and preventive maintenance. And there are four categories of workplace incidents, such as minor injuries, medical treatment injuries, fatal accidents, and lost time injuries. Parameter values were derived from realistic assumed values based on Sri Lankan industry cost ranges and expert consultation. A cost-benefit framework was constructed, using investment costs, direct and indirect incident-related expenses, and practical operational constraints such as regulatory requirements and workforce availability. The analysis is done by the software application LP_Solve IDE version 5.5.2.11. The model was tested under different scenarios, including different standard cases, increased incident occurrence, unavoidable fatal accidents, reduced budget, and expanded budget scenarios. In a 400-employee manufacturing case, the model prioritised preventive maintenance (46.8% of budget), OHS training (15.2%), and emergency preparedness (11.7%). A 47.2% reduction in minor injuries, a 60% reduction in medical treatment injuries, 0% of fatal accidents, and an 81.8% reduction in lost time injuries are recorded. The multiple scenarios of the model show how it varies according to operational conditions and risk environments. Across all scenarios, the model gives both positive and negative outcomes. Sensitivity analyses show that optimal safety outcomes can be achieved with moderate budgets, and that increasing investment beyond this will not get additional benefits. When allocating, we can adjust accordingly to gain a benefit through OHS measures. This shows that a data-driven optimization-based approach to OHS resource allocation can transform safety management from a compliance-driven expense to a strategic investment, improving both worker well-being and organizational performance. The proposed model offers recommendations for future research, including dynamic modelling, real-world implementation studies, and integration of advanced analytics for continuous improvement.

Keywords: *OHS, cost-benefit, optimisation, industry*

ID 18

DETERMINANTS OF STOCK PRICES IN THE HOTEL AND TOURISM INDUSTRY: EVIDENCE FROM THE COLOMBO STOCK EXCHANGE

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Stock market performance affects the overall economy of the country and is considered a key indicator of investor confidence, financial stability, and economic growth. The hotel industry is connected to the stock market through the performance of publicly traded hotel companies. This study aims to empirically examine the determinants of stock prices in the hotel and tourism sector in Sri Lanka, using quarterly panel data from 2015 to 2024 for listed hotel companies on the Colombo Stock Exchange (CSE). The ten hotels were selected based on the market capitalisation of the hotel companies. Panel data analysis and the vector error correction model (VECM) were used to study the relationships between company-specific financial factors and macroeconomic variables affecting stock prices. The fixed effects model was identified as the best-fitted model, indicating that return on equity (ROE) and net asset value per share (NAVPS) have a significant positive impact on the stock prices of hotel companies. However, company revenue showed a significant negative relationship with stock prices. The most important finding was that stock prices had a strong positive relationship during the COVID period, due to investors shifting to the stock market as interest rates fell to historically low levels. Supporting this, interest rates showed a negative correlation with stock prices. Moreover, stock prices were relatively more sensitive to changes in tourism arrivals, with a positive relationship. The exchange rate revealed a positive, significant relationship with stock prices. As a result of this, Sri Lanka becomes a cheaper and more attractive destination for foreign tourists. Increased tourism demand leads to the profitability of companies. The findings of the vector error correction model indicate that there is a long-run equilibrium relationship running from the tourism variables to the hotel sector index. These insights not only provide practical insights into the factors influencing the stock price behaviour of the tourism sector but also support the view that the industry has strong potential for future growth and investment in the Sri Lankan economic landscape.

Keywords: *Stock prices, Colombo stock exchange, hotel and tourism industry, panel data analysis, vector error correction model*

ID 19

IMPACT ASSESSMENT OF RESEARCH OUTPUTS FUNDED BY THE NATIONAL RESEARCH COUNCIL OF SRI LANKA

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Research Impact Assessments (RIAs) play a pivotal role in ensuring that research investments are optimised to generate the greatest possible impact on society. RIAs help funders and research organisations in making informed funding decisions and resource allocations. Furthermore, RIAs can be used to communicate the value of research to various stakeholders, including the public, funding agencies, governments, and industry partners. This study assessed the impact of research outputs funded by the National Research Council (NRC) of Sri Lanka from 2014-2024 using both statistical and mathematical approaches. The primary objective was to analyse how NRC funding influenced research output production across different grant types, including Investigator-Driven (ID) grants, Target-Oriented (TO) Multidisciplinary Research Grants, and Public-Private Partnership (PPP) program. Data from 380 completed grants was analysed using quantitative approaches with systematic categorisation based on grant values, research fields, project duration, and resulting outputs. Descriptive analysis was conducted to understand trends and patterns of research outputs, while regression analysis quantified the statistical relationships between grant values and research outputs. Zero-Inflated Negative Binomial (ZINB) regression model was used to address over dispersion and excess zeros in count data. Medical Sciences, Engineering Technology, and Agriculture emerged as dominant fields, accounting for the majority of outputs and funding allocation. Conferences (58.1%) and SCI/SCIE publications (16.9%) constituted the most common outputs from ID grants, while TO and PPP grants emphasised practical applications, including products, patents, and policy changes. ZINB regression analysis demonstrated that each million LKR increase in funding yielded approximately 10.8% more SCI/SCIE publications and 13.8% more PhD completions, establishing strong positive relationships between funding and high-quality academic outputs. Conversely, the analysis revealed no statistically significant relationship between funding and patents ($p=0.288$), indicating that structural barriers beyond financial resources, such as lengthy approval processes, limited industry partnerships, and gaps in translating research discoveries into innovations, hinder patent production. The study found significant positive funding effects for conferences ($p=0.023$) and postgraduate degree completions (PhDs: $p=0.011$; M.Phils: $p=0.019$), demonstrating that higher funding leads to more impactful outputs, especially in academic and educational domains. The weighted mathematical model developed assigned patents the highest weight (0.25) due to their commercial potential, providing a framework for quantifying research impact across diverse output categories. These findings offered evidence-based insights that enable the NRC to strategically optimise funding allocation and maximise the value of public investment in research in Sri Lanka.

Keywords: *Impact assessment, NRC Sri Lanka, ZINB regression, research funding, research outputs*

ID 21

A PERFORMANCE-ORIENTED FIREFLY ALGORITHM FOR TRANSPORTATION PROBLEMS

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Transportation problems represent key optimisation challenges in logistics and supply chain management, where the objective is to minimise distribution costs while satisfying supply and demand constraints across various sources for destinations. Numerous strategies have been developed in the past to address the transportation problem, as the literature attests. First, a basic feasible solution is obtained using techniques such as the North West Corner Method, Least Cost Method, and Vogel´s Approximation Method, etc. Second, optimisation is carried out using algorithms like the Stepping Stone Method and the Modified Distribution Method. This study presents an improved method for transportation optimisation problems or near optimisation problems that makes use of a modified firefly algorithm. The Firefly Algorithm is an innovative form of swarm intelligence that effectively addresses complex combinatorial optimisation problems. It operates under several assumptions: fireflies are unisexual and mutually attractive, their attractiveness is directly proportional to their brightness, attractiveness decreases with increasing distance, and they move randomly when brightness is equal. This paper proposes a methodology that includes two significant modifications. A novel approach for selecting the lowest-cost cell by modifying the cost value based on average values. Then, the attractiveness value is calculated using a modified firefly algorithm, and the maximum possible amount is allocated to the cell that prioritises its attractiveness value. This approach demonstrates superior performance in generating optimal or near-optimal solutions for both balanced and unbalanced transportation problems. Benchmark tests show that our approach achieves greater accuracy and computational efficiency compared to existing traditional methods.

Keywords: *Firefly algorithm, transportation problem, basic feasible solution, optimal solution, balanced and unbalanced problems*

ID 22

DEGREE-BASED TOPOLOGICAL INDICES OF LEPROSY DRUGS

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Leprosy is commonly thought of as a medieval, chronic disease, also referred to as Hansen's disease, which is caused by the bacteria *Mycobacterium leprae* and each year, there are 200,000 cases recorded in more than 120 countries around the world. The illness affects the skin and nerves, causing irreparable damage to the hands, feet and eyes. The topological index is a numerical value that is derived from the molecular graph of the chemical compound. The different types of topological invariants are studied in theoretical chemistry, for instance, in the quantitative structure-property relationship (QSPR) and quantitative structure-activity relationship (QSAR) studies. Drug design/delivery is costly and time-consuming due to laboratory experiments. In mathematical chemistry, topological indices can be used to investigate drugs for diseases without experiments using molecular graphs. It represents the graph based on chemical structure, in which the atoms and bonds are treated as vertices and edges, respectively. In this study, all multi-bonds were treated as multi-edges, and all hydrogen atoms were included in a molecular graph. This enhanced method assists in reducing assumptions of traditional computing techniques using molecular graphs of compounds when computing topological invariants. It can be categorized into three main parts such as degree-based, distance-based, and spectral-based indices. The widely studied and most popular topological indices are the degree-based topological descriptors. The goal of this study is to compute degree-based topological indices for the selected drugs for the disease. The first, second, and third Zagreb indices, the forgotten index, the hyper Zagreb index, the atom-bond connectivity index, the product connectivity index, the sum connectivity index, the harmonic index, and the geometric-arithmetic index were calculated for selected leprosy treatment drugs: Clarithromycin, Clofazimine, Dapsone, Minocycline, Moxifloxacin, Ofloxacin, Rifampicin and Sparfloxacin. The physicochemical and biological properties of drugs can be analyzed with the computed values of topological invariants using QSPR/QSAR researches.

Keywords: *Topological indices, leprosy, molecular graphs*

ID 53

OPTIMISING INVENTORY MANAGEMENT THROUGH DEMAND FORECASTING: A CASE STUDY OF A SMARTPHONE COMPANY IN SRI LANKA

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Effective inventory management remains a critical challenge in fast-paced industries, where fluctuating demand and supply chain delays often lead to either overstock or stockouts. This study introduces a practical and data-driven approach for a major smartphone distributor in Sri Lanka to improve inventory management. The company has faced many challenges with inventory issues, including excess inventory of older models and regular stock outs specially during high demand times. These issues highlighted the lack of a reliable demand forecasting mechanism resulting in operational inefficiencies and financial losses. To address this gap, this study developed predictive models using historical daily sales data covering the period from September 2023 to February 2025. Totally 796 daily data points from three primary distribution channels, which are General Trade (GT), Modern Trade (MT), and Business-to-Business (B2B) were used for this. Then the dataset for modelling was developed using feature engineering techniques, including the lagged sales, calendar-based variables, and policy-related variables such as Sri Lanka's 2024 VAT adjustment. Two machine learning models, which are Decision Tree (DT) and Random Forest (RF), were selected for forecasting. These models were selected due to their good interpretability ability for specially short-term forecasting scenarios where historical data availability is limited. Exploratory data analysis highlighted clear temporal sales patterns, with strong influence from day-of-week and holiday variables. Also distinct demand behaviours were observed across the three distribution channels. First, Root Mean Square Error (RMSE) were used to evaluate model performances, and then validated statistically through the Diebold Mariano test. Findings showed that while DT models performed well in the more stable GT channel (RMSE = 15.5), RF models achieved higher accuracy in more complex channel environments like MT (RMSE=16.74) and B2B (RMSE=23.13) with statistically significant results. Finally, the study concludes that machine learning-based forecasting offers a viable path to smarter inventory planning, when tailored to channel-specific behaviours. The insights generated helped to reduce the risk of both overstock and stock outs and also enabled more agile and timely responses to changing market conditions. Overall, this research provides a valuable contribution to the practical application of predictive analytics in supply chain decision-making, especially for the consumer electronics sector.

Keywords: *Demand forecasting, inventory management, random forest, decision tree, smartphone sales*

ID 94

ENHANCING SALES FORECASTING FOR THE SWIMWEAR INDUSTRY: A HYBRID MODEL INTEGRATING STATISTICAL TECHNIQUES AND MACHINE LEARNING

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Accurate Sales Forecasting is crucial for strategic planning and operational efficiency in the highly seasonal and trend-sensitive swimwear industry. This study aims to enhance forecasting accuracy by developing and evaluating various predictive modelling techniques, encompassing traditional statistical techniques, machine learning algorithms, and deep learning architectures, and hybrid approaches integrating statistical methods with advanced sequence modelling. Historical monthly sales data for swimsuits and swim bottoms, spanning from 2017 to 2024, were used for model development and evaluation. The forecasting models explored encompassed traditional approaches such as Linear Regression and SARIMA, machine learning techniques including Random Forest, Gradient Boosting (XGBoost), Support Vector Regression, and K-Nearest Neighbours, deep learning methods such as the Multi-Layer Perceptron, and hybrid frameworks such as SARIMA and XGBoost enhanced with Traditional Feature Engineering. Forecasting performance was assessed using MAE, RMSE, and MAPE metrics. Machine learning models like XGBoost, MLP and Random Forest performed better than simpler models such as Linear Regression and K-Nearest Neighbours when dealing with complex sales data. XGBoost gave the most accurate forecasts, especially when feature engineering was used. Combining SARIMA with traditional feature engineering as a hybrid model improved results by handling both seasonality and complex patterns. Support Vector Regression and Multi-Layer Perceptron also worked well for categories with unpredictable demand. Forecasts were more accurate for swimsuits, which showed clear seasonal trends, compared to swim bottoms, which had more irregular and volatile patterns. To facilitate practical adoption, an interactive web application was developed using Streamlit, allowing users to select swimwear categories, forecast horizons, and forecasting models, and visualise forecast results dynamically. The application demonstrated the feasibility of translating complex hybrid models into accessible decision-support tools for business users. This research highlights the importance of methodological integration, acquisition of external features, and understanding the implications of uncertainty in developing an effective sales forecasting system for unpredictable retail contexts. The proposed hybrid forecasting framework adopts a scalable, precise, and interpretable approach to decision-making for the swimsuit sector and possibly the whole seasonal retail market.

Keywords: *Time series, sales forecasting, machine learning, deep learning, hybrid*

ID 95

ENHANCING MOTOR INSURANCE RISK MANAGEMENT: A CASE STUDY OF ABC COMPANY USING MACHINE LEARNING, NATURAL LANGUAGE PROCESSING AND SURVIVAL ANALYSIS

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In Sri Lanka, the motor insurance industry faces numerous challenges with respect to claim occurrence predictions, as well as categorisation of the reasons for claim intimations, and identification of variables impacting time to claim. All these variables impact not only the actual nature of risk management but also pricing for insurance and customer satisfaction. Insurers in Sri Lanka tend to take a more limited approach to risk assessment when compared to industry practice globally, as they tend not to consider driver characteristics but simply the type of vehicle to be insured and the policy type. The objective of this study was to improve knowledge about claim prediction, categorisation of loss, and timeliness, utilising a dataset of 347,764 motor insurance policies (2019 - 2023) acquired from a well-known insurance company, ABC Company. Data pre-processing included removing duplicates from the dataset, as well as investigating missing data and imputing. Feature engineering created new variables for customer demographics, and categorical variables were encoded. A total of seven machine learning models (XG Boost, Logistic Regression, Decision tree, KNN, Naïve Bayes, Random Forest and Cat Boost) were trained and XGBoost yielding the best performance (ROC-AUC 0.8608, precision 0.75, recall 0.64, F1 0.69, accuracy 0.78) which allowed categorization of risk into groups with low, medium, and high risk. Natural language processing was conducted in a hybrid approach; keyword matching using a combination of keyword matching and fuzzy matching with a zero-shot classification. The largest amount of claim intimations came from the category "hit with a third-party vehicle," consistent with the documents from 2019 to 2023. Cox Proportional Hazards model in survival analysis was used to analyse 68,400 records against several covariates, and found that being insured on private customer vehicles, with hybrid fuel types, and an increased amount of premium amount increased the risk of lodging a claim. This fact was counterbalanced by a newer vehicle reduced the risk of lodging a claim. Log-rank tests were performed, and they suggested that significant differences for claim timing relating to the covariates of agent, product, and premium level, with the opposite being true for three-wheelers and policies of low premiums, were showing increased probabilities of survival. In conclusion, this research has armed motor insurers and other firms with basic informational foundations for conducting motor vehicle insurance pricing in Sri Lanka.

Keywords: *Motor insurance, machine learning, natural language processing, survival analysis, risk management*

POLYMERS AND MATERIAL SCIENCES

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ID 24

INVESTIGATING THE INFLUENCE OF GRAPHITE SOURCE PROPERTIES ON THE PHYSICOCHEMICAL CHARACTERISTICS OF GRAPHENE OXIDE SYNTHESIZED VIA THE HUMMERS' METHOD

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The modified Hummers' method is widely utilized to synthesize graphene oxide (GO); however, the influence of graphite's microstructural properties, such as degree of oxidation, crystalinity, on the resulting GO properties remains inadequately understood as attempts to distinguish the effects of graphitization degree, crystallinity, and crystallite size have been made complicated due to the utilization of samples with varying particle sizes in previous studies. Moreover, limited comparative research has been done on the special potential of Sri Lankan vein graphite as a precursor for GO synthesis. This study investigates how the microstructural properties of different graphite precursors affect the characteristics of the resulting GO. Specifically, it evaluates the suitability of Sri Lankan vein graphite in comparison to other commercially available graphite. The graphite samples, Sri Lankan vein (from Kahatagaha and Bogala), Indian synthetic, Chinese flake, Australian flake, and Canadian flake, were ground and sieved to a uniform particle size range of 10–32 μm, and each was mixed with 98% H_2SO_4 at 10.0°C. Next, $KMnO_4$ was added slowly, and the temperature was gradually raised to 50.0°C. Treatment with ice, DI water, and 30% H_2O_2 was then performed. The resultant mixture was sonicated, centrifuged, and washed with 6.675% HCl and DI water to purify the GO. X-ray Diffraction (XRD), Fourier Transform Infrared (FTIR) spectroscopy, Raman spectroscopy, and sedimentation rate analysis were used to characterise the synthesised GO samples. XRD and FTIR analyses of GO displayed distinct peaks and oxygen-containing functional groups compared to their graphite precursors. GO derived from Chinese and Sri Lankan graphites exhibited higher I_D/I_G ratios, indicating greater defect presence and higher oxidation according to Raman analysis. However, I_D/I_G ratios of GO from Canadian, Indian, and Australian graphites were comparatively lower, showing lower oxidation. Chinese GO displayed the strongest carboxyl group peaks. Sedimentation rate was faster for GO prepared from Indian and Canadian graphites, indicating poor dispersibility in water. Higher graphitisation degree corresponded to greater GO oxidation as observed through higher I_D/I_G ratios and FTIR peaks. Smaller graphite crystallites synthesised GO with more carboxyl groups. These results demonstrate that graphite source properties have a significant impact on GO quality. Sri Lankan vein graphites displayed favourable characteristics for GO synthesis due to high graphitisation degree, purity, and crystallinity, which reduces the need for processing during manufacturing, emphasising it as a favourable precursor for commercial, dispersible, and high-performance GO-based materials.

Keywords: *Graphene oxide, hummers' method, sri lankan vein graphite, XRD*

ID 93

ECO-FRIENDLY ANTICORROSION COATING FOR IRON: SYNERGISTIC PROTECTION VIA GRAPHENE OXIDE, PARSLEY EXTRACT, AND ZINC IN ACIDIC MEDIA

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The pursuit of high-performance, environmentally friendly anticorrosion coatings have driven advancements in the design and development of multifunctional protective systems for metallic substrates. In this contribution, a novel graphene oxide (GO), parsley extract (PaE) and zinc ion (Zn) modified epoxy coating system composite was designed, formulated, and thoroughly evaluated for corrosion inhibition performance on iron substrate. Stepwise modification was confirmed by FTIR, XRD, Raman spectroscopy, and TGA, confirming enhanced thermal stability as well as successful modification of each modifier. Scanning electron microscopy (SEM) revealed that the GO-PaE-Zn epoxy coating formed a uniform, compact, and defect-free surface morphology, effectively minimizing corrosion-induced surface degradation compared to uncoated and conventionally coated substrates. Weight loss tests in acidic media confirmed the superior performance of the GO-PaE-Zn coating compared to neat epoxy and GO-epoxy coating, with enhanced corrosion resistance and stability. Enhanced protection could be attributed to the synergistic effect of the impervious barrier of GO, organic inhibition by phytochemicals from parsley, and the sacrificial nature of zinc ions, along with filling in defects. A comparative evaluation in aggressive H_2SO_4 media confirmed the robust performance of the coating, with inhibition efficiencies exceeding 90% in acidic media. In general, these findings confirm the potential for a green anticorrosion approach by the GOPaE-Zn epoxy system to protect iron and steel. Future investigations will explore self-healing performance through coating and long-term service life in natural environments, along with the incorporation of additional green inhibitors and metal ions to further promote its multi-functionality.

***Keywords**: Green anticorrosion, graphene oxide, corrosion inhibition, epoxy coating*

THEORETICAL AND APPLIED PHYSICS

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ID 20

COMPARATIVE ANALYSIS OF V-I VERSUS B-V COLOUR-MAGNITUDE DIAGRAMS OF GLOBULAR CLUSTER NGC 1866

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Colour Magnitude Diagram (CMD) is a fundamental diagnostic tool in stellar astrophysics, enabling detailed exploration of the evolutionary structure, age, and composition of star populations. This study aims to investigate the effectiveness of the two most used colour indices, V-I and B-V, in CMD construction, for the young, massive globular cluster NGC 1866. CMDs, constructed using high-resolution Hubble Space Telescope (HST) photometry in the F555w(V), F814w(I), and F438w(B) bands. Point Spread Function (PSF) photometry was employed to accurately identify stars in the crowded cluster environment. For each filter, a list of stars was created, which included coordinates of the stars in pixels, magnitude through each filter and the magnitude error. This step was followed by catalogue cross-matching and colour indices calculation to create precise stellar catalogues to plot CMDs. The V-I and B-V filter combinations were chosen due to their wide use in previous studies and their differing sensitivities to various regions of the electromagnetic spectrum, allowing them to highlight different stellar populations. CMDs were constructed using these colour indices, which were directly compared to their effectiveness in revealing the evolutionary features of the cluster. The V-I CMD demonstrates higher separation of key evolutionary sequences, in particular the red clump and red giant branch, compared to the B-V CMD, which makes the main sequence and turn-off more noticeable. In V-I CMD, the red clump appears as a distinct, well-populated feature, and the structure of the red giant branch is clearly visible, facilitating identification of helium-burning phases and clear population splits. In contrast, the B-V CMD has a red giant branch and the red clump in a narrower colour range, making it more challenging to identify evolutionary phases, while it is effective at highlighting the main sequence and the turn-off region. This exhibits the importance of filter selection in CMD construction. The enhanced clarity of the V-I CMD makes it the preferred choice for detailed population studies and for constraining age and internal structure in young, metal-poor clusters like NGC 1866.

Keywords: *Colour magnitude diagrams, hubble space telescope, point spread function, stellar evolution, stellar populations*

ID 75

DEVELOPMENT OF AN AUTOMATED REAL-TIME TEMPERATURE PROFILING SYSTEM FOR DRYERS IN THE APPAREL INDUSTRY

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In textile applications, it is essential to maintain consistent thermal profiles for quality control in the industrial curing processes. This study explains the development of a real-time monitoring and profiling system by using ESP32 microcontrollers, MAX6675 digital converters, and K-type thermocouples. The system is used to capture temperature data from pre-decided points within the dryer chamber to ensure optimal curing. The circuit consists of an ESP32 board connected to MAX6675 modules that interface with K thermocouples placed along the dryer chamber (2 ft,4 ft,6 ft,8 ft, and 10 ft) positions. Data is transmitted to a desktop application built using Python and the PySerial library through serial communication, which displays a real-time temperature profile that is updated every 30 Seconds. Temperature data were collected under two conditions. Paired datasets were recorded before the dryer reached the saturation phase (pre-saturation) and after it became saturated (post-saturation). These datasets were employed to identify the relationship and interchangeability between manual readings and sensor readings. Additionally, to identify the accuracy and reliability of the sensor readings, a separate set of sensor-only data was collected at five different positions (2 ft,4 ft,6 ft,8 ft, and 10 ft) after the dryer had reached saturation. To analyse the temperature data, the sensor readings were compared with the manual readings. In the pre-saturation phase, a linear relationship was observed (Manual = 4.97 +0.85* Sensor). However, the post-saturation phase showed no relationship between the two methods. The Bland-Altman analysis also indicated that the two methods were not interchangeable. In post-saturation, the manual readings continued to change due to probe placement errors, calibration drift, vertical heat gradient, or poor heat contact in the manual method. In contrast, the sensor readings after a gradual increase in shape stabilize and maintain their position. Sensor-based readings exhibited better precision, maintaining a standard deviation below. $\pm$ 5 ^{o}C, which aligned with the industrial tolerance level, as a result, we can obtain more accurate temperature readings throughout the dryer chamber. Communication between the ESP32 and PC was created through the serial port. This system demonstrates a robust, low-cost, and scalable solution for a temperature monitoring system using Python and Arduino with data visualisation tools in the dryers, which are used for curing in the apparel industry. A sensor-based system ensures accurate, reliable industrial temperature profiling.

Keywords: *ESP32, MAX6675, K-thermocouples, arduino, pyserial library*

ID 78

MULTIBAND PHOTOMETRIC ANALYSIS OF NGC 4147 GLOBULAR CLUSTER WITH HST DATA TO DETERMINE THE AGE OF THE CLUSTER

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Globular clusters (GCs) are among the oldest stellar associations in a galaxy. Determining their ages and other physical parameters is essential for understanding the evolution of simple stellar populations and establishing a lower bound for the age of the universe without relying on cosmological models. NGC 4147 is a metal-poor globular cluster located in the galactic halo and is considered one of the oldest known clusters in the Milky Way. In this study, archival photometric data of NGC 4147 were analysed to estimate its age, metallicity, and distance modulus using a multiband approach. Three colour-magnitude diagrams (CMDs) were constructed using five Hubble Space Telescope passbands: F336W, F439W, F555W, F606W, and F814W. Point Spread Function (PSF) photometry was done using the IRAF software package. A Bayesian isochrone fitting method, A Markov Chain Monte Carlo (MCMC) sampling was used to simultaneously estimate all cluster parameters, utilizing a grid of isochrones from the Dartmouth Stellar Evolution Program (DSEP). The F606W–F814W CMD gave the most reliable results, with an estimated age of 11.35 ± 0.19 Gyr, a distance modulus of 16.99 ± 0.01, and metallicity [Fe/H] = –2.12 ± 0.05. The analysis assumes uniform stellar reddening across the stellar field and NGC 4147 to be a simple stellar population. Despite these simplifications, the results closely match previous studies, demonstrating the effectiveness of this method.

Keywords: *MCMC, PSF photometry, colour-magnitude diagram, isochrones, hubble space telescope*

ID 100

TEMPORAL ANALYSIS OF TEMPERATURE IN THE SINHARAJA RAINFOREST USING MODIS SATELLITE DATA

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The Sinharaja Forest Reserve, a UNESCO World Heritage site and the last major tropical rainforest in Sri Lanka, faces increasing threats from climate change and anthropogenic activities. This study aims to analyze long-term trends of temperature and forest cover variation in the Sinharaja rainforest using satellite-derived Land Surface Temperature (LST) data. Forestry and climate change are closely related, and climate change is currently a global issue, receiving extensive attention. Traditional temperature modelling methods based on ground stations are limited in both spatial and temporal coverage, making it challenging to monitor temperature patterns accurately. LST records from NASA's MODIS Terra satellite (MOD11A1.061 product) were used to create a 21-year monthly time series from 2000 to 2021. The core zone of Sinharaja was considered the study area, and missing values were addressed using linear and nearest-neighbor interpolation. MODIS LST data were also validated against Ground Temperature data from the Department of Meteorology using Pearson and Spearman correlations, and the suitability of MODIS LST for temperature estimation in data-scarce regions was confirmed. To assess long-term temperature patterns, the Mann-Kendall trend test and time series decomposition analysis were applied. While the Mann-Kendall test did not show a statistically significant trend, a gradual warming trend with a positive linear gradient of 4.2×10^{-4} °C was revealed by the time series decomposition analysis. A strong seasonal cycle was also evident throughout the study period. These results suggest underlying climate changes that are difficult to track with traditional statistical methods alone. A decline in forest density in parts of Sinharaja over the last twenty years was observed through visual inspection of time-series satellite imagery. The study indicates the importance of using satellite data for monitoring climate and land cover changes and supports the need for continued remote sensing to guide conservation efforts.

***Keywords**: Climate change, land surface temperature (LST), remote sensing, Sinharaja rainforest, time series analysis*

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- Greta Thunberg -