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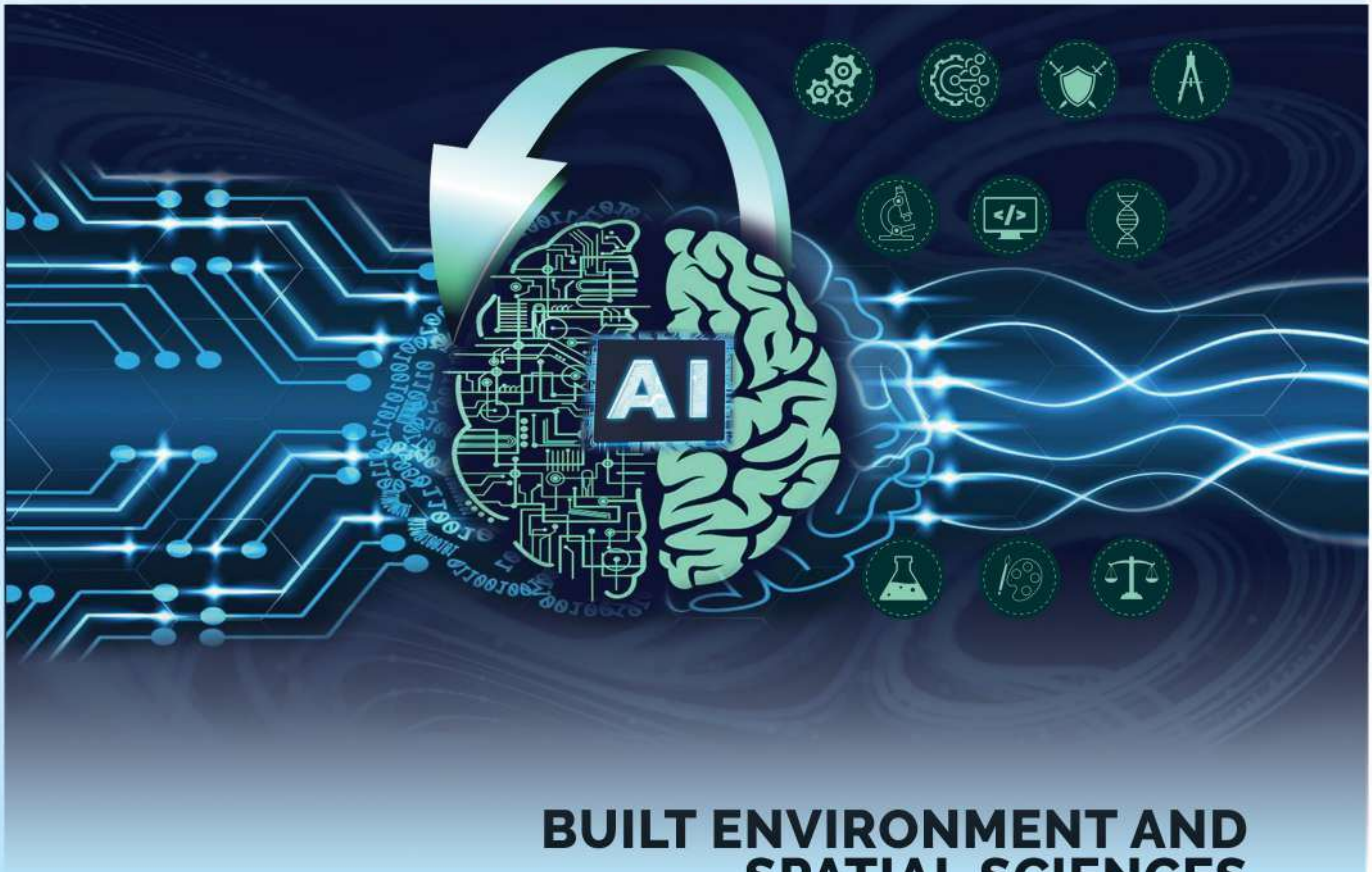
17th INTERNATIONAL RESEARCH CONFERENCE

Unravelling the Paradigm Shift: Revolutions in the Era of AI

26TH - 27TH SEPTEMBER 2024



BUILT ENVIRONMENT AND SPATIAL SCIENCES

ABSTRACTS

General Sir John Kotelawala Defence University

17th INTERNATIONAL RESEARCH CONFERENCE

UNRAVELLING THE PARADIGM SHIFT: REVOLUTIONS IN THE ERA OF AI

BUILT ENVIRONMENT AND SPATIAL SCIENCES

ABSTRACTS

General Sir John Kotelawala Defence University
Ratmalana, Sri Lanka.

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This book contains the abstracts of papers presented at the **Built Environment and Spatial Sciences** Sessions of the 17th International Research Conference of General Sir John Kotelawala Defence University, Ratmalana, Sri Lanka held on the September 26–27, 2024.

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Message from the Chief Guest

I am truly honoured to welcome all the distinguished participants to the 17th International Research Conference (IRC) at General Sir John Kotelawala Defence University (KDU). This annually organized conference serves as a unique milestone showcasing the rich research culture deeply embedded within KDU. As a prestigious seat of learning, novelty and innovation remain at the heart of KDU's mission. Therefore, 'Unravelling the Paradigm Shift: Revolutions in the Era of AI' has been chosen as the key theme of IRC 2024.

Moving ahead with the momentum of modern-day research, we are set to uncover the extensive impacts of artificial intelligence, not just in defence but across every facet of national interest. Currently, AI has become a driving force, reforming our defence strategies, transforming healthcare, and restructuring our educational frameworks and infrastructure.

Investing in research is essential for national advancement, promoting innovation, formulating policies, and offering solutions that address our most pressing challenges. Hence, the IRC serves as a vital platform that fosters such great endeavours, contributing significantly to national development. Our responsibility as defenders of national security is profound, extending beyond traditional roles to include the ethical integration of advanced technologies that ensure our nation's safety and prosperity.

KDU stands as a symbol of a rich and diverse research culture across many disciplines. It is also a hub for high-quality research, upholding international standards of academic excellence. This conference represents a critical meeting of minds where leading experts converge to define strategies for our future. Each discussion and presentation at this event is a step toward securing a thriving, prosperous future for our region.

I extend my best wishes to all for a successful and productive conference, eagerly anticipating the innovative ideas and transformative insights that will undoubtedly arise.

GENERAL SHS KOTTEGODA (Retd) WWV RWP RSP VSV USP ndc
Chancellor General Sir John Kotelawala Defence University

Message from the Keynote Speaker

Brain health is a holistic concept encompassing cognitive, sensory, social-emotional, behavioural, and motor functions, enabling individuals to achieve their full potential. With one in three people globally affected by a brain disorder, the urgency for preventive brain health initiatives is evident. Since the inception of World Brain Day in 2014, there has been a renewed global focus on this critical area. The World Federation of Neurology (WFN), in collaboration with key organizations such as the American Academy of Neurology (AAN), the European Academy of Neurology (EAN), and the Asian Regional Consortium of Headaches (ARCH), has led the charge to raise awareness and promote brain health worldwide.

This keynote address will outline the journey of World Brain Day and its impact on the global brain health movement, with a specific focus on prevention. It will explore the evolution of brain health concepts and the alarming prevalence of brain disorders, emphasizing the need for urgent, coordinated action. Central to this effort is the role of artificial intelligence (AI) in enhancing preventive brain health strategies. AI-driven technologies are increasingly being used to predict, diagnose, and monitor brain health conditions, enabling earlier interventions and more personalized approaches to prevention.

The address will highlight the author's pioneering work in community-based programs, public health campaigns, and international collaborations. It will underscore the critical role of prevention, early intervention, and AI-powered tools in improving quality of life and reducing the global burden of brain disorders. The ultimate goal is to advance comprehensive brain health initiatives that leverage cutting-edge technologies to ensure a healthier future for all.

Professor Tissa Wijeratne
DR OAM MD PhD FRACP FRCP(London) FRCP (Edin) FAAN (USA) FEAN (EAN) Professor and Chair, Director, Senior Neurologist, Department of Neurology, Western Health, Victoria, Australia Co-Founder and Co-Chair, World Brain Day, World Federation of Neurology

Message from the Vice-Chancellor

Greetings to all participants, speakers, and guests of the 17th International Research Conference (IRC) at KDU. This year's IRC is centered around a timely theme that has sparked diverse dialogues in the realms of research and innovation. The theme, 'Unravelling the Paradigm Shift: Revolutions in the Era of AI', serves as an eye-opener for both eminent and novice researchers across the globe. It also highlights the critical role that advanced technologies play in shaping our world.

At KDU, we take pride in being at the forefront of defence education in Asia, a distinction affirmed by our high rankings and our pivotal role in shaping global security dialogues. KDU claims to have a unique history of providing high-quality education for both military and civilian students. It also proudly stands as a thriving hub for cutting-edge research that addresses pressing global and national issues. We strongly believe in fostering a rich and diverse research culture among KDU's students and staff, aligned with international standards. Therefore, IRC is recognszed as a key event in KDU's annual calendar, emphasizing its significance in the institution's academic and research endeavours.

This year, we aim to explore the revolutionary impacts of AI across diverse disciplines, reaffirming our commitment to leading these discussions on a global scale. The insights shared here will undoubtedly spark new research initiatives and strategic collaborations, enhancing Sri Lanka's stature as a leader in both academic and strategic domains.

I extend my sincere gratitude to all those whose collective efforts have brought this conference to a reality. Your contributions ensure that KDU plays a prominent role in the international arena, driving discussions that will shape the future of technology and strategy. I look forward to a successful event, characterized by insightful discussions and pioneering ideas.

REAR ADMIRAL HGU DAMMIKA KUMARA, VSV, USP, psc, MMaritimePol, BSc (DS)
Vice Chancellor General Sir John Kotelawala Defence University

Message from the Chairperson

It is my honour, as the Chairperson, to welcome you all to the 17th International Research Conference at KDU. This year, we explore how artificial intelligence has evolved from a technological innovation into a catalyst for transformative change across numerous sectors. With an impressive selection of 441 research papers, drawn from nearly 1000 submissions, our conference spans across 11 distinct tracks covering a wide range of disciplines. Our theme, “Unravelling the Paradigm Shift: Revolutions in the Era of AI," highlights the profound and far-reaching transformations that AI is driving—from reshaping urban infrastructure to revolutionizing healthcare. The conference is designed to promote interdisciplinary dialogue, addressing not only technological advancements but also the ethical, social, and economic implications of these developments. One of our key objectives is to create a platform where researchers, professionals, and thought leaders can come together, exchange ideas, and foster collaborative initiatives that will push the boundaries of innovation. I am deeply grateful to all our keynote speaker and the plenary speakers, other presenters, , participants, and the entire organizing team for their tireless efforts and contributions. Your dedication to advancing knowledge is what brings this conference to life, positioning it as a critical forum in global research. Together, we are charting a path toward a future where technology and society grow hand in hand, reshaping the landscape of not just research but our daily lives. Let’s engage in meaningful discussions that will inspire new perspectives and drive impactful solutions. Here’s to a successful conference, rich in insight and collaboration. Finally, I would like to extend my best wishes to all the presenters, authors, and participants joining the KDU IRC 2024, whether on-site or online. I hope each of you finds this conference not only informative and enjoyable but also an encouraging opportunity to experience the warm hospitality of KDU throughout these two fruitful days.

Dr. Nirosha Wedasinghe
Ph.D(KDU-SL), MIT(CStud-Aus),B.Sc in Comp IS (London Met -UK), SMIEEE(US), MBSC(UK), MCS(SL), FISDS(Japan) Senior Lecturer cum Director -Centre for Gender Equity and Equality General Sir John Kotelawala Defence University Conference Chair-IRC 2024

Message from the Secretary

As we gather for the 17th International Research Conference at KDU, I extend a warm and heartfelt welcome to all participants, researchers, and thought leaders. This year, we proudly present 441 research papers selected from nearly 1,000 submissions, spanning across 11 tracks in diverse fields such as Defence and Strategic Studies, Medicine, Health Sciences, Engineering, Technology and Computing, Basic sciences, Law, Social Sciences and Humanities, and the Built Environment and Spatial Sciences. Our theme, "Unravelling the Paradigm Shift: Revolutions in the Era of AI," reflects the profound ways that AI is transforming our world, becoming integral to our lives and work. The discussions here aim to explore how AI can address global challenges, drive innovation, and foster interdisciplinary collaborations that will shape the future. Looking ahead, the future of IRC lies in broadening its horizons. We aim to increase international participation, diversify the scope of research, and establish global research consortia to tackle real-world problems that extend beyond the borders of Sri Lanka. The insights gained here must lead to actionable outcomes, particularly in formulating policy recommendations in areas such as AI in defence, public health, and education. This conference is more than just a forum for discussion; it is a platform where the brightest minds collaborate to drive change. I extend my heartfelt thanks to all our speakers and participants for their dedication and contributions. Together, we are not only shaping the future of research but also crafting solutions that will impact society on a global scale. Here's to a successful and inspiring conference that drives innovation, shapes policy, and sparks meaningful collaboration.

Dr. HM Prasanna Herath
Ph.D. (USJ), RN(SLNC), B.Sc(Nursing) Hons (UPSL), CTHE Senior Lecturer Faculty of Allied Health Sciences Erasmus coordinator General Sir John Kotelawala Defence University Conference Secretary- IRC 2024

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ORAL PRESENTATIONS

ID 04

Investigating the Challenges of Software Adoption Among Quantity Surveyors in Sri Lanka

NVOD Imarshana[1#] and WN Kawmudi[1]

[1]Department of Quantity Surveying, Faculty of Built Environment and Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[#]37-qs-0028@kdu.ac.lk

In comparison to other countries, software adoption for quantity surveying tasks in Sri Lanka has been relatively slow. Considering the quantity surveying practices in Sri Lanka, several primitive software packages are used by the quantity surveyors in Sri Lanka for their work. This study's objectives were to identify the software applications and tools commonly used by quantity surveyors worldwide, assess the current state of software application usage in Sri Lankan quantity surveying practices for major tasks, investigate barriers to software adoption, and make recommendations for empowering IT adoption among Quantity Surveying professionals. The study applied a mixed research strategy based on a pragmatic research philosophy. The target population consisted of quantity surveying professionals working in both contracting and consulting firms. The sample was selected applying a sampling technique that included simple random sampling for questionnaires and purposive sampling for interviews. Content analysis and frequency index analysis were used in data analysis since they provide reliable results. The study found that the most often used software applications among respondents were Excel, AutoCAD, Cubicost, MS Project, and Microsoft Access as popular software for a variety of uses such as designing, tendering, bidding, planning, quantity take-off, and database management. This study offers insight into the barriers to IT adoption among Sri Lankan quantity surveyors and offers recommendations for enhancing IT adoption within the quantity surveying profession in Sri Lanka by focusing on software applications. Based on the findings, this paper suggests promoting software use for tendering/ bidding and implementing digital document management systems for the Sri Lankan construction industry as future research directions.

Keywords: *Information Technology (IT), quantity surveying, software application, Sri Lanka*

ID 127

The Impact of Time, Cost, Quality Parameters on Value Engineering Application in Project Management Practices, Referencing to Post-contract Stage

DVH Dodangoda[1#] and WN Kawmudi[1]

[1]Department of Quantity Surveying, Faculty of Built Environment and Spatial Sciences (FBESS), General Sir John Kotelawela Defence University, Southern Campus, Sri Lanka

[#]37-qs-0002@kdu.ac.lk

The three basic objectives of a project are time, quality, and budget. Poor construction quality, delays in the completion of projects, and cost overruns continue to afflict Sri Lanka's construction industry. Poor management and cooperation both before and after the contract have a significant impact on these issues. Value engineering is one method that is used in many countries to lessen project management issues. The main objective of the research is to measure the impact of time, cost and quality on value engineering approaches in project management in the post-contract stage. The research study was enhanced by the exceptional representation of industry professionals, comprising 92.3% of the reply rate. The industry specialists made a variety of suggestions based on their experience with value engineering during the post-contract stage of a project. Methods of statistical analysis were used to review the collected data. The findings indicated that using the VE approach, the quality factor had an overall influence of 37.5%, the cost component had an impact of 3.9%, and the time factor had an impact of 39% on the range of effective project management techniques. The factors of time, cost, and quality in high-rise building projects at the post-contract stage were the primary focus of this study. Further research could be done to explore how the value engineering concept affects the project management methods applied in infrastructure projects in Sri Lanka.

Keywords: *project management, time, cost, quality, value engineering*

ID 155

Ensuring the Quality of AI Integrated Smart Contracts in Sri Lankan Construction Industry

DMNA Gunawardhana[1#], SH Rodrigo[2], SD Jayasooriya[3], and DB Karunarathna[3]

[1]Corps of Engineer Services, Sri Lanka Army, Sri Lanka
[2]Corps of Sri Lanka Engineers, Sri Lanka Army Sri Lanka
[3]Faculty of Built Environment and Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[#]gunawardhana.1st@gmail.com

Artificial Intelligence (AI) integrated Smart Contracts have been evolving within the construction industry globally and have already attracted the focus of the Sri Lankan construction industry. With the long-term adaptability to the traditional system, construction professionals have a dedicative responsibility to achieve the expected quality outcomes with modern orientations. This study attempted to evaluate the challenges faced in ensuring the effectiveness and quality of AI-integrated smart contracts in the Sri Lankan construction industry; focusing on key areas: knowledge and adaptability, cost and investment, legal framework, technical and infrastructure facilities, and quality assurance and control. It also provides recommendations to overcome the most severe challenges. The primary data collection was done through a questionnaire survey distributed among the professionals experienced in Project Management in Sri Lankan construction projects both in the government and private sector and a quantitative analysis was done based on the Relative Important Index technique. The analysis identified the most severe challenges as lack of knowledge and experience, reluctance to move forward and difficulty in assessing physical factors. Quality assurance and control was identified as the most challenging aspects. Improving the knowledge of smart contracts by enhancing expertise on their implementation and maintenance, government interference in promoting, standardization of adjoining sectors and implementation of moderate quality management techniques and practices will minimize the impact of the challenges and enable more effective performance under smart contracts handling by improving the quality and efficiency of construction industry in Sri Lanka.

Keywords: *quality, AI-integrated smart contracts, Sri Lankan construction industry.*

ID 188

Boosting Sri Lanka's Tea Exports: Applying Lean Six Sigma for Enhanced Quality

MNS Rajapakshe[1#]

[1]Institute of Chemistry Ceylon, Sri Lanka

[#]nishadirajapakshe@gmail.com

The current economic crisis has intensified the demand for foreign exchange. Given its established presence, the tea industry holds the potential to boost foreign exchange earnings. This paper presents a case study on implementing Lean Six Sigma techniques to enhance tea quality for high-end international markets, aiming to increase direct exports from 5% to 30%. The project succeeded, surpassing the target, with exports reaching 37.2% and revenue increasing by Rs. 148.4 million. A Pareto analysis identified unacceptable liquor quality as the primary defect affecting market acceptance. A cause-and-effect diagram pinpointed the causes of low-quality liquor. A strong positive correlation (r = 0.813) was found between the percentage of fermented leaves and sample rejection. Issues such as leaf fermentation and damage, burnt tea, high crude fiber, withering problems, and colour discrepancies were recorded as the causes of tea sample rejection. After the introduction of the new measures, the Process Capability Index (Cpk) increased from 0.02 to 1.37. Implemented solutions included using plastic crates and lorries for leaf collection, introducing crate caps, installing a temperature-recording system, setting night alarms every two hours, assigning nightly camera checks, implementing a mister system, and reducing unnecessary handling during shifting.

Keywords: *Lean Six Sigma, tea quality improvement, increasing process capability, tea direct exports*

ID 198

Factors Contributing to Delays in Building Permit Issuance in the Colombo Municipal Council Area: An Administrative Perspective

WMRT Wijesuriya[1#], NB Sugathadasa[2], and WANM Weerasinghe[3]

[1]Department of Industrial Services and Quality Management, Faculty of Built Environment and Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[2]Department of Estate Management and Valuation, Faculty of Management Studies and Commerce, University of Sri Jayewardenepura, Sri Lanka

[3]Department of Quantity Surveying, Faculty of Built Environment and Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[#]wmrtwijesuriya@kdu.ac.lk

Delays in the Sri Lankan construction sector, particularly within the Colombo Municipal Council (CMC) area, have been a persistent issue with significant adverse impacts. This study explored the factors contributing to delays in obtaining building permits within this region, building on existing literature that emphasizes the construction sector's critical role in economic development and societal well-being. Empirical data were gathered through focus group interviews and secondary data from 2018 onwards. The findings reveal substantial challenges in the building application process, primarily due to client errors and administrative constraints. Notably, between 2018 and 2023, a majority of applications exceeded the standard 14-day processing period, with 65% experiencing delays in 2023 alone. Client-related issues include a lack of awareness of building regulations and inadequate comprehension of required documents. Administrative obstacles consist of outdated inspection equipment, technological limitations in CAD submissions, and irregularities in planning committee operations. To address these issues, the study proposes several recommendations, such as public awareness campaigns, technological upgrades for online submissions, modernization of inspection equipment, continuous staff training, and optimized committee scheduling. These measures aim to mitigate delays, enhance regulatory compliance, and foster a more responsive administrative framework for effective building permit management in the CMC area.

Keywords: *constructions, Colombo Municipal Council, building permit, delay*

ID 257

Assessment of the Accuracy and Precision of Deviations in Control Points through the Three-Point Resection Method

PSHP Kumara[1#], DS Munasinghe[1], and R Jenan[1]

[1]Department of Surveying and Geodesy, Faculty of Geomatics, Sabaragamuwa University, Sri Lanka.

[#]pshp_kumara@std.geo.sab.ac.lk

Land surveying techniques have been changing rapidly from conventional methods over the past two decades. The resection method in surveying applications has made the processes more cost-effective and time-efficient. The three-point resection method (TPRM) is a widely used technique in surveying that enables the determination of the coordinates of a resected point with higher precision and accuracy which the coordinates may not be known. To improve the accuracy of the resection method further, this study examined and proposes a three-point resection method (TPRM) through a triangle model, which is combined with three known control points. This model identifies any impacts on the accuracy and precision of positions for resected points, irrespective of the points residing inside or outside the triangle. The primary objective of this study was to determine whether the control points can be established with higher accuracy and precision using the three-point resection method. Furthermore, the study aimed to determine the optimal positions extracted from a MATLAB function. The approximate values of the resected coordinates were initially estimated using the Kaestner-Burkhardt method (KBM). Least squares estimation was then applied to obtain the best-estimated coordinates of the resected point. The tertiary control coordinates and least square-adjusted coordinates were used to analyse the accuracy of the resected coordinates. The results show that the relationship between the precision of resected point coordinates, residing inside the triangle indicates higher precision than the points residing outside.

Keywords: *TPRM, Kaestner-Burkhardt method, Error Ellipse Method*

ID 258

Preparedness of Construction Stakeholders for the Adoption of E-tendering in the Sri Lankan Building Construction Industry for the Public Sector

MPY Silva[1#], AARK Amarathunga[1], and AH Lakmal[1]

[1]Department of Quantity Surveying, Faculty of Built Environment and Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[#]36-qs-0040@kdu.ac.lk

Tendering is a process undertaken to obtain offers from interested contractors to carry out specific packages of construction work. Presently, most construction stakeholders in developing countries use a paper-based tendering method, which is time-consuming, costly and labour-intensive. To address the increasing calls for efficiency improvements and sustainability in the construction industry, the adoption of e-tendering presents several benefits, including electronic exchange of information and avoidance of errors associated with traditional tendering. This study aimed to investigate the readiness of Sri Lankan construction contractors and consultants, the key parties involved in the tendering process, to embrace e-tendering while considering the aspects of sustainability and digitalization. A mixed-method approach was employed, starting with a literature review to compare conventional and e-tendering processes. Subsequently, a questionnaire survey was conducted to identify the current level of usage of e-tendering and to investigate the preparedness levels of consultants and contractors to implement e-tendering. Expert interviews were conducted to identify strategies for successful adoption. The findings reveal that while electronic tools are used in the tendering process, there is insufficient readiness for complete e-tendering implementation. The study suggests that the government sector should lead the initiative to enhance e-tendering adoption, thereby promoting greater efficiency and sustainability in the industry.

Keywords: *E-tendering, readiness, barriers*

ID 282

The Impact of the Built Environment on Psychological Well-being of Battle Casualties in Sri Lankan Rehabilitation Centres

BAKU Bangama[1#] and KDHJ Premarathna[1]

[1]Department of Architecture, Faculty of Built Environment and Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[#]kithunikabangama1206@gmail.com

Architecture is a silent maestro that orchestrates human experience, intertwining aesthetics, emotions, and psychological well-being. Resilient warriors returning from the Eelam War carry not only physical wounds but also enduring psychological scars. This study focused on Sri Lankan rehabilitation centres, exploring the profound connection between the built environment and the psychological well-being of Eelam War battle casualties. Further, it focused on a rehabilitation center in Sri Lanka dedicated to addressing the specialized healthcare needs of war veterans with psychological impairments. It scrutinized the existing centre, probing whether its architectural features address the specific psychological needs of veterans, including preferred environments, safety, routines, nature, and social connections crucial for healing. This study acknowledges the ability of architecture to communicate with individuals on physical, emotional, and intellectual levels, fostering a sense of connection and belonging. The study challenges architects and designers to comprehend spatial intricacies for overcoming trauma, considering the dual journey of a disabled soldier's recovery—both physical and psychological. The study aimed to identify spatial requirements through literature reviews and case studies, offering valuable insights for future military rehabilitation centre designers. The rehabilitation centre's architecture, planning, and spatial sciences were observed as part of the case study process, which carefully analyzed Sri Lanka's post-civil war conditions. The data were analyzed qualitatively through thematic analysis. This study contributes to the evolution of architectural settings by restoring a psychological state of equilibrium and connection with the built environment.

Keywords: *built-environment, spatial requirements, psychological well-being, rehabilitation centre, war veterans*

ID 363

Investigating the Accuracy of Object Detection in UAV Model Utilizing Neural Networks for Military Applications in Sri Lanka

HAGVD Perera[1#], KA Dinusha[1], KP Manuranga[1], and RKK Dilrukshi[1]

[1]Department of Spatial Sciences, Faculty of Built Environment and Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[#]38-sursc-6262@kdu.ac.lk

In the modern military setting, fast improvements in drone technology have transformed warfare strategies, providing key advantages in reconnaissance, surveillance, and special operations. Sri Lanka's diversified and difficult geography have presented unique security concerns that demand advanced defensive technology. With key objective of developing an object detection method utilizing neural networks, this study examined the integration of Unmanned Aerial Vehicles (UAVs) equipped with advanced object detecting techniques into Sri Lanka's military structure. Here, object detection in UAV imaging have utilized YOLOv8 (You Only Look Once Version 8), a deep learning model which is known for its accuracy and real-time processing capabilities for recognizing objects of interest. An adapted aerial object identification dataset and a questionnaire were used in this study to assess YOLOv8's performance in a range of operational circumstances. The way how this model detects a variety of objects in a range of environmental conditions was evaluated. The study also analysed the ethical consequences, operational issues, and technological difficulties of using UAVs for military reconnaissance. Through integrating modern object detection technology on UAVs with deep learning language, it is possible to enhance Sri Lanka's military capabilities. The effectiveness of YOLOv8 model, which is well-known for its accuracy and real-time processing in boosting national security have been analysed and discussed. By addressing the technological considerations in the use of UAVs technologies, this study may offer robust defence plans customized to unique security and geographic conditions of Sri Lankan Military context.

Keywords: *reconnaissance, object detection, UAVs, military*

ID 376

An Application of Terrestrial Laser Scanning for the Inventory of Archaeological Monuments for the Use of Architectural Aspects

KNNB Kalugama[1#], KP Manuranga[1#], HDS Asoka[1], and AR Rupasinghe[1]

[1]Faculty of Built Environment & Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[#]37-sps-0003@kdu.ac.lk, manuranga.kp@kdu.ac.lk

This study explores the implication of Terrestrial Laser Scan (TLS) technology in the field of archaeological monument inventory, particularly for architectural utilization. Traditional methods of data collection, such as tape measurements and simple instruments, are often laden with errors and are labor-intensive. TLS is a faster, accurate, and non-invasive data collection technique, which can act as a substitution for traditional methods that might pose risks to the user during spatial data acquisition, especially in structurally compromised sites. Its ability to generate detailed three-dimensional (3D) data has transformed spatial data collection. Light Detection and Ranging (LiDAR) technology, integral to this process, shows immense potential in gathering high-density information crucial for the architectural conservation and renovation of ancient buildings. The study investigated the specific data formats required by architects in the renovation of ancient buildings. The preference in data formats by the architects were obtained via a questionnaire survey. The point cloud data was analyzed to furnish accurate architectural data on ancient buildings, facilitating their renovation. The study provides the facade drawings required for renovations, three-dimensional models, and dimensions required for architectural renovation in the selected site. In conclusion, the findings confirm the extensive application of TLS in digitally documenting ancient buildings. Moreover, the study contributes significantly to the field by providing architects and conservationists with a reliable, accurate, and efficient tool for heritage preservation.

Keywords: *archaeological monument, architectural conservation, heritage preservation, LiDAR Technology, TLS*

ID 411

The Analysis of Existing Land Ownership in Urban Development with Special Reference to Meda-Minuwangoda Grama Niladhari Division

KAIS Kuruppu[1#], AC Gunathilaka[1], CP Ranawaka[1], and TGUP Perera[2]

[1]General Sir John Kotelawala Defence University – Southern Campus, Sri Lanka
[2]University of Sri Jayawardenepure, Sri Lanka

[#]37-sps-0005@kdu.ac.lk

This study scrutinizes the intricate interplay between land ownership and urban development within the Meda-Minuwangoda Grama Niladhari Division of Sri Lanka. Employing questionnaires, Bimsaviya data, and a literature review, the study attempted to analyse nuanced dynamics shaping the urban landscape. Findings indicate that individual ownership is linked to higher land quality, while co-owned lands exhibit characteristics suggesting lower perceived quality. The study emphasizes the pivotal role of well-defined property rights in shaping urban landscapes, despite acknowledging data discrepancies. Recommendations for policymakers focus on more effective ownership transfer mechanisms and enhanced land title maintenance. The research advocates for the integration of advanced geospatial technologies in future investigations to improve data accuracy and deepen the understanding of the complex relationship between land ownership and urbanization dynamics. Future work could extend the analysis to specific local authority areas, incorporating quality mapping components to provide investors with valuable insights. The study concludes by proposing the adoption of advanced geospatial technologies, such as GNSS receivers and the latest land information system data, to enhance the precision and comprehensiveness of research on the impact of existing land ownership on urban development in the Meda Minuwangoda GND. This technological integration may not only improve research data quality but also contribute to a more sophisticated understanding of the intricate relationship between land ownership and urbanization dynamics in the specified area.

Keywords: *property rights, tenure system, urban lands*

ID 434

Lean Six Sigma Practices in Small and Medium Enterprises: A Bibliometric Analysis

WKD Ramese[1#], SD Jayasooriya[1], AH Lakmal[1], MLNH Premarathna[1], and MNR Wijetunga[2]

[1]Faculty of Built Environment & Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[2]Department of Design and Merchandsing, School of Education and Human Sciences, Oklahoma State University, USA

[#]wkdramesh@kdu.ac.lk

This research focuses on an extensive exploration of Lean Six Sigma (LSS) in Small and Medium Enterprises (SMEs) following a bibliometric analysis. The Scopus, a well-recognized scholarly database, was used to identify the publications encompassing the years from 2007 to 2024. The procedure of selecting articles adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Bibliometric analysis was conducted utilizing the Biblioshiny, a software platform within R Studio, specifically version 4.4.1. This method facilitated the identification of prominent articles, journals, countries of origin, authors, and thematic areas within the study field. The results show that research relating to implementing LSS in HEIs are continuing to grow. An analysis of the research performance according to publication output, distribution of words in article title, author keywords, performances of countries, institutes, and authors, including total, single, collaborative, first author, and corresponding author publications was conducted. Topics related to work simplification, process monitoring, critical success factors, and process engineering are likely to feature in the domain of implementing LSS within HEIs in future. The adoption of LSS strategy into the SMEs improve the quality of small and medium businesses and add value that continuously enhances the satisfaction of the customers. This paper can serve as a guide for various practices in the literature on implementing Lean Six Sigma in SMEs. Furthermore, this review provides guidance on how Lean Six Sigma approach can be applied to improve the quality of SMEs.

Keywords: *Lean Six Sigma, SMEs, Biblographic analysis, Thematic areas*

ID 449

Potential to Utilize Digital Twin Technology in Conserving Cultural Heritage within the Built Environment of Sri Lanka

KSKNJ Kudasinghe[1#] and WDBJ Jeewananda[2]

[1]Department of Architecture, Faculty of Built Environment and Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[2]Department of Quantity Surveying, Faculty of Built Environment and Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[#]ksknjkudasinghe@kdu.ac.lk

The "digital twin" concept has gained prominence in architecture and construction for maintaining accurate digital representations of physical structures. There is no generalised digital twin system which can be applicable for all purposes; thus, the digital twin development is context and site-specific. Building Information Modelling is invaluable for performance modelling, behaviour analysis, and preventive maintenance of historic sites, yet its implementation complexities demand customized approaches. In Sri Lanka, digital twin adoption lags due to uncertainties in construction, operation, utility, and limited research on their cultural heritage impacts. Modernization threatens colonial street architecture, intensifying conservation urgencies. Digital twins offer detailed virtual models capturing architectural nuances and historical contexts, crucial for UNESCO World Heritage sites facing modernization and climate change threats. The UN's 2030 Sustainable Development Goals prioritize cultural and environmental sustainability, underscoring the need for effective conservation strategies. This study used a literature review, two case studies with a detailed algorithm for the creation of a digital twin, and professional interviews for identifying challenges and strategies for digital twin implementation. Case studies of the De Soysa building and Rangiri Dambulla Caves illustrate their potential respectively: the former preserving legacy amid urban development, the latter optimizing preservation through microclimatic analysis. Project-specific digital twins are pivotal for safeguarding cultural identity and managing heritage properties. Challenges in digital twin use for heritage preservation include data capture, costs, integration, and ethical considerations. Solutions entail advanced technologies, funding strategies, standard data formats, cloud storage, and ethical data handling to enhance management and preservation.

Keywords: *digital twins, historical cultural heritage, conservation*

ID 462

Application of Ecotourism Guidelines and Standards in Sri Lankan Resorts with Special Reference to Bolgoda Area

JAMY Jayasuriya[1#], WAPS Kumara[2], and KNK Pathirana[2]

[1]Architect - ISS Architects (PVT)Ltd
[2]Department of Architecture, Faculty of Built Environment and Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[#]malakajay0@gmail.com

This study investigated the application of ecotourism guidelines and standards in Sri Lankan resorts, focusing on Bolgoda area. Ecotourism, aimed at minimizing environmental impacts while promoting conservation and cultural understanding, is critical for countries like Sri Lanka, rich in biodiversity and natural beauty. However, the increasing tourist influx poses significant environmental threats. This study assessed the effectiveness of local eco-tourism guidelines established by the Sri Lanka Tourism Development Authority, hypothesizing their adequacy in ensuring eco-friendly resort designs. The primary objective of this study was to assess the contribution of these guidelines to ecotourism in Sri Lanka. Secondary objectives included understanding the global and local context of ecotourism, the necessity of regulatory measures, and the effectiveness of Sri Lanka's regulatory system. Through case studies of eight resorts in Bolgoda area, data were collected using a detailed checklist based on international and local standards. Results indicated that resorts adhering closely to ecotourism principles scored higher in these areas. However, common weaknesses were found in environmental management and safety measures across all resorts, suggesting the need for more rigorous guidelines and better implementation. Main limitations of this study are its focus on a single geographical area and a small sample size, which may not be representative of all Sri Lankan resorts. Despite this limitation, the findings provide valuable insights into the current state of ecotourism practices in Sri Lanka and highlight areas for improvement. The paper concludes with recommendations for enhanced environmental management, improved safety protocols, and increased local community involvement to promote sustainable tourism development in Sri Lanka.

Keywords: *ecotourism, guidelines, standards, Sri Lankan resort architecture, Bolgoda*

ID 478

Developing Pre-Cast Partition Wall Panels Using Mud-Concrete (MC) Technology

HBGK Nayanajith[1#] and FR Arooz[1]

[1]Department of Architecture, Faculty of Built Environment and Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[#]frarooz@kdu.ac.lk

The growing emphasis on sustainable building materials has sparked interest in earth walling systems. The Mud-Concrete (MC) technology, combining concrete's strength and durability with traditional mud-based construction methods, offers an affordable, load-bearing wall system for indoor comfort. However, challenges arise when creating thin non-load-bearing walls due to shrinkage-related defects. This study explored the development of partition wall panels using Mud-Concrete technology, focusing on thickness reduction and robust construction systems. The methodology of the study involved experimental testing such as compressive strength test and flexural strength test of series of mix design adjustments on the purpose of reducing the thickness from 50% (from 150 mm to 75mm thickness) for the non-load bearing partition wall. The results concluded that the mix design can be improved as fine $\leq$ 10% ($\leq$ sieve size 0.425mm), sand 55-60% (sieve size 0.425mm $\leq$ sand $\leq$ 4.75 mm), gravel 30-35% (sieve size 4.75mm $\leq$ gravel$\leq$ 20mm), cement 8% (minimum), bamboo fibre 2% (Particle size 10mm-25mm) and water 18% to 20% from the dry mix while arranging the 5-8mm thick, 10mm width bamboo strips creating a 150mm x 150mm mesh in the centre of 75mm thick precast Mud-Concrete non-load bearing wall panel. The study also proposes robust construction systems, joineries, and accessories for the installation process. Finally, the outcome offers methods to reduce the virgin material usability in manufacturing process such as the thin Mud-Concrete panels helping to utilize the interior spaces effectively in constructions.

Keywords: *Mud-Concrete (MC), Wall thickness, Partition wall panels, Earthen constructions, Bamboo reinforcement, Bamboo fibre, Non-load bearing walls*

ID 569

A Study on the Applicability of BIM to Reduce Building Services Maintenance Costs of the Hotel Building Projects in Sri Lanka

KAPBK Arachchi[1#], IGWR Jayaweera[1], and AARK Amarathunga [1]

[1]Department of Quantity Surveying, Faculty of Built Environment and Spatial Sciences (FBESS), General Sir john Kotelawala Defence University, Sri Lanka

[#]37-qs-0058@kdu.ac.lk

This study aimed to explore the potential of Building Information Modelling (BIM) in reducing building services maintenance costs for hotel projects in Sri Lanka. it addressed common issues such as inadequate coordination, quality control lapses, and communication gaps between construction and maintenance teams. The study focused on identifying and reducing factors influencing maintenance costs in Sri Lankan hotels, with an emphasis on the impact of building services. Objectives included identifying maintenance costs, identifying how to minimize these costs, exploring digital representation and management systems for building services, and providing recommendations for Quantity Surveying and Facility Management. The literature review revealed that hotel facility operation and maintenance costs are influenced by diverse factors such as building characteristics, material availability, managerial factors, energy consumption, and customer satisfaction. Maintenance officers play a crucial role in maintaining indoor air quality. Therefore, the study emphasizes the need for a holistic approach to building projects, advocating for early investments in quality construction and design to yield long-term savings. The research identifies building services, particularly HVAC systems, as a significant contributor to maintenance costs. Using a mixed method approach involving quantitative data analysis through Relative Importance Index (RII) Method and qualitative data analysis through semi structured interviews and the literature review, the study recommends the use of BIM software for digital representation to enhance cost-effectiveness, efficiency, and productivity in hotel buildings maintenance. The findings highlight the importance of addressing building services, leveraging BIM technology, and adopting value engineering and a comprehensive approach to minimize maintenance costs in hotel projects.

Keywords: *building, building information modelling, hotel projects, life cycle, maintenance cost*

POSTER PRESENTATIONS

ID 27

Impact of Modern Technology on the Quality of Sustainable Construction in the Sri Lankan Construction Industry

PA Deemantha[1#], SD Jayasooriya[1], AH Lakmal[1], and AGKMWS Atapattu[2]

[1]Faculty of Built Environment and Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[2]Faculty of Graduate Studies, General Sir John Kotelawala Defence University, Sri Lanka

[#]akiladeemantha371@gmail.com

The Sri Lankan construction industry, a key driver of national development, is experiencing significant transformation through the integration of modern technologies. This study examined the impact of modern technologies such as Artificial Intelligence (AI), Building Information Modeling (BIM), Augmented Reality (AR), robotics, and 3D printing on the quality and sustainability of construction practices in Sri Lanka. Utilizing a mixed-methods approach, including quantitative analysis via SPSS and qualitative insights from content analysis, the study explored the relationship between technology adoption and sustainable outcomes. The findings reveal a strong positive correlation between the use of these technologies and enhanced sustainability in construction projects. However, the study also highlights substantial challenges, including high implementation costs, a shortage of skilled personnel, and inadequate policy frameworks. To overcome these barriers, it proposes strategies that involve educational reforms and government-led initiatives to promote broader technological adoption. This study contributes to the academic discussion on sustainable construction by providing practical insights for industry stakeholders, policymakers, and practitioners. It also emphasizes the critical role of modern technologies in advancing the sustainability and resilience of the construction sector in Sri Lanka, underscoring the importance of a strategic approach to integrating these tools into existing practices for the industry's long-term growth and competitiveness.

Keywords: *modern technology, sustainable construction, Sri Lanka, technology integration, construction challenges*

ID 99

Applicability of Effective Claim Management Framework Under FIDIC 2017 Red Book in Sri Lankan Construction Industry

WB Kalpani[1#], KPSPK Bandara[1], WANM Weerasinghe[1], and WDBJ Jeewananda[1]

[1]Department of Quantity Surveying, Faculty of Built Environment and Spatial Sciences (FBESS), General Sir John Kotelawala Defence University, Sri Lanka

[#]buddhima53@gmail.com

An increase in claims is the outcome of the issues that the construction industry is currently facing. The present claim procedures' inherent inefficiencies frequently result in contractors receiving little or no payment for claims they file related to building projects. For their claims to be paid in full, contractors must ensure that they submit their claims precisely and accurately. In recent times, several researchers have investigated reducing construction claims as their top priority. They have focused on specifically defining the expected causes of claims, and it has come across those delays in construction is a major source of the increase in claims. This study examined the current Claim Management (CM) procedure in Sri Lanka, the problematic issues of the current procedure, the solutions for overcoming the issues, and the applicability of implementing a successful Claim Management Framework (CMF) for the Sri Lankan construction industry within the terms of the FIDIC 2017 Red Book. A framework was presented which may prevent disputes over construction claims. Expert interviews and document reviews were all used in this qualitative study. Content analysis using manual techniques were applied for the data analysis. The study presents a new format for presenting claims and identifies methods for identifying claim situations. Insufficient understanding among site staff regarding claim procedures and a lack of a standardized procedure are major issues in the Sri Lankan construction industry. A standardized framework can improve claim preparation, reduce cost overrun and project delays, reduce misunderstandings, expedite documentation, and ensure fairness ultimately leading to project success.

Keywords: *construction claims, CMF, FIDIC Red Book 2017*

ID 108

Interior Design for Learners Memory Retention Enhancement through Virtual Reality

DW Kasun Gayantha[1#], T Chandrasekera[2], MNR Wijetunge[2], UI Perera[2], HDS Asoka[1], and SD Jayasooriya[1]

[1]General Sir John Kotelawala Defence University, Sri Lanka
[2]Oklahoma State University, US

[#]gayanthak@kdu.ac.lk

This pilot study as a part of a larger research, sought alternatives for traditional spatial ability development exercises of interior design learners to cater to the increasing staff-student ratios. The impact of different instructional modalities on visuospatial working memory (VSWM) of interior design learners was investigated utilizing a quasi-experimental design with three groups: Physical Reality Instructional Modality (PRIM), Non-Immersive Virtual Reality Instructional Modality (NVRIM), and Immersive Virtual Reality Instructional Modality (IVRIM). The participants underwent pre-and post-tests to assess their VSWM, with a spatial ability training intervention conducted between the tests. Results show that while PRIM led to a decrease in average VSWM scores, both NVRIM and IVRIM improved VSWM performance post-intervention. The impact of NVRIM on VSWM was found to be greater than that of IVRIM and PRIM. Furthermore, all three instructional modalities improved the speed of VSWM functions. Results conclude that virtual reality instructional modalities have the potential to enhance VSWM in interior design learners more effectively than traditional physical reality modalities. However, the study acknowledges the need for further research with larger sample sizes to validate these findings and suggests potential applications of the results in design education.

Keywords: *spatial ability, physical reality, virtual reality, interior design, instructional modalities*

ID 144

AI-Driven Innovations in Cost Estimation and Quality Control in Sri Lankan Construction Projects

LADCN Wijesinghe[1#], SD Jayasooriya[1], and MKM Nilupulee[1]

[1]Faculty of Built Environment and Spatial Sciences (FBESS), General Sir John Kotelawala Defence University, Sri Lanka

[#]nimanthawijesinghe96@gmail.com

The integration of artificial intelligence (AI) in construction project management has significantly enhanced cost estimation and quality control processes. This study, employing a mixed-method research design, explored the impact of AI-driven innovations on these critical aspects of the construction industry. Through a comprehensive analysis involving surveys and regression analysis, this study investigated the adoption rate, benefits, challenges, and overall influence of AI on project outcomes. Data were collected using stratified random sampling techniques to ensure a representative sample of quantity surveyors, civil engineers, project managers, and quality control engineers. The findings revealed a high adoption rate of AI tools among respondents, resulting in notable improvements in accuracy, efficiency, and predictive capabilities. The positive correlation between AI adoption and project outcomes, such as cost savings, quality enhancements, project timeliness, client satisfaction, and return on investment (ROI) underscores the transformative potential of AI technologies. Despite the challenges like high initial costs, lack of skilled personnel, and data privacy concerns, the advantages of AI, including increased accuracy and data-driven decision-making outweigh the drawbacks. The study also highlights AI's versatility, extending its applications to project scheduling, risk management, and procurement, thereby enhancing communication and collaboration among stakeholders. The paper concludes with recommendations for construction companies to maximize the benefits of AI adoption, including investing in AI tools, training personnel, ensuring data security, developing integration strategies, fostering a culture of innovation, conducting pilot projects, and complying with industry regulations. By addressing these aspects, construction firms can harness AI's full potential, leading to more successful and sustainable project outcomes.

Keywords: *artificial intelligence, cost estimation, quality control, quality management, construction industry, data security*

ID 245

Analysis of Green Space Recovery of Post Forest Fire: A Case Study in Laggala, Wilgamuwa, Sri Lanka

DAPS Wasalathilaka[1#], NV Wikramathilaka [1], CP Ranawaka[1], and TATP Bandara[1]

[1]Faculty of Built Environment & Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[#]37-sps-0001@kdu.ac.lk

Alongside human development, natural forests are being simultaneously destroyed. Meanwhile, fires appear to be a major cause of forest damage. Forest fires can result from both human activities and natural factors. Dedicated to delivering precise assistance and focused attention, this study aimed to analyse how to minimize damage and expedite recovery through a proactive approach. Thus, this study engaged in developing remote sensing approaches for forest fire detection. Developing strategies of remote sensing such as Normalized Different Vegetation Index (NDVI) and Normalized Burn Ratio Index (NBR) were used for forest fire assistance. Further, two-dimensional (2D) visualization of forest fires was embedded to improve the scope of this study. Moreover, this study conveyed a discussion using differential Normalized Burn Ratio (dNBR) to identify burn severity areas. Still, it is a challenge to detect the green space recovery rate through post-forest fires. However, this study tried to formulate an equation for the recovery rate of forest fires. Results indicated that the areas of fire severity and the changes in green areas were determined by calculating NDVI. These results can be utilized for forest fire management and fire mitigation. The study demonstrated that Geographic Information Systems (GIS) and Landsat data can effectively evaluate post-fire vegetation recovery over large areas. Human intervention, such as reseeding and controlled burning, plays a crucial role in enhancing recovery. The study recommends using advanced satellite imagery, comprehensive monitoring programs, and involving local communities in restoration efforts. These findings contribute to understanding vegetation recovery dynamics. They offer valuable insights for developing strategies for ecological restoration in fire-affected regions.

Keywords: *forest fire, remote sensing, NDVI, NBR, green space, GIS, Landsat*

ID 263

Investigating the Reliability of Smartphone LiDAR for Outer Boundary Surveys

AMP Athukorala[1#], WMIU Adikaram[1], KNNB Kalugama[1], and KP Manuranga[1]

[1]Faculty of Built Environment & Spatial Sciences, General Sir John Kotelawala Defence University

[#]37-sps-0007@kdu.ac.lk

The field of land surveying has been influenced by the development of modern technology over the years. Modern instruments have made data collection faster, easier, and more efficient. The surveying instruments have been made lightweight, compact, and user-friendly in the present. Light Detection and Ranging (LiDAR) is one such sophisticated technology that has revolutionized the field of land surveying. However, the affordability of such sophisticated instruments for surveyors in developing countries has become an issue. In such situations, the ability to utilize already available technology to perform surveying tasks would become much more helpful. This study analysed the use of LiDAR sensors that are built into smartphones as a viable option for surveying outer boundaries. The LiDAR sensors in smartphones are designed to assist in computer vision tasks such as biometrics and image enhancement even though the working principle of the LiDAR sensor remains the same. By using the assistance of other sensors integrated into the smartphone and the smartphone camera itself, spatial data collection can be done. This study compared the accuracy of the outer boundary survey of smartphone LiDAR with the surveys done using Total Station (TS). The results of the study show that the extent generated from different land plots using smartphone LiDAR has little variation to the extent generated from the data collected using Total Station.

Keywords: *LiDAR, land surveying, outer boundary surveys, TS, smartphone LiDAR*

ID 309

Harnessing Spatial Intelligence in Adopting Net Zero Energy Building Concept to the Residential Buildings in Sri Lanka

GKE Perera1[1#], KSPK Bandara[1], WANM Weerasinghe[1], and WDBJ Jeewananda[1]

[1]Department of Quantity Surveying, Faculty of Built Environment and Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[#]kalanaeksith.perera@gmail.com

The pressing need to address the rising energy demand in residential and high-rise housing developments has become a crucial issue for stakeholders. As the construction industry seeks efficient alternatives to meet these energy requirements, the concept of Net Zero Energy Buildings (NZEB) has gained significant attention. NZEB emphasizes energy production from affordable, locally sourced, and renewable resources, substantially reducing energy consumption. Despite its benefits, the widespread adoption of NZEB faces various challenges. This study explored the integration of the NZEB concept into residential buildings in Sri Lanka, focusing on the innovative application of spatial intelligence in design and implementation. By conducting a thorough methodology, including literature reviews, surveys, and interviews with industry experts involved in NZEB projects, the study examined the current preparedness, obstacles, and initiatives in Sri Lanka's construction sector. The findings reveal insights into the nation's efforts and highlight both successes and areas needing improvement. The data gathered reflects the construction sector's evolving mindset towards sustainable practices. Despite existing challenges, the study emphasizes the critical need to adopt NZEB principles, aligning with global sustainability goals, and ensuring a greener future for residential buildings in Sri Lanka.

Keywords: *carbon emission, net zero energy building, residential buildings, Sri Lanka, sustainability*

ID 327

The Impact of Architecture on the Healing Process of Paediatrics: A Case Study of Lady Ridgeway Hospital in Sri Lanka

MN Ranagala[1#] and KDHJ Premarathna[1]

[1]Department of Architecture, Faculty of Built Environment and Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[#]manumiranagala16@gmail.com

Optimal health, encompassing both physical and psychological wellbeing, is a fundamental goal, with healing as a critical process. This study explored the impact of architectural and landscape design on creating healing environments in paediatric healthcare, focusing on Lady Ridgeway Hospital, the largest paediatric hospital in Sri Lanka. The study aimed to establish a framework for designing hospital environments that cater specifically to paediatric patients, recognizing that their needs differ significantly from those of adults. Existing research suggests that paediatric healthcare facilities possess distinct features that influence the creation of healing environments; however, there is limited emphasis on the role of architectural elements within these settings. This study contributes to the broader understanding of how architectural elements can influence health outcomes in paediatric care, underscoring the need for specialized design strategies that address the unique requirements of paediatric healthcare facilities. The study investigated both indoor and outdoor environmental design factors at Lady Ridgeway Hospital through thematic observation and structured questionnaires. The findings suggest a strong correlation between the hospital's ambiance and the recovery of paediatric patients. Further, the study proposes that strategic architectural features such as size, proportion, texture, and colour, grounded in architectural principles, can significantly enhance the healing process for children.

Keywords: *architectural design elements, paediatric healthcare environments, psychological healing*

ID 329

Local Climate Zone Mapping Using World Urban Database And Access Portal Tools: A Study Of Colombo City Area

Gunasekara VGRG[1#] and Munasinghe DS[1]

[1]Faculty of Geomatics, Sabaragamuwa University, Sri Lanka.

[#]vgrg_gunasekara@std.geo.sab.ac.lk

Urbanization is accelerating worldwide, and Colombo city is no exception, experiencing rapid urban growth and its associated challenges. Urban heat is intensifying significantly, making up-to-date Local Climate Zone (LCZ) maps crucial for identifying urban land types and assessing urban heat islands. These maps aid in effective urban planning and management strategies. This research focuses on creating an updated LCZ map for Colombo using the World Urban Database and Access Portal Tools (WUDAPT) method. By leveraging GIS-based methods and remote sensing technologies, the study aims to provide a comprehensive understanding of Colombo's evolving urban landscape and its implications for urban heat mitigation and climate resilience. Key challenges in the map creation process include identifying suitable training areas for specific LCZ classes within Colombo's densely populated and limited spatial confines. Addressing these challenges requires a nuanced understanding of urban morphology, land use patterns, and environmental dynamics. Visual comparisons of the newly created LCZ map for Colombo with existing maps reveal significant changes over a ten-year period. The methodology involves several steps to develop LCZ maps using the WUDAPT LCZ generator, which requires comprehensive training area files covering all LCZ classes. These files are based on detailed data collection and analysis. The training area files are then input into the WUDAPT LCZ generator, which uses algorithms to generate the final LCZ maps. The output, including the final LCZ maps, is delivered via email for researchers to analyze and interpret. This organized, systematic, and clear method ensures accurate and reliable results.

Keywords: *LCZ (Local Climate Zone), WUDAPT (World Urban Database and Access Portal Tools), Colombo City, Urbanization*

ID 366

The Role of Professional Surveyors in the Emerging Trend of Building Information Modelling (BIM)

WKH Kalpitha[1#], KGES Dias[1], KP Manuranga[1], and JMO Jayamanne[1]

[1]KDU Southern Campus, Sri Lanka

[#]36-sps-0003@kdu.ac.lk

The Building Information Modelling (BIM) process plays a vital role in the construction industry. It helps in understanding future operations and building maintenance. The main problem identified in this study is the lack of proper scientific knowledge about the process of BIM among professional surveyors in Sri Lanka. Therefore, the purpose of this study was to find out the possibility of surveyors reducing the most important components such as time and cost by involving in this BIM process. The knowledge regarding the BIM of professionals in the construction industry was assessed through a questionnaire survey. According to their responses, it could be identified that the involvement of the surveyors in the BIM process in the construction industry was not satisfactory. As the most useful BIM tools for the surveyors, Revit, ArchiCAD, and Leica Cyclone were identified. However, the usage of the Leica Cyclone BIM tool in Sri Lanka was very rare. According to the questionnaire survey data, the usefulness of the ArchiCAD BIM tool was used more than the Leica cyclone. The BIM tool called Revit was used personally. Building renovation, pipeline clashes detection, as-built surveys, data management, and effective documentation were some of the facilities offered by the Revit BIM tool, The paper concludes that there were no considerable barriers to implementing the BIM process among the surveyors.

Keywords: *ArchiCAD, BIM Process, Leica Cyclone, Revit*

ID 367

Analysis of Urban Green Spaces and Potential Expansion to Kandy city, Sri Lanka

TATP Bandara[1#], NV Wickramathilaka[1], CD Iddagoda[1], and DAPS Wasalathilaka[1]

[1]Faculty of Built Environment & Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[#]37-sps-5994@kdu.ac.lk

Urban green spaces (UGS) and its potential expansion are vital for urban cities to enhance the quality of urban living conditions. Recently, many studies have been conducted to identify potential urban expansion. However, detecting urban green spaces is not an easy process. Urban green spaces are changed year by year due to rapid urbanization. The main objective of this study wad to identify the potential for future expansion of green spaces, with specific goals including detecting changes in urban green spaces, determining their current potential, and developing methods for future expansion. Therefore, this study demonstrated a method to detect changes in urban green spaces through the Normalized Difference Vegetation Index (NDVI) remote sensing (RS) quantifies. Furthermore, this study developed a method to validate detected green spaces. Urban potential expansion is different to urban green spaces. Thus, this study attempted to identify potential expansion based on population density and urban temperature. The study's recommendations advocate for the integration of UGS in urban planning, the adoption of innovative green infrastructure solutions like green roofs, and the prioritization of green spaces to foster resilience, sustainability, and inclusivity in the city's development. Challenges identified include land use conflicts, limited open spaces, and the impact of cultural heritage on urban planning.

Keywords: *NDVI, UGS, RS, urbanization, green space, population density*

ID 382

Land Use Change and Its Impact on Urban Flooding: A Case Study on Kandy City Sudden Flood in December 2022

WMIU Adikaram[1#], OJ Perera[1], and KP Manuranga[1]

[1]Department of Spatial Science, Faculty of Built Environment & Spatial Science, KDU Southern Campus, Sri Lanka

[#]37-sps-0006@kdu.ac.lk

An unexpected flood in Kandy City in December 2022 brought about the investigation into its root cause. The investigation sought to find out the causes of the unusual event as there had never been a flood in the area. Initially, rainfall data was analysed to determine how flooding affected the disaster. Surprisingly, the findings showed no significant link between the flood disaster and considerable rainfall. As a result, interest shifted to the analysis of land use changes using satellite imaging. The analysis showed that built-up areas had significantly increased while watershed areas had decreased at the same time. These results strongly indicate that ongoing construction, land use changes, and reduction of water catchment areas were the main factors that contributed to the unexpected flooding in Kandy City. Inadequate drainage infrastructure exacerbated flooding. This study highlights the need for good urban planning, sustainable development, and improved drainage systems to prevent future flood risks in Kandy City by illuminating the significance of land-use changes in flood occurrence.

Keywords: *drainage infrastructure, Kandy City, land use changes, rainfall analysis, unauthorized construction, unexpected flood, watershed areas*

ID 422

Spatial Modeling of Two-Dimensional Road Traffic Noise in Urban Zones: A Case Study in Ratnapura Municipal Council

DMAP Dissanayaka[1#], HHKT Bandulasoma[1], IR Shehal[1], NV Wickramathilaka[1], and CP Ranawaka[1]

[1]Faculty of Built Environment and Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[#]37-sps-0012@kdu.ac.lk

Addressing the global concern of noise pollution emanating from urban motor traffic, this study employed a sound model to assess the noise landscape in the Ratnapura Municipal Council area of Sri Lanka. Field observations provided crucial data on vehicle speed, type, and density at various points within the study area, serving as input for the sound model. Data collection spanned two distinct periods, 7:00 a.m. to 9:00 a.m. and 12:30 p.m. to 2:30 p.m., strategically chosen to capture peak noise levels. Utilizing multiple interpolation techniques, decibel values were extrapolated, with the Kriging-Spherical technique identified as the optimal method based on field-observed noise readings at corresponding locations. The study reveals zones within the municipality experiencing elevated noise pollution levels, and regional distribution maps illustrate the intricate relationships between contributing factors and noise pollution. The findings provide recommendations for mitigating noise pollution, with a specific focus on the Ratnapura context. Moreover, this study underscores the importance of adapting strategies to the dynamic nature of urban environments, enhancing our comprehension of the current state of noise pollution. The findings provide practical insights for governments and urban planners, offering sustainable solutions to address this pervasive issue. Additionally, it emphasizes the necessity for continuous, long-term research to comprehensively grasp evolving noise patterns, supporting ongoing data collection and analysis initiatives.

Keywords: *Kriging-Spherical interpolation, noise pollution, sound model, urban motor traffic*

ID 525

An Analysis of Harbor Basin Bathymetry Using Satellite Imagery: A Case Study in Kirinda Fishery Harbor, Sri Lanka

SR Wijewardhane[1#], GP Gunasinghe[1], KP Manuranga[1], and H Waligodapitiya[2]

[1]Faculty of Built Environment & Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka

[2]Ceylon Fishery Harbours Corporation, Sri Lanka

[#]37-sps-0009@kdu.ac.lk

Accurate bathymetric data involves mapping the depth and features of the underwater terrain. Further, bathymetric data can be revealed by effective harbor management, navigation, infrastructure planning, and dredging operations. Precise bathymetry is the basis of creating reliable nautical charts and ensuring safe navigation for vessels. The traditional sonar surveys have essential limitations, despite their effectiveness. Therefore, different methods such as satellite imagery are being used to make bathymetric data collection more effective and cost-effective, to address the limitations of traditional sonar surveys. In this study, at the harbor basin in Kirinda, the most advanced remote sensing techniques and image processing methods were implemented to generate a wide-ranging bathymetric map. The maps generated from remote sensing technology, made available insights into underwater topography, sediment distribution, and changes over time. The analysis of Landsat 8 satellite imagery data from 2012, 2014, and 2017 were used, and to confirm the accuracy of the satellite-derived bathymetry, sound-derived bathymetry data from 2012, 2014, and 2017 were also combined. The following changes of Kirinda Fishery Harbor have been observed, that are sediment variations, resulting in increased maintenance costs and disruptions for harbor users, over the period from 2012 to 2017. Prevention of safe channels for vessels was identified as a result of siltation leading to a reduction in the harbor basin's depth. This information provides a better understanding of the physical characteristics of the harbor. Furthermore, it supports decision-making processes related to infrastructure planning and maintenance and facilitates effective harbor management and navigation safety.

Keywords: *bathymetric data, harbor management, remote sensing, sediment variation, underwater topography*

ID 531

Examining the Impact of Elevation Mask on Atmospheric Delay Errors in GNSS Static Observations

PAMT Rupathunga[1#], JMO Jayamanne[1,2], and PAT Hansamal[1]

[1]Department of Spatial Sciences, General Sir John Kotelawala Defence University, Sri Lanka
[2]Nottingham Geospatial Institute, University of Nottingham, UK

[#]36-sps-0019@kdu.ac.lk

The study aims to investigate the impact of different mask angles on the precision of GNSS static data acquisition and to analyze the correlation between precision and diverse refraction models. The angle of the elevation mask is utilized to ascertain the minimum elevation above the horizontal plane that is deemed acceptable for the detection of satellites. This study focused on the Southern province of Sri Lanka, and the investigation employed control points within this region. Data was collected using Topcon GR-5 devices and processed with Leica Geo Office software. The accuracy of the system was assessed by considering various mask angles and refraction models. The results reveal a negative correlation between elevation mask angles and atmospheric delay errors. A 15° mask angle shows fewer errors compared to 10° angle. The study suggests that GNSS observations without ionospheric and tropospheric models achieve better precision with mask angles exceeding 15°, reducing atmospheric delay errors. The results of this study can help professionals choose the best mask angle for their GNSS applications and increase the overall precision of static data collecting.

Keywords: *ionospheric error, tropospheric error, elevation mask*

ID 779

Quality Assurance in Designing Based Architectural Education and Its Holistic Assessment in Sri Lanka

SMM Sanjunee[1#], H Munasinghe[2], and FR Arooz[1]

[1]Faculty of Built Environment & Spatial Sciences, General Sir John Kotelawala Defence University, , Sri Lanka

[2]George Brown University, Toronto, Canada

[#]smmsanjunee@kdu.ac.lk

Architectural education is a distinctive form of teaching and learning that spans over art, science and social sciences. It is the qualification that enables designers to contribute in built environment and work for the betterment of the community by enhancing the quality of life through the built environment. In the process of making a professional architect is a complex process that involves a major portion of subjective teaching and learning. The individual interpretations and cognitive work further make the architectural education unique and complex. Quality assurance is a very popular concept in higher education as it is identified as a crucial component in making well qualified professionals to the world beyond the universities. Adaptation of quality assurance scheme that is responsive to the authentic nature of architectural education is slightly touched in the field of research in architectural education. Therefore, the study aimed to develop a framework bridging the gap between general quality assurance frameworks and architectural education. Further the study details few issues and concerns of typical architectural education when referred with quality assurance that can be used in positive modification to fundamental objectives of architectural education. These will enable to enhance the quality of architectural education in the modernity by comprehensively addressing the needs of contemporary construction industry.

Keywords: *architectural education, quality, quality assurance and holistic assessment*

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