16th INTERNATIONAL RESEARCH CONFERENCE

ACHIEVING RESILIENCE THROUGH DIGITALIZATION, SUSTAINABILITY AND SECTORAL TRANSFORMATION

BUILT ENVIRONMENT AND SPATIAL SCIENCES

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Contents   Page

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ORAL PRESENTATIONS

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ID 169

Mapping of Human-Elephant Conflict Risk Zones: A Case Study of Sooriyawewa Divisional Secretariat Division, Sri Lanka

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Abstract

With developments and population, people are facing hazards. But without identifying such hazardous areas, actions cannot be taken to prevent such incidents. The Human Elephant Conflict (HEC) is a main hazard that impacts rural society in Sri Lanka. HEC is the conflict between elephants and humans and causes deaths of elephants and humans. Increased populations of elephants and humans, habitat modification, rainfall, water bodies, and land use changes are vital for HEC. This study focuses on mapping the spatial distribution of HEC risk zones in Sooriyawewa Divisional Secretariat Division. Furthermore, this study develops a method to validate the accuracy of risk zones. Furthermore, the directions of the HEC hazard propagation are demonstrated over the risk zones. Embedding Geographic Information System (GIS) with spatial interpolation is vital to identify risk zones. Moreover, integrating GIS can greatly facilitate the classification of HEC risk zones into low risk, moderate risk, and high risk. Additionally, this study used Inverse Distance Weighted spatial interpolation to create its hazard risk validation approach. A comparison of spots with some interstitial buffers was made to determine the propagation of the HEC from the center of Sooriyawewa. Therefore, it is crucial to determine the directions of risk and take actions to reduce the risk of HEC hazards. This will help in generating an HEC scenario map for the future and formulating an action plan of mitigation measures to avoid damage, loss of life, and socio-economic impacts in the study area.

Keywords: *GIS, HEC, Hazard, Spatial distribution*

Development of a Forest Resilience Index by Combining Multispectral and Microwave Vegetation Indices

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Abstract

Sri Lanka is one of the few surviving countries in the world with an extensive natural forest cover, however, most of the existing forests have been impacted by changing environmental conditions and escalating disturbances. To preserve our forest environment, investigating its temporal resilience is important. Forest Resilience is the capacity of forests to recover from disturbances in which they experience undesired shifts from their original state to available alternative stable. This research study mainly focused to analyze the resilience of forests Wilpattu National Park and Kanneliya Rain Forest with a time series of the Landsat 8/9 and Sentinel 1 satellite imagery during the period of the year 2017 to 2022 by generating Forest Resilience Index (FRI). In this study, Landsat 8/9 and Sentinel 1 satellite images were used to create the NDVI, LAI and Radar Vegetation Index (RVI) layers. Then a time series analysis was conducted with values of NDVI, LAI and RVI. The final outcomes of Forest Resilience Indices were generated with NDVI and RVI. The FRI for Wilpattu National Park is 0.7827NDVI + 0.2173RVI and for Kanneliya Rain Forest is 0.7853NDVI + 0.2147RVI. The validation was conducted with generated FRI for the Upper Wilpattu area, and it was succeeded. This analysis has helped to evaluate the temporal variability which indicates the resilient dynamics of the Sri Lankan forests.

Keywords: *FRI, LAI, NDVI, RVI, Time Series Analysis*

Monitoring The Impact on Paddy Fields During the Construction of The Southern Expressway Using Remote Sensing and GIS

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Abstract

Paddy production in Sri Lanka holds immense significance as a critical agricultural sector that sustains the country's population by providing rice, the staple food. Understanding the fluctuations in paddy land area is crucial since it directly influences paddy production, making it a vital national endeavour. In this regard, the primary focus of this investigation is centred around examining the diminishing extent of paddy land area within the Hambantota district. This reduction can be attributed to the construction of the southern expressway, and to unravel this relationship, remote sensing methods have been employed. To assess changes in paddy land area, Landsat images spanning the years 1990 to 2022 were utilized, enabling a comprehensive analysis of the Hambantota district. The outcomes of this study have uncovered a conspicuous decline in paddy land area in close proximity to the expressway during the study period. As one moves away from the expressway, a gradual increase in paddy land area becomes evident. This pattern underscores the transformative impact of infrastructure development on the agricultural landscape. The implications of these research findings extend beyond their immediate significance. They furnish valuable guidance for future construction projects across Sri Lanka, encompassing the construction of expressways, as well as railroads. By integrating these insights into the planning and execution of such projects, adverse environmental impacts, particularly the destruction of paddy lands, can be effectively mitigated. This serves as a vital step towards achieving sustainable development and safeguarding the country's agricultural productivity.

Keywords: *Agriculture, Landsat imagery, Paddy Land, Remote Sensing.*

ID 366

Estimation of Above Ground Biomass in Sinharaja Forest Reserve, Using Sentinel Images

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Abstract

This research aimed to explore the potential of remote sensing techniques in estimating Above Ground Biomass (AGB) values over the Sinharaja forest area in Sri Lanka. Sentinel-1&2 satellite images were used to extract AGB values, and the accuracy was validated using field measurements. Statistical analysis including correlation and regression analysis were employed to investigate the relationship between the estimated AGB values and field measurements. The results revealed a strong positive correlation between Sentinel-1 Estimated AGB and field-calculated AGB, while the correlation between Sentinel-2 Estimated AGB and field-calculated AGB was relatively weak. Non-linear regression analysis was also conducted to explore the relationship between the AGB values, which revealed a quadratic relationship between Sentinel-2 Estimated AGB and field-calculated AGB. Non-linear regression analysis was not conducted between sentinel-1 and field-calculated AGB data. Because there was strong positive correlation. This study conducted an annual analysis of above-ground biomass (AGB) along Neluwa, Lankagama, and Deniyaya roads within Sinharaja Forest. By comparing AGB values from 2018 to 2022, significant decreases were observed in 2019, indicating a critical year for deforestation activity. These findings provide valuable insights for conservation efforts and measures to mitigate further forest degradation and protect the ecosystem. The study suggests that remote sensing techniques can be used as a reliable and cost-effective method to estimate AGB values in dense forest areas, particularly when field measurements are difficult to obtain. However, higher resolution multispectral satellite images or advanced techniques can be used for more accurate results. Overall, the study provides valuable insights for forest management and conservation practices.

Keywords: *AGB, Deniyaya, Lankagama, multispectral, Neluwa, Sentinel, Sinharaja*

Sustainability and High-Rise Design for the Future: Importance of Connectivity between Vertical Living and the Natural Environment

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Abstract

High-rise living had been universally accepted as a sustainable solution to the housing problem by the end of the 20th century. However, it invariably results in the separation of people from nature, a fact that is especially true of users occupying the upper floors of high-rise apartments. Consequently, such a lifestyle has long been associated with the poor mental and physical health of their users. Sustainable high-rise buildings are, therefore, not merely about responsivity to environmental, technical, and economic issues, but also about the improvement of high-rise dwellers' quality of living. Such concerns become even more important in the context of the high-rise's evolution as a holistically sustainable urban dwelling of the future, due to rising real estate prices in urban areas. It is a foregone conclusion, therefore, that the aforementioned negative influences would also occur in the Sri Lankan context, especially since high-rise living has yet to become entrenched in the collective conscious of her people as a viable lifestyle choice. This paper demonstrates how the outdoor natural environment affects the mental well-being of high-rise dwellers. Responses of dwellers of three different high-rise apartments in Colombo, Sri Lanka, regarding their phenomenological experiences of how the outdoor natural environment affected their mental well-being, were collected, and qualitatively analyzed. The results show how the presence of visual connections to the natural environment contribute to the mental health and well-being of high-rise dwellers. These findings have relevance to the way user-friendly high-rise apartments that would be designed in the foreseeable future.

Keywords: *High-rise, Natural environment, Views*

ID 478

Impact of Designed Exterior-Built Environment in Enhancing the Well-being and Quality of Life of the Elders – A Case of Wellness Sanctuaries in Sri Lanka

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Abstract

Twenty first century resulted with the rapid urbanization and the population of ageing as some major key phenomena related to the elderly living in cities. The concept of the elderly home was raised as a result of the significance of the modern concepts and variations occurred in the lifestyles of the younger population. Therefore, there is a crucial need of identifying the responsiveness of the exterior environments of the wellness sanctuaries in relation to the enhancing process of the well-being and the quality of life of the elders in the present scenario. The research focuses on identifying the effectiveness of the well-designed exterior environments of the elderly homes to the process of maximizing their well-being in the final chapter of their lives. The architectural attributes regarding the exterior façade and the exterior landscape will be taken into consideration when reviewing the deep study on literature to flow up the study. The Approach will be taken from three case studies with observations, structured questionnaire, and semi structured interviews. The study analyzed case studies to identify the neglected attributes in elders' living spaces and suggest improvements. Elders' perspectives highlighted the need for consideration of exterior environments. The study highlighted the relationship between humans and nature and confirmed the importance of architecture in solving these issues. This study will support future decision-making in designing for elders, as Sri Lanka ranks first in South Asian population ageing.

Keywords: *Active ageing, Built environment response, Population ageing, Quality of life, Well-being*

Sri Lankan Identity in Architecture: Perceptions of Lay People on Designed Sri Lankan House

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Abstract

Architects often face the challenge of understanding and meeting the preferences of their clients, ensuring that their designs align with the client's expectations. One key preference commonly expressed by Sri Lankan clients is the desire for a "Sri Lankan identity" or a distinct architectural style that reflects their culture. However, there is uncertainty regarding whether these clients have a clear understanding of their own requirements or can effectively communicate their ideas to the architect. This study aims to explore the perceptions of lay people regarding the concept of "Sri Lankan identity" in architecture, specifically in the context of designing Sri Lankan houses aiming to shed light on the complexities of translating cultural identity into architectural design. Qualitative data were collected using researcher made structured interviews conducted among selected 82 people from 22 districts in Sri Lanka, as well as Sri Lankans living abroad who have experiences in house design. Purposive sampling method was used to select the above sample. The interviews consisted of structured questions divided into three parts: demographic data, identification of general ideas on Sri Lankan identity and perceptions on designed Sri Lankan house. The data were analysed qualitatively as a thematic analysis. This study suggests that there is no universally agreed-upon definition for a house with Sri Lankan identity. Further, this research contributes to the understanding of the complex nature of Sri Lankan architectural identity and context sensitivity in architectural design practices.

Keywords: *Perceptions of Lay People, Residential Architecture, Sri Lankan Identity, Sri Lankan context*

15-Minute City Concept for Designing Resilience Future Cities and the 'New Normal' of Urban Built Environments in a Post-Pandemic World

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Abstract

The Coronavirus pandemic was the greatest crisis that the world faced since the World War II and the impact of the pandemic runs to greater extents that it changed the world into a whole new formation. The entire world was deemed to lock-downs and the global population was restricted to their homes. This New Normal affected the world in numerous ways and the pandemic emphasizes the incompatibility of the modern cities to cope up with the pandemics. 15-minute city model was a concept that was thriving in the period of pandemic and some winning cases like city of Paris bought the lime light to the concept. According to its author Carlos Moreno the concept will result more healthier, resilient and sustainable future cities, but the same has been heavily criticized for contributing in gentrification and causing unreasonable demand on the built environment. The paper is to study this debate over the 15-minute city concept with the analysis of its practical implementation in selected case studies from different geographical as well as social contexts. And to identify the risks, strengths and threats that the concept may imply in future implication by analysing the cities that have used the concept in their reformations and to provide an insight for using the concept effectively in future development proposals.

Keywords: *Cycling, 15-Minute City Concept, Walkability*

ID 325

A Study on the Practicability of Expedited Arbitration on the Sri Lankan Construction Industry

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Abstract

Arbitration procedure was originated as the most efficient Alternative Dispute Resolution (ADR) method as it was a fast track in resolving disputes and no legal formalities were involved. But it was then criticized internationally as being a foundation for civil litigation. Hence, expedited arbitration procedures were introduced in the international arbitration forums as a variant of arbitration to re-root the advantages once originated in the arbitration proceedings, the accelerated speed and cost effectiveness, while considering the necessity of the finely tuned procedural of a quality award. Many studies have established that in the current practice expedited arbitration has been adopted in numerous arbitration institutes and is effectively being initiated to solve challenging disputes in various discipline. Thus, this study aims to approach the practicability of expedited arbitration in the Sri Lankan Construction Industry. To identify the current practice and the tendency of adaptation it in Sri Lankan construction, qualitative primary data was collected from conducting semi-structured with Sri Lankan construction stakeholders and arbitration institutes and analyzed through content analysis which resulted the conclusion that construction stakeholders tend to be more reluctant towards adopting expedited arbitration and identified motives behind was lack of awareness and mainly the downfall of the Sri Lankan construction.

Keywords: *Construction Disputes, Expedited Arbitration, Sri Lankan Construction*

ID 263

Waste Material Management on Building Construction in Sri Lanka; Mitigation of Concrete Waste Factor and Cost Effect During Construction Stage

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Abstract

Material waste is one of the most important factors which affects the contractor directly by reducing profit and affecting the employer by increasing project costs. As a result, most of the building projects have planned to address multiple levels to reduce this waste. Concrete debris is one of the waste materials in construction that costs the project's stakeholders the most. When compared to other material wastes, the volume of waste concrete generates as a primary component of the construction is disproportionately high in Sri Lankan construction projects. Most countries are currently working to reduce concrete waste while pursuing sustainable growth. As a result, traditional methods were used to reduce concrete waste which have not been effective over time. The aims of this research study is to achieve waste material management in building construction in Sri Lanka, mitigation of concrete waste factors, and cost-effective during the construction stage. To achieve the aims, a comprehensive literature review, semi- structured interviews and a questionnaire were conducted to gather data through both qualitative and quantitative procedures. The empirical findings revealed that concrete waste has a positive relationship with project cost. Precast elements, lean construction techniques, 3R concept, and a few more others were identified to minimize concrete waste, which reduces the project cost in the Sri Lankan construction industry. These research findings deliver beneficial evidence to the practitioners with an in-depth understanding of the important necessity for the construction industry and thereby benefiting to reduce the project cost in construction projects.

Keywords: *Building Construction, Cost effectiveness, Concrete waste*

ID 32

The Impact of Lean Construction Tools on Reduction of Contractor Related Causes of Delay in Sri Lankan Construction Industry

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Abstract

Large rate of delay in project delivery is a major criticism faced by the Sri Lankan construction industry. Most of the responsibility for construction delays lies with the Contractor. Currently available delay mitigation strategies are not efficacious to mitigate delays attributable to Contractors. The goal of the Lean Construction approach is to increase project value by reducing waste and enhancing project performance. Utilizing Lean Construction Tools guarantees that a project is finished on time and within budget. This paper aims to identify the impact of Lean Construction Tools (5S, Last Planner System, Visual Management, First Run Studies) on reduction of Contractor related causes of delay. This was met by utilizing a mixed research methodology, which includes both the gathering of quantitative data through a questionnaire survey held among 40 professionals and the gathering of qualitative data by conducting semi-structured interviews with 8 construction industry specialists. SPSS software was used to analyze data collected from the questionnaire survey and content analysis was used to examine the data obtained from the semi-structured interviews. The results revealed that implementation of Lean Construction Tools can lead to reduction of Contractor related causes of delay. Further it was disclosed that 5S is the Lean Tool that has the highest impact on reduction of Contractor related delays. Findings have also revealed that lack of awareness about Lean Construction is the most critical challenge for the successful implementation of Lean Construction Tools within Sri Lanka. The results depict that to overcome this barrier, awareness on Lean Construction must be enhanced among construction industry professionals.

Keywords: *Contractor Related Causes of Delay, Lean Construction Tools, Sri Lanka*

ID 264

Reviewing the Possibility of Incorporating Mediation Method for Settlement of Contractual Disputes in the Construction Industry of Sri Lanka

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Abstract

It is essential to have an effective Alternative Dispute Resolution (ADR) method in the construction sector since disputes adversely affect the performance of construction projects. Studies on ADR practices in Sri Lanka denote that Negotiation and Adjudication are the preferred and the initial ADR methods. Previous studies indicate that Arbitration is the most popular construction dispute resolution method despite of its disadvantages. This research study took a qualitative approach where data collection was conducted through 21 semi-structured, expert interviews, analysed via content data analysis. The findings indicate that Mediation is an effective ADR method because effective outcomes such as cost-effectiveness, time effectiveness, flexibility, and maintenance of relationships could be achieved. Hence, Mediation could be recommended as the most appropriate initiative as well as to be attempted throughout ADR rather than Adjudication or Arbitration. Mediation is recommended here as the most desirable approach to resolve disputes without affecting the relationship between the parties. This study revealed that a limited awareness of Mediation within the Sri Lankan construction industry has arisen due to the lack of detailed knowledge among Industry Stakeholders. This was due to a lack of emphasis on construction contracts and the disputant parties' attitude. This had a considerable impact on the limited use of Mediation in Sri Lanka. Researchers and practitioners can use the results of this study to understand Mediation practices and make suggestions on how to overcome the issues, to achieve effective mediation outcomes.

Keywords: *ADR, Construction Industry, Mediation*

Exploring ISO Standardization as a Quality Assurance Mechanism in Sri Lankan Higher Educational Sector

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Abstract

Higher education is a critical economic sector that has eventually been followed by all other major economic sectors such as financial services, healthcare, telecommunication, aviation, transportation etc. Today, higher educational institutions all over the world operate in a fast-dynamic environment with high competition for reputation, talent acquisition, and student attraction. Following the basis of the high competition is leading to a significant focus on quality. It is not easy to define the quality in terms of higher education owing to the complex relationships of higher education to students and the different roles of a student in the higher education process. Addressing the issue, ISO has recently published a new quality framework for higher educational institutions; ISO 21001:2018 Educational Organisations Management System and most of the institutions adopted ISO 9001 standard series until the publication of the new ISO standard for higher education. This study employs an evidence-based approach and critically evaluates the existing literature on ISO Quality Management Systems (QMS) implementation in higher education institutions in different countries to elaborate on the necessity of adopting it in the Sri Lankan context. Further, it attempts to summarize the key benefits, challenges, and critical success factors of ISO implementation in Sri Lanka. According to the findings, the key benefits of ISO adoption to higher education institutions are cost reduction, consistent customer satisfaction, risk management, international recognition, adopting rapid changes, attracting grants/ funds, and strengthening international linkages and relationships. In addition, the challenges and critical success factors are also elaborated for easy implication.

Keywords: *Higher education, ISO 9001:2015, ISO 21001:2018, Quality, QMS*

ID 518

Causes for Non-compliance of Made Black Tea with the Main-Relevant-Grade

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Abstract

Sri Lankan tea delights connoisseurs worldwide with its exquisite taste and captivating aroma. On the international stage, Sri Lanka proudly stands as the fourth-largest tea exporter. Although the country's export-oriented tea processing facilities consistently strive for enhancement, in adopting cutting-edge technologies to meet and exceed stringent global quality standards, it was revealed that more than 75,000 main grade sample lots tend to be labelled as their secondary grades per annum, and it was evident that the trend of the percentage of sample lots labelled as the secondary grades of the relevant main grade is increasing. The economic loss caused by this for the last twelve months was calculated to be as US dollars 97.5million. The objective of this study is to disclose the causes for non-compliance of made black tea with the main relevant grade. The data were collected using the Simple Random Sampling technique and the sample size is 383. The dependent variable of the study is 'samples labelled as their secondary grades (SG)' while seven independent variables have been recognised: Bold leaf (BL), Ragged leaf (RL), Unstylish leaf (UL), Broken leaf (BL), Mixed leaf (ML), Flaky leaf (FL), and Stalk or Fibre (SF). The hypothesis was tested using correlation analysis. The regression results of measuring relationships between BL and SG, RL and SG, FL and SG, and SF and SG, signify valid regression models, which explain 67.5 percent , 59.7percent , 54.2percent , and 55.3 percent of the variance of the outcome variables, respectively. The analysis showed that BL (Broken Leaf), RL (Ragged Leaf), FL (Fannings Leaf), and SF (Small Leaf) are significant predictors of SG (Secondary Grades) since their beta coefficient values exceeded 0.7. This study aims to provide valuable insights to all stakeholders in the tea industry, guiding their efforts towards reducing secondary type grades. According to the findings, the primary contributors to secondary type grades are high levels of Ragged leaf and Bold leaf. Hence, it is essential to implement proper handling techniques for tea processing to address this issue effectively.

Keywords: *Bold leaf, Ragged leaf, Flakey leaf, Stalk or Fiber, and Secondary grades*

Evaluating the Impact of Building Information Modeling on Optimizing Quality Management Processes in the Construction Industry

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Abstract

The construction industry can be considered as a critical sphere in the nation's economic progress. However, due to an insufficient quality management procedure, this industry has been plagued by considerable problems, including the failure to complete projects within the triple constraints. The purpose of this research is to assess the impact of Building Information Modelling (BIM) on the optimization of quality management processes in building projects. Cost overruns, project delays, and ineffective quality control methods are the issues which confront the construction sector. BIM has emerged as a viable solution in addressing these difficulties by offering a digital platform that improves project stakeholders' cooperation, information flow, and decision-making. The aims of this research were attained by utilizing qualitative and quantitative data acquired through a comprehensive questionnaire survey and a detailed literature survey. The sum of circulated questionnaires was 40 and the number of responses was 75 percent. Correlation and regression analysis was done with the use of SPSS software to analyze the collected data. According to the findings of the study, there is a substantial beneficial association between BIM dimensions (3D, 4D, and 5D) on the quality management process. According to the regression analysis, the adoption of 3D BIM has the greatest influence on quality management, followed by 4D BIM (time) and 5D BIM (cost). According to the study, BIM may greatly improve quality management procedures in building projects. It suggests the significance of boosting awareness, encouraging stakeholder collaboration, and developing standardized BIM guidelines for optimal adoption. More empirical research is required to fully realize the benefits of BIM in quality management.

Keywords: *Building Information Modelling, Construction Industry, Quality Management*

ID 232

Application of Lean Six Sigma to the Sri Lankan Construction Industry

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Abstract

This research paper investigates the application of Lean Six Sigma in the Sri Lankan construction industry. The study aims to recognize the barriers in implementing Lean Six Sigma and to propose strategies for its successful implementation. There are several barriers in the implementation of Lean Six Sigma, including a deficiency of understanding, resistance to change, lack of skills and resources, complex project environments, cultural aspects, and insufficient data management. A literature review and interviews with industry professionals are a part of the methodology, which is followed by a content analysis. The sample was selected by using the purposive sampling technique covering construction professionals such as Engineers, Architects, Quantity surveyors, Project Managers, and Executives in the construction sector. Overall, the paper provides a thorough overview of Lean Six Sigma, its potential benefits in the Sri Lankan construction sector, and the implementation challenges. It provides stakeholders with actionable recommendations to improve project performance and contribute to long-term economic growth in the Sri Lankan Construction Industry.

Keywords: *Construction Industry, Lean Six Sigma*

An Evaluation of Tropospheric Delay on GNSS Observations

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Abstract

The Global Navigation Satellite System (GNSS) is used to find point locations in latitude, longitude, and altitude which are involved among the satellites and receivers through electromagnetic signals. Due to the refraction of the electromagnetic signals, the signals are delayed than the actual propagation time. In this study, the effect of tropospheric delay on GNSS observations is considered by single-point observation on a primary control point of the Sri Lanka Datum 99 network. The study aims to investigate the total tropospheric delay of GNSS observations affected at different times of the day without considering dry and wet components of the delay. The 24 hours of dual-frequency row data were collected and processed separately on the morning, afternoon, and evening observations using Leica Geo Office 8.4 software applying Hopfield, Simplified Hopfield, and Saastamoinen models to correct the tropospheric delay. Then the purpose was to identify the variation of GNSS observations affected at different times of the day due to the tropospheric delay, by determining the best tropospheric model which can be used to minimize tropospheric delay, and by defining the best time for getting GNSS observations. The Saastamoinen model shows the minimum variation towards the original values of the A166 primary control point. According to this study, morning was the best time for collecting data for GNSS purposes.

Keywords: *Dual Frequency, Hopfield Model, Saastamoinen Model, Primary Control Point, Tropospheric Delay*

Soil Erosion Assessment Using RUSLE & ANN Models and Identifying the Correlation by Landslide Frequency Ratio Method: A Case Study of Kalu River Catchment of Sri Lanka

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Abstract

Soil erosion is a critical environmental concern with profound implications for agricultural productivity and natural resource sustainability. This research endeavors to evaluate soil erosion within the Kalu River catchment in Sri Lanka, spanning the period from 2000 to 2020, using the Revised Universal Soil Loss Equation (RUSLE) and Artificial Neural Network (ANN) models. The primary objectives are to quantify annual soil loss and delineate the spatial distribution of soil erosion risk. The study reveals that the K factor, LS factor, P factor, C factor, and R factor exert varying degrees of influence on soil erosion. Through the application of an ANN model, accurate predictions of soil erosion are achieved. However, for assessing soil erosion susceptibility in the specific study area, the RUSLE model emerges as more effective. Additionally, the research investigates disparities in soil erosion across sub-catchments within the Kalu River catchment. Results indicate that sub-catchment A10 experiences the highest soil erosion, while A4 exhibits the lowest erosion rates. Furthermore, the Landslide Frequency Ratio (LFR) method is employed to establish a correlation between soil erosion hazard classes and landslide frequency. By integrating LFR values, soil erosion rates, and land-use changes, high-priority regions requiring soil conservation measures are identified. This study underscores the significance of estimating soil erosion rates, creating hazard zonation maps, and prioritizing areas for sustainable land management and soil conservation practices. Additionally, it enhances soil erosion factor comprehension, offers valuable insights for further research, and empowers policymakers, land-use planners, and farmers in implementing Eco-friendly land-use practices.

Keywords: *ANN model, Kalu River catchment, LFR, Land-use changes, RUSLE model, Soil erosion*

Analysis of Hambanthota Coastal Zone Infringements Enforced by Coast Conservation and Coastal Resource Management Using Remote Sensing

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Abstract

Sri Lanka is still a developing country. Therefore, various changes are taking place in the construction sector, both legally and illegally. Such illegal constructions are common in developing countries. With the development of the country, the numbers of illegal settlements are increasing along the coastal zone of Sri Lanka. This process is harmful to the coastal conservation of the country. Therefore, Coast Conservation Act 1981, 1988, 2011 (Amendment) was implemented by Coast Conservation and Coastal Resource Management department to protect coastal zone and reduce unauthorized constructions but there is a problem whether the regulations of the Coast Conservation Act are properly followed or not at the coastal management zone. So, the main objective of this study was to identify the infringements in the coastal zone. Locations were selected by the experts of this field, and they were from Kudawella west to Mawella south and from Unakoratuwa west to Medaketiya in the Hambanthota district because those areas were the highly affected locations through the district. To fulfill the main objective of the study, the proposed methodology was to create normalized difference build-up index maps using Landsat satellite images and final vegetation line coordinates. As the final result, this study gained reclassified building index map for the selected locations and this study depicts the role of remote sensing and geographic information systems to identify the sustainable development growth of the area.

Keywords: *Coastal zone, Coast Conservation Act, Normalized Build-up Index*

The Effect of Seasonal Variability in Mean Sea Level and Tidal Constituents: A Case Study in Sri Lanka

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Abstract

The seasonal fluctuations cause water level variations in coastal regions. This research aims to investigate the seasonal variability of tidal constituents and Mean Sea Level (MSL). Tidal data of seven years from the Colombo Port was used to investigate the seasonal variability of both MSL and tidal constituents. The processing of tidal data was performed by using a harmonic analysis based tidal processing and analysis software TOTIS. The findings indicate that the MSL at Colombo exhibit a pattern with seasonal variations. MSL is high during the Southwest monsoon season than the Northeast monsoon season in generally. Then, the variability of amplitude and phase of diurnal (K1, M1, S1, O1), semi-diurnal (K2, M2, S2, T2), and long period (MF, MM, MSF, and SSA) tidal constituents were investigated for Colombo Port. The amplitude of all diurnal constituents exhibited a pattern with seasonal variations, with higher values during the Northeast monsoon season than the Southwest monsoon season. The amplitudes of all semidiurnal constituents exhibited a pattern opposite to that of the diurnal constituents in generally. However, it exhibited a complete opposite pattern during the years 2025 & 2020 where the MSL variation also altered. The long constituents were also exhibited a pattern with seasonal variations. The study found that the phase of each tidal constituent exhibited the same pattern in all years, although K1, M1, M2 and S2 changed the patterns during the same years in which the pattern of MSL was changed. Furthermore, unlike the amplitude variability patterns, the phase component patterns within the same category were not similar to each other. Finally, the study emphasized that amplitudes and phases of tidal constituents exhibit significant alterations with seasonal variations.

Keywords: *Harmonic Analysis, MSL, Seasonal Variability, Tidal Constituents, Tide.*

POSTER PRESENTATIONS

Assessing Benefits of Developing a Simulation Model for Sustainable Constructions Using Life Cycle Assessment (LCA) Approach in Sri Lanka

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Abstract

Using the Life Cycle Assessment (LCA) method to create a simulation model for sustainable projects in Sri Lanka can have a number of advantages. LCA is a methodical approach that assesses the environmental effects of a process or product throughout the course of its full life cycle, from the extraction of raw materials to the disposal at the end of its useful life. LCA is a tool that assists in identifying potential environmental costs associated with construction projects and enables well-informed decision-making to lessen these effects. This employs a content analysis to conduct a comprehensive review on the national and international existing models/frameworks and data bases for modelling the sustainability of constructions and a questionnaire survey to assess the feasibility of using LCAs with the professionals of the construction industry. Results prove that there very few information on widely used models by the design professionals Furthermore results indicate that in maintaining indoor air quality and energy aspects using LCAs need to be implemented with significance in the Sri Lankan context. Findings also proved that the burden of a high-cost requirement is needed to implement LCA in Sri Lanka, therefore existing database inventory from foreign countries need to be modified to suit local data. A LCA model can help Sri Lanka's construction industry transition to more environmentally friendly and sustainable practices, so the long-term benefits outweigh the short-term drawbacks.

Keywords: *LCA, Simulation model, Sustainability*

ID 479

Evaluation of a Cost-Effective Interior Flooring System Using Burnt Clay Brick for Residential Buildings

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Abstract

Price escalation of construction materials and the economic crisis faced by the construction industry call the attention of building related professionals to experiment with cost effective material inventions. This research is initiated with the aim of developing a cost effective and an innovative interior flooring system using burnt red brick. The paper presents the findings of the initial step of the pilot study of the experimental research conducted to identify the potential of developing the proposed and to assess the feasibility of interior flooring system using burnt red bricks. The proposed system involves laying tiles on a well-compacted quarry dust layer, filling grout gaps with fine-grinded brick powder mixed with a binder gum, and applying multiple layers of grinded brick and binder gum paste to achieve a mirror finish. The economic benefits of the burnt red brick flooring system were explored in comparison to traditional flooring options. Among the various flooring options, the brick flooring system stands out for its remarkable cost-effectiveness. Priced at Rs. 570.00 per square foot, it offers an affordable solution that combines sustainability and energy efficiency. The use of locally available materials, such as burnt clay bricks, contributes to its cost-effectiveness. These bricks are produced at lower firing temperatures compared to porcelain or ceramic tiles, resulting in significant energy savings during the manufacturing process. By utilizing red bricks, which are widely accessible, the system reduces the need for resource-intensive materials and minimizes the environmental impact associated with their extraction and production. The findings of this research provide valuable insights into the viability of this cost-effective flooring system within the field of architecture.

Keywords: *Architectural appearances, Burnt clay brick, Cost-effectiveness, Interior flooring, Water absorption.*

Typology Assessment of Burnt Clay Roof Tiles: A Case of Ancient Burnt Clay Technology in Sri Lanka

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Abstract

The ancient circular clay roof tiles with the radiocarbon dating of 2250 BP, found in archaeological excavation in Citadel in ancient city Anuradhapura in Sri Lanka. Artefacts prove that the ancestors' rich clay technology revolution and dramatically improving of: the shapes and dimensions; properties improvement; advancing of production; and burning process during this era. However, their technological approach was disappeared to the present generation and selected as the research gap to fill the void based on the good conditions of artefacts found in year 1999 and collected sample from museum for research purpose. This research aim focuses to decode samples in order to reveal ancestors' knowledge on clay technology together with their developed strategies in order to incorporate for current building application and selected objective was the physical characteristics/ performance test on artefacts. The research methodology was the laboratory testing of artefacts and evaluation under the content analysis method. The synthesis analysis proved that ancestors had adopted the Nature Inspired Solution/ biomimetic design application to shape up the tile and focused on dimension proportioning scientifically during the forming of the ancient circular roof tile. The adjustable roof structure frame work is used to identify a clay roof tiles installation pattern and two approaches found as possible application. The physical plum tests were carried out and proved that tiles were even suitable for vertical application as well. The formation of hole in the top of tile also proved as a scientific approach by our ancestors. The artificial formed rain was conducted and the proposed pattern on roof tile laying was identified as the correct approach, which can establish the ancestors' scientific approach as rich on roof tile design and could compete against with modern instrumental application.

Keywords: *Artefacts, Sustainability, Technology*

ID 517

Students' Perceptions of University Library Spaces; Evidence from Government Universities in Sri Lanka

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Abstract

Academic libraries are fulfilling a special role in higher education institutes. It is one of the most important, memorable and highly functional spaces for campus communities. Conceptually, libraries are considered as the brains of universities. However, the rapid physical developments and growing student population of universities are demanding the well-designed and highly functional spaces within universities including libraries. Thus, it is important to know the perceptions of main stakeholders towards the spaces they used in campuses. Therefore, this study is predominantly focused to research on the students' perceptions of university library spaces to incorporate in designer guidelines which can be used in practicing the library architecture in Sri Lanka. Thus, the methodology was adopted to find students' perceptions using a quantitative analysis. The structured questionnaire was circulated among the sample of 150 university students who use the library spaces representing the selected three case studies. Using IBM SPSS software, collected data were evaluated via the reliability tests, the mean value tests and the correlation tests. The issues pertaining with the case studies were prioritized on their levels of impact and the degree of negligence levels in common ground. The list of drawbacks that should be addressed, design recommendations and solutions for identified problems were provided individually to uplift the standards of all three case studies. Pierson correlations tests were also used to determine the relationship between demographic data and measured parameters. Finally, a check-list was presented to incorporate in designer guidelines to ensure the quality of academic library spaces.

Keywords: *Academic library, Design framework, Postgraduates, User perception, Universities of Sri Lanka, Undergraduates*

Use of Darkness in Religious Places – A Study of User Perception on Use of Darkness for Enhancing the Sense of Place

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Abstract

Architecturally we can control the sense of place by using darkness. Most of the time, people turn into darkness when people want to live in their own thoughts. Religious place is a place which has a huge relationship with human thoughts because it cures human mind and people usually look for the truth and inner peace. Identified matter was, that there is a dark chamber in every religious place. Hindu kovil has a chamber where the god lives. Catholic churches have altar space which covered from the outside and light up only for God. Buddhist temples have Buddha chamber which is dark inside. The question which is identified was why all religious chambers are dark. Does it give some kind of a spiritual feeling to the pilgrims? Can darkness enhance the spirit of place? If the darkness can treat the human mind then as Architects, we can use it to enhance the spirit of place. Then it will help people to create inner peace in their own places. This research focuses to identify how darkness affects pilgrim's thoughts and how does it feel as a sense when in a place of darkness. A questionnaire was developed to identify the participants' perception of being in the dark in the worship spaces and they got many different answers with equal base. All comments relate to the factor that darkness helps to concentrate their mind and helps to create a virtual gap with the outside busy world. After doing a survey test it proves that darkness helps people to concentrate their mind and calm down inner thoughts. Finally, architecture can use darkness for spaces that need relaxation.

Keywords: *Darkness, Dark spaces, Religious places, Sense of place*

A Case Study of Life Cycle Cost Comparison Between a Green Building and a Non-Green Building in Sri Lanka

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Abstract

As the world moves towards more sustainability, Increasing the adoption of green construction has risen to the top of the construction sector worldwide. Green building is a key strategic step towards achieving sustainable development by saving resources, energy, and environment. As the world moves to a greater sustainability, green building has gone to the construction industry's priority list. While currently Sri Lanka is facing an economic and energy crisis, the green building concepts can help the economy by boosting the construction sector. If the implement process of green building concept in Sri Lanka develops within the next 30 or 40 years, it may be capable of converting revenue generating opportunities on construction sector. People only consider the construction's initial cost rather than the total cost over its entire life cycle. When it comes to construction time span, it's near to 3 to 4 years, while the total life span of a building counts over 60 to 70 years. It's better to consider the Life Cycle Cost (LCC) of a building which consists of maintenance, overhaul, services, and repair cost parameters. Thus, the primary goal of this study is to analyze the cost of a green building and a non-green building in Sri Lanka. A case study was done on two selected university buildings. A cost benefit analysis was carried out, accounting for the initial cost in comparison to LCC. Site visits & semi structured interviews which were selected by purposive sampling were used for the data collection. This was done with a mixed method of qualitative & quantitative analysis through a comprehensive study. With the aim of economic consideration of green building concept, this will be a timely research study to Sri Lanka to overcome this emerged economic & energy crisis.

Keywords: *Cost Benefit Analysis ,Green Buildings, LCC, Sustainable Construction*

ID 206

Identification of Implementation Barriers of Building Information Modelling for Green Building Construction in Sri Lanka

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Abstract

Green Building Information Modelling (Green BIM) is a novel approach to address the ever-growing need for sustainability in the built environment. It offers a more standardized way to create buildings, which in turn optimizes building performance while meeting green building requirements. However, BIM adoption still faces significant barriers, even though it could improve the efficiency of sustainable building projects. Hence, this study aims to determine the advantages of using Green BIM, as well as implementation barriers of BIM for Green Building construction in Sri Lanka. A Mixed method approach was followed in carrying out the study. A questionnaire was developed based on the identified barriers from the literature review, to determine the most significant barriers. Identified barriers were analyzed using Relevance Important Index (RII) method. Semi structured interviews were also carried out to determine the significance of adopting BIM for Green Building construction. A content analysis was conducted for the qualitative data obtained through semi structured interview and RII analysis was carried out for quantitative data. Analysis of the responses demonstrated that "Not receiving enough client support and government support", followed by "Inadequate vision of BIM benefits" and "Lack of well-developed practical strategies for implementing Green BIM" were the most significant barriers. The study also presented possible solutions for Green BIM implementation barriers. Further, the study recommends some actions that the Government and educational institutes should take to overcome barriers in implementing Green BIM and is needed to identify to mandate BIM and to develop strategies in mitigating barriers of Green BIM implementation.

Keywords: *Building Information Modelling, Green Building Construction, Implementation Barriers*

ID 209

Identification of the Implementation Issues of Value Management Concept to the Sri Lankan Construction Industry

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Abstract

The concept of Value Management (VM) is a tool which is used in maximizing the value, which is becoming more appropriate to the construction industry of Sri Lanka. The VM will help to reduce cost which helps the Sri Lankan construction industry. This research aims to address obstacles related to the implementation of VM in the construction industry of Sri Lanka with a view to provide conceivable measures in avoiding these difficulties and to increase the usage of the system within the construction industry. The level of knowledge and implementation of VM practices, as well as the barriers to its implementation in the construction industry were evaluated by using a questionnaire survey strategy and interviews. Construction specialists were selected by means of stratified random sampling. The data was analyzed using frequency index analysis. The study reveals that the topmost challenge to implement VM is the minimal level of knowledge of VM among construction professionals. Therefore, the flow of knowledge must be given from the undergraduate level to the senior professionals. To avoid these barriers and accomplish an enhanced quality construction industry practice, it was recommended that the course modules relating to VM should be introduced at the academic level. Further this research will benefit in implementing a model for VM/Value Engineering (VE) for the Sri Lankan construction context.

Keywords: *Barriers, Construction Industry, VM, VE*

The Propriety and Limitations of Relying on Artificial Intelligence and Digitalization in the Field of Quantity Surveying, Sri Lanka

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Abstract

This specific study is carried out to determine to which extends the Artificial Intelligence (AI) can intervene within the field of Quantity Surveying and the tasks accommodated with the field within the Sri Lankan context. The Objective of this research is to identify the tasks and duties that a conventional Quantity Surveyor may perform which are the most critical and vulnerable towards being AI based in the future. These identified tasks and duties will be then directed towards a population of Quantity Surveyors and related professionals to gain their understanding on this matter in both qualitative and quantitative manners. The interviews were put through content analysis process and the gathered Quantitative data were analysed through Likert scale. The questionnaires were incorporated with Relevance Important Index analysis. The conclusions further denoted that most of the Quantity Surveying related tasks and duties were compatible to be associated with AI and digitalized means which could lessen the actual Quantity Surveying personnel involvement in the future. The most conventional and essential Quantity Surveying practices were at the most risk of being replaced by AI systems such as Estimating practices, Cash-flow, labour and material management to name a few. The analysis also proved to show which are the most vulnerable Quantity Surveying duties they could be. Given the proprietary of these each duty to be incorporated with AI or not, the limits they could be associated with, and the reasons why are lastly presented as in recommendations and implications which denoted that it is more probable for Quantity Surveyors to incorporate the AI systems rather than having to face the risk of being replaced by the systems themselves.

Keywords: *AI, Limitations, Digitalization, Propriety, Quantity Surveyor*

ID 345

Impact of Risk Factors for Project Abandonment of Building Construction Projects in Sri Lanka

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Abstract

In Sri Lanka there are many building projects which are either incomplete or simply neglected. It is challenging for any country to see that the significant development if its construction industry is inefficient. This is especially true for nations where numerous initiatives are frequently abandoned. Around the world, projects are still being abandoned. In Sri Lanka number of abandoned projects have increased. Structured questionnaires, interviews and comprehensive literature survey guided the study. The responses were composed via e-mail and interviews. There were 50 responses from questionnaire survey and 10 interviews including project managers, architects and chief Quantity surveyors which, were chosen at random. Using SPSS, these statistical data were examined using correlation and regression techniques, and content analysis was used to evaluate the interviews. The findings demonstrated that there is a strong correlation between the risk indicators and the project abandonment. The findings and recommendations that were gained from this study can be applied for reducing the abandonment of building construction projects in Sri Lanka.

Keywords: *Building constructions, project abandonment, Risk factors, Sri Lanka*

Enhancing the Effectiveness and Efficiency by Adopting Building Information Modelling in the Service Delivery of the Quantity Surveying Practice of Sri Lanka

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Abstract

Building Information Modelling (BIM), in the global construction context of the new millennium, has grown into a new advanced paradigm where it is increasingly, universally recognized as a new buzzword. BIM has a great potential to incorporate with the construction project's life cycle. Thereby, it is more probable to be a standard practice. Incorporating of BIM applications, the practice of quantity surveying in the new millennium is undergoing a paradigm change from traditional manual techniques to completely automated digitalization in the purpose of providing the service in an efficient and effective manner. However, in Sri Lanka, traditional manual processes are still used in Quantity Surveying (QS) practice, which is problematic. The execution of BIM applications for the QS practice is a fear among Quantity Surveyors because the professionals' existence is creating a threatened and challenging nature when employing BIM in the QS practice. Lack of government influence, unavailability of computer facilities with higher capacities and cost of software and hardware are distinguished as the main obstructions and are discussed here. The present knowledge about BIM applications relevant to the QS practice of Sri Lanka is explicitly explaining, BIM applications adoption that can have an influence on the QS's functions. Thereby, to overcome the deficiencies faced by QSs due to the usage of traditional manual methods, this study focuses on the strategies to integrate BIM by discovering the present status of using BIM within the QS operation.

Keywords: *BIM, QS*

ID 055

Two-Dimensional Road Traffic Noise Mapping: A Case Study of Matara City in Sri Lanka

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Abstract

Road traffic noise pollution is increasing year by year due to urbanization. Road traffic noise pollution is increasing year by year due to urbanization. Road traffic contributes to 80% of a city's noise pollution. Noise mapping is a comprehensive method for measuring and analyzing environmental noise, including the number of persons who are bothered by it and how often they experience its disruptive effects. This study focuses on visualizing road traffic noise levels in Matara city, Sri Lanka. Traffic noise varies in different factors and a proper noise equation is essential to calculate road traffic noise. The noise observation points' separation and the precision of the noise equation are key factors in determining how well noise is represented visually. The Henk de Klujijver's noise model is used for calculating noise levels in this study. Suitable spatial interpolations are vital to interpolate traffic noise levels. Moreover, this study enhances the accuracy comparison between Inverse Distance Weighted, kriging, and spline spatial interpolations on road traffic noise mapping. Designing noise observation points (Nops) is vital to the accuracy. Therefore, 10 metre distance interval was used for Nops. According to the Root Mean Square Error (RMSE), kriging interpolation had the minimum RMSE value. The final noise visualization was done by kriging spatial interpolation. However, 65.44% area was less than 63dB in the morning, and 64.82% area was less than 63dB in the evening. Urban planners of city development projects can utilize the results of this study in the future.

Keywords: *Noise models, Noise visualization, RMSE, Spatial interpolation*

ID 365

Study of Solar Radiation Variation over an Area Using GNSS Observations – Spatial Reference to KDU Southern Campus

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Abstract

At present, Global Navigation Satellite Systems (GNSS) are used to study the behaviour of the atmosphere including the ionosphere and the troposphere by calculating the time taken for a GNSS satellite signal to reach the Earth. The GNSS satellite signals get interrupted while travelling through the ionosphere due to free electrons produced from exposing the particles in the atmosphere to extreme Ultraviolet radiations. These amounts of free electrons are identified as the Total Electron Content (TEC) in the ionosphere. So due to these interruptions, a delay occurs when GNSS satellite signals reach the GNSS receivers on the Earth's surface. This effect is called as the ionospheric delay. So, scientists use statistics related to ionospheric delay to study the behaviour of the ionosphere. This study also describes a method to obtain the TEC in the ionosphere using the ionospheric delay and determines the solar radiation variation over an area using those calculated TEC values. Herein, single-frequency GNSS signals of the Global Positioning System were used and thereafter TEC values along each signal path were calculated. Then the variations of TEC values were obtained and thereby an equation was derived through nonlinear regression analysis to predict the solar radiation variation. After the analysis, the study is concluded by obtaining the TEC variations over an area and finding an ideal method to obtain solar radiation variation using those TEC values obtained with the help of the model created through nonlinear regression analysis.

Keywords: *GNSS , Solar Radiation, TEC*

Assessment of Soil Erosion Using GIS Base Erosion Potential Method – A Case Study of Victoria Reservoir Watershed

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Abstract

Soil erosion is a serious environmental problem that adversely affects ecosystem health and land productivity. Effective land management and erosion control strategies depend on accurate assessment and identification of areas vulnerable to soil erosion. To identify areas prone to erosion, this study focuses on soil erosion assessment using a Geographic Information System (GIS)-based erosion potential method. The study used different layers of data including topography data, land cover, soil properties, rainfall and temperature patterns to estimate the overall erosion potential model. GIS technology facilitated the integration and analysis of these data layers, enabling a spatially clear assessment of erosion risk across the study area. The results of the erosion potential assessment revealed spatial patterns of erosion susceptibility across the study area. It ranges from 0.008 m^2/year to 3.2 m^2/year. Areas with little vegetation and areas with steep slopes were found to have a higher potential for erosion. On the other hand, areas with abundant vegetation and gentle slopes showed less potential for erosion. The analysis highlighted the influence of rainfall and temperature, by emphasizing the importance of considering climatic factors in erosion assessment. The findings of this research provide valuable insights for land managers and policymakers in implementing targeted soil conservation measures.

Keywords: *Erosion potential method, GIS, Soil erosion, Victoria Reservoir watershed.*

ID 452

An Assessment of Urban Expansion through the Integration of Remote Sensing Data and the Relative Shannon Entropy Model in GIS: A Case Study of Mirissa Tourism City in Sri Lanka

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Abstract

Urban expansion, defined as the increase in the built-up area of settlements accompanied by population growth, has a long history influenced by human activities. However, in densely populated areas, urban growth can occur without physical expansion, while urban expansion can occur without substantial population growth due to densification. The developing world has experienced rapid growth across various industries, with tourism emerging as a significant and expanding global sector. Unplanned urban expansion has led to the issue of urban sprawl, which has become a prominent topic in various scientific disciplines. This study focuses on investigating the expansion of Mirissa Tourism City. The primary objective is to determine urban land expansion using Shannon's Entropy value. Remote sensing and Geographic Information Science (GIS) techniques offer methods to assess expansion indices using satellite imagery. Satellite images from 2005, 2010, 2015, and 2020, obtained from United States Geological Survey (USGS) Earth Explorer, and were used as primary data sources. The Normalized Difference Built-up Index (NDBI) was employed to extract the built-up areas and calculate urban expansion/urban sprawl, enabling the identification of expansion patterns in the study area. The findings include the generation of maps depicting the expansion of built-up areas in Mirissa Tourism City, revealing the urban expansion using Shannon's entropy value. Incorporating such analysis into town planning allows for the identification of extension patterns that promote sustainable development. The results indicate that the region experienced a slight expansion between 2005 and 2010, followed by a moderate rate of expansion from 2010 to 2015 and in 2020. Ultimately, the output highlights that urban expansion predominantly occurred from the beach-side towards the city center area in Mirissa Tourism City.

Keywords: *GIS, NDBI, Remote Sensing, Shannon's Entropy, Urban Expansion, Urban Sprawl*

ID 519

Accuracy Assessment of Land Use Mapping Methods-Spatial Reference to KDU Southern Campus

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Abstract

The development of land-use mapping is approached from a historical perspective. Southern campus was chosen as a study area because it has a water area, a cultivation area, a built-up area and a forest area which were needed to create a land use land cover map. With the most recent technologies, numerous methods for mapping land usage have been established. To assess the validity of these procedures, no comprehensive investigation has yet been carried out. As a result, it is emerged to analyse the accuracy of land use mapping. The Global Navigation Satellite System (GNSS) was used as a ground data collection method to prepare a land use plan of the study area. Further, land use maps for the same area were prepared by using satellite images and drone images. Accordingly, the accuracies of the Remote Sensing product were compared with the output of the ground data collection method. According to this study, The Supervised Method of sentinel image has received 88% accuracy and the semi-automatic Method of sentinel image has received 88% accuracy Moreover, the unsupervised Method of sentinel image has also received 86% accuracy. The Supervised Method of drone image has received 90% accuracy. In comparison of all these results, the drone images are suitable for in creating land use land cover maps.

Keywords: *Drone Images, Image Classification, Remote Sensing*

A Geospatial Analysis of the Vehicle Parking System in Galle Fort

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Abstract

A proper vehicle parking system is essential to the development of transportation systems in growing countries. Studying parking data to exploit flaws and finding solutions has also been hindered due to the dynamic nature of traffic and parking data. This research focuses on assessing the efficiency of the existing parking system in the Galle Fort, using parking demand and driver's parking choice behaviour. From the field survey and questionnaires, five locations were identified to cause a lack of parking space during their peak hours and dedicated days. The parking supply information was obtained by using remote sensing and field surveys. They were combined with traffic statistics to calculate the parking space demand in the study areas. It was found that the above-mentioned locations caused a lack of parking spaces in the area. By using existing literature, field survey and questionnaires, parking spaces were provided with a user favorability rating based on the orientation of the parking space, condition, safety, ease of searching and shade available to the parking space. Land use and parking demand have a strong visible relationship. Strategic designing of parking spaces is vital since a valuable space in a city should be efficiently utilized while incorporating a smooth traffic flow. Further information on the attitude of drivers in the region in choosing a parking space can be determined from this research. Overall, this study provides useful information about the parking system of Galle Fort which can assist in the creation of the future development plan.

Keywords: *Galle Fort, GIS, Parking choice behaviour, Parking demand, Parking supply, Parking system*

ID 220

The Impact of RIBA Plan of Work on the Quality of Projects in Sri Lankan Construction Industry

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Abstract

The stage of Sri Lankan construction industry is evidenced by frequent project failures due to the performance of triple constraint. Inefficient project planning leads the projects toward an abyss. Royal Institute of British Architects (RIBA) Plan of Work is one of the leading project management techniques around the world. In the present day, many projects are moving towards the quality of projects while applying the RIBA Plan of Work. It guides all stages of the project life-cycle. The objectives of the study were achieved by using qualitative and quantitative data gathered through semi-structured interviews and a questionnaire. A comprehensive literature survey was carried out to understand and identify the concept of the RIBA Plan of Work and triple constraint performance which affect the project quality. The relationship between time, cost and quality performance, and project success was determined through the correlational analysis, and the impact of the relationship was determined through the regression analysis using SPSS software. The challenges pertaining to the implementation of the RIBA Plan of Work in Sri Lanka were identified through interviews by conducting a content analysis. The findings of this research discuss the critical success factors of time, cost, and quality performance which has a direct impact on the final output of construction projects. Finally, insufficient knowledge, denial of acceptance, PESTEL condition difference in practiced countries, implications with regard to time for implementing the RIBA Plan of Work, and implications of training/educating individuals involved in Sri Lankan construction projects were identified as the challenges.

Keywords: *Critical Success Factors, Project Success, RIBA Plan of Work, Triple Constraint*

ID 236

The Impact of BIM Software Application on the Quality of the Construction Project Success: Special Reference to the Post Pandemic Situation in Sri Lanka

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Abstract

The COVID-19 pandemic significantly impacted Sri Lanka's construction sector and even in the post-pandemic situation. As a response, project stakeholders embraced remote work practices. This presents an opportunity for stakeholders in the construction industry to leverage Building Information Modelling (BIM) software applications to enhance the quality of the project success. BIM's integration throughout the construction project life cycle positions it to become the standard, including procurement processes. The widespread adoption of BIM tools has transformed the global construction industry, automating service delivery and revolutionizing practices of the construction professionals. This research offers insights into using BIM software applications to overcome challenges associated with traditional methods. Findings indicate a positive impact of using BIM software applications by the construction professionals on the quality of project success in the post-pandemic situation of Sri Lanka and a positive relationship is observed between the BIM software applications by the construction professionals and the quality of project success. These findings can inform improvements for better preparing future professionals for upcoming challenges. In addition, this research emphasizes the importance of leveraging BIM software applications for enhanced the quality of the project success. It provides valuable insights to the construction professionals in empowering them to navigate the changing landscape and capitalize on the benefits of BIM. By embracing the advancements and recommendations outlined in this study, construction professionals can proactively adapt the future challenges and deliver improved project outcomes.

Keywords: *BIM Software, Project Success, Post Pandemic Situation*