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BOOK OF ABSTRACTS

UNIVERSITY OF VOCATIONAL TECHNOLOGY, SRI LANKA

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PREAMBLES

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MESSAGE OF THE VICE CHANCELLOR

I am delighted to join you for the 8th International Research Symposium (IRS 2024) of the University of Vocational Technology, focused on the timely and transformative theme of 'Vocational Education for a Sustainable Greener Economy.' This event is a powerful testament to the university's commitment to leveraging research and education to drive sustainable development.

In today's world, the role of Technical and Vocational Education and Training (TVET) has never been more significant. As economies across the globe pivot towards sustainability and green practices, TVET emerges as a critical driver of this transition. By equipping individuals with the skills and knowledge needed to tackle environmental and economic challenges, this sector not only empowers communities but also lays the foundation for a resilient and prosperous future.

The University of Vocational Technology leads this transformative journey by seamlessly integrating innovative education with practical applications to advance sustainable development goals. Its unwavering commitment to research and development spans critical areas such as Educational Strategies for Sustainable TVET, Engineering Technology for a Green Economy, Digital Technologies and Creative Industries, Innovation and Entrepreneurship for Economic Resilience, and Sustainable Practices for a Multifunctional Green Economy. These initiatives highlight the essential role of education and research in tackling the multifaceted challenges of the 21st century and driving progress toward a more sustainable future.

IRS 2024 provides an invaluable platform for researchers, educators, and industry leaders to collaborate and exchange insights. It is through such dialogues and partnerships that we can chart pathways to ensure vocational education remains relevant, innovative, and impactful.

As we gather here today, let us reaffirm our collective commitment to sustainability and strive to create a greener, more equitable economy. I extend my heartfelt congratulations to all the authors for your published research work. I would also like to express my heartfelt gratitude to the Organizing Committee, all Reviewers, and the staff of the University of Vocational Technology for their dedicated efforts in making this event a success.

Prof. C. Mahesh Edirisinghe
Vice Chancellor

MESSAGE OF THE KEYNOTE SPEAKER

I like to provide my warm congratulations to this very important International Research symposium on "Vocational Technology Education for a Sustainable Greener Economy". marking another significant occasion in the journey of the University of Vocational Technology. Multi-disciplinary research and collaborations are essential to achieve a greener economy leading towards net zero and UN Sustainable development goals. This symposium provides that platform with 5 sub-themes covering several disciplines.

With your continued support and dedication, I am confident that the University of Vocational Technology will continue to lead the way in fostering sustainability and green practices in the industry, thus contributing to an eco-friendly future for Sri Lanka, The achievements reached thus far would not have been possible without the dedication and hard work of the organizing committee led by the Symposium Chair Ms. Madhavi Perera. I also would like to acknowledge Ms Samantha Manawadu, who has won many Green Building Council awards, for making my presence possible.

Prof. Priyan Mendis
Professor University of Melbourne, Australia
Founder Chairman,
Green Building Council of Sri Lanka

MESSAGE OF THE GUEST OF HONOUR

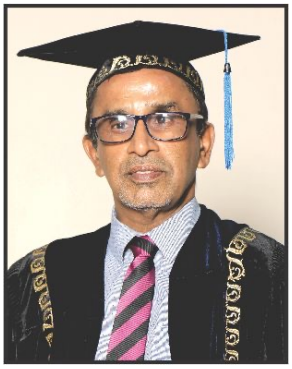
It is an honor to contribute to the University of Vocational Technology Symposium 2024 as a guest speaker on the theme, "Empowering Dreams: Unlocking Higher Education Research Pathways for Vocational Excellence." Vocational education is a cornerstone of any nation's economy, workforce development, and educational progress. By bridging the gap between industry needs and academic expertise, it equips individuals with skills that drive innovation and growth. Since its inception, the University of Vocational Technology has been a pioneer in this mission, nurturing talent and advancing vocational excellence in Sri Lanka.

Through its visionary free education system, Sri Lanka has the potential to achieve its aspirations by fostering research-driven solutions, enhancing global competitiveness, and shaping a resilient, skilled workforce. By investing in vocational education, we are not only empowering individuals but also driving the nation towards a future of sustainable development and economic prosperity. The University of Vocational Technology stands as a beacon of hope and progress, demonstrating the transformative power of education. Its commitment to excellence and innovation has set a benchmark for vocational institutions worldwide. As we gather to discuss and share insights, let us remember the profound impact that vocational education has on our society. It is through these efforts that we can build a more inclusive and dynamic economy, where every individual has the opportunity to thrive.

Thank you for the privilege of sharing in this important conversation. Together, we can unlock the potential of dreams and pave the way for a brighter future. Let us continue to champion vocational education as a catalyst for national progress and global advancement.

Dr Nadeesha Chandrasena
Urban Innovator

MESSAGE OF THE DEAN, FACULTY OF EDUCATION



It is a great pleasure to issue this message on the occasion of the International Research Symposium (IRS), 2024 of the University of Vocational Technology. The Symposium is an annual event in the academic calendar of the University and has been a great success in the last several years.

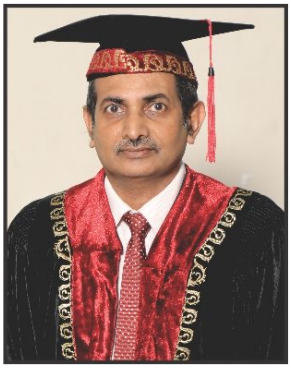
The University has continued to promote conducive environment for increased generation of quality research while enabling mentorship of early researchers through research methodology and data analysis capacity development. We believe that dissemination of knowledge and providing exposure to staff and students to engage in research is a part of our responsibility. It is a great opportunity for them to improve their analytical skills and interact with a wider community.

This annual symposium will provide an excellent platform for students and faculty members of the University, other public and private universities and research institutions to show-case their research productivity and promise for the future new knowledge generation.

Finally, I would like to thank the organizing committee and others who have worked hard to contribute to the success of this symposium.

Dr.Sunil Kularatne
Dean
Faculty of Education

MESSAGE OF THE DEAN, FACULTY OF ENGINEERING TECHNOLOGY



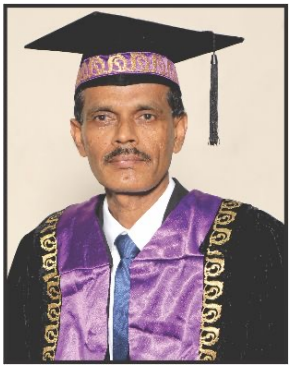
It is a great pleasure to have an opportunity to convey my best wishes to the 8th International Research Symposium (IRS-2024) of the University of Vocational Technology. I want to express how proud I am of the hard work you have all put into your research works. This event highlights the diversity of ideas and perspectives that enrich our community, allowing us to learn from one another and discover new approaches to the important challenges we face today.

This symposium is not just about presenting your work; it is also a fantastic opportunity to share ideas and engage in meaningful conversations. Connecting with fellow researchers and industry professionals can spark innovative ideas and lead to valuable collaborations. Remember, the insights you gain from each other can inspire new directions in your research and open doors to exciting possibilities.

As you present your research, keep in mind that the journey of discovery is just as important as the results. Embrace the spirit of exploration and creativity that drives your work. Consider how your findings can contribute to broader conversations in your field and make a positive impact in the community. I am excited to hear about the remarkable work you have accomplished and to see the engaging discussions that will take place throughout the symposium. Together, we can celebrate our achievements and inspire one another to reach even greater heights.

Dr. Jayalal Wettasinghe
Dean
Faculty of Engineering Technology

MESSAGE OF THE DEAN, FACULTY OF INDUSTRIAL TECHNOLOGY



Greetings from the 2024 International Research Symposium, an exciting platform for innovation, learning, and collaboration. On behalf of the Faculty of Industrial Technology, it is my great honor to address all of you as we gather to explore groundbreaking research and insights across diverse fields. Our faculty consists of four dynamic departments: Film and Television Production Technology, Agriculture and Food Technology, Industrial Management, and Quantity Surveying. These departments drive our mission of nurturing future leaders equipped with the knowledge, skills, and entrepreneurial spirit to meet the evolving needs of industries worldwide.

We provide six Bachelor of Technology degree programs that are uniquely tailored to meet industry standards: Media and Arts Production Technology, Film and Television Production Technology, Food Process Technology, Industrial Management, Hotel Management, and Quantity Surveying. In order to ensure that our graduates not only succeed in their chosen disciplines but also possess the abilities to innovate, adapt, and lead in the rapidly evolving technological landscape, our academic programs place a strong emphasis on techno-entrepreneurship. At the Faculty of Industrial Technology, we are committed to fostering a research and innovation culture among our students and faculty members. This symposium reflects our ongoing efforts to promote academic excellence, encourage knowledge sharing, and inspire new solutions to the challenges facing industries today.

I urge everyone to think creatively and courageously as we have meaningful conversations and share ideas. Let's work together to influence industry, science, and technology in order to create a sustainable and prosperous future.

Dr. Kamal Edirisinghe
Dean
Faculty of Industrial Technology

MESSAGE OF THE DEAN, FACULTY OF INFORMATION TECHNOLOGY

It is a great pleasure to send this message as the Dean of the Faculty of Information Technology for the International Research Symposium 2024 at the University of Vocational Technology on the theme "Vocational Technology Education for a Sustainable Greener Economy"

This event has become a significant occasion for the University, as the dissemination of knowledge is a fundamental responsibility of academics. I encourage our students to demonstrate dedication and commitment in publishing your academic work for achieving your professional goals. As we stand at the forefront of the technological revolution, I am filled with immense pride and anticipation for the challenging yet exciting event which leads the university to up-lift to a higher rank.

As we all know organizing this kind of event on annual basis is not an easy task. I wish to congratulate the organizers of the Symposium for their determined effort.

I firmly believe that this Symposium will bring a productive output in terms of academic and students research work. I express my special thanks to the symposium organizing committee, all participants and the presenters. Best wishes for a successful and inspiring symposium.

Ms. T.K. Malwatta
Dean
Faculty of Information Technology

MESSAGE OF THE SYMPOSIUM CHAIR

As the Symposium Chair of IRS 2024 it is an honour for me to welcome all of you to IRS 2024. This year, University of Vocational technology is very proudly hosting IRS 2024 under theme "Vocational Technology Education for Sustainable Greener Economy" . It is the 8th research symposium organized by the university and IRS has become a tradition in the university and it has fostered a research culture in the university and it has been beneficial for all of us to advance in our research careers.

This year's theme marks an important responsibility that has being entrusted to University of Vocational Technology as the only university catering to TVET sector in the country. With the whole world, Sri Lanka too is planning to steer our economy towards sustainable development and green economy. During this journey our country will need an empowered skillful work force who can adopt to dynamic challenging situations and TVET sector will be entrusted with building this workforce. We believe IRS 2024 will be an ideal platform to present research outputs and disseminate new knowledge that can empower the TVET sector professionals to thrive and meet these new challenging goals.

The feedback we received for this symposium was beyond our expectations and we received a large number of research papers in various fields that are aligning with our five tracks. All the papers were evaluated through blind review process by at least two subject experts and the feedback was given to the authors to improve the quality of their research work and the papers meeting the expected academic and research standards were selected for the presentations. On behalf of the program committee , I extend my heartiest gratitude towards all the reviewers who dedicated their valuable time and provided us the feedback required to maintain the academic standards of the symposium.

Congratulations to all the authors on your achievement and we are looking forward to a productive day of disseminating knowledge and insightful discussions. I am confident that the proceedings of IRS 2024 will inspire all of us to explore new research paths and conduct prominent research work in our respective fields.

Ms. P.M. Perera
Symposium Chair - International Research Symposium 2024 - UOVT

TRACK 1

EDUCATIONAL STRATEGIES FOR SUSTAINABLE TVET

EFFECTIVENESS OF THE MIND MAPPING TECHNIQUE IN ESSAY WRITING: A CASE STUDY OF GRADE 11 ESL LEARNERS

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Abstract: Essay writing is a challenging skill for Grade 11 ESL learners in Sri Lanka. The mind-mapping technique has been utilized to enhance essay writing skills in many countries. Hence, this experimental study examined the effectiveness of the mind-mapping technique compared to the traditional outlining technique in improving essay writing to address the difficulties these students face. Both Mind mapping and outlining techniques improved students' essay writing skills. However, students who used the mind-mapping technique performed better than those who used the outlining technique. The most significant improvement was seen in the organization of essays, attributed mostly to the use of the mind mapping technique, compared to content, language, and mechanics of writing. The findings highlighted the effectiveness of the mind-mapping technique in enhancing essay writing in general and organizing skill in specific. Based on the findings of this study it can be concluded that the mind-mapping technique has a positive impact on the essay writing skill. Hence, the mind-mapping technique is recommended to be incorporated into teaching and learning processes to enhance the essay writing of Grade 11 ESL learners.

Keywords: ESL Learners, Essay Writing, Mind Mapping, Outlining.

AN ANALYSIS OF PRONUNCIATION TEACHING INCLUSION INTO SRI LANKAN ENGLISH TEXTBOOKS FROM GRADE THREE TO G. C. E. (A/L)

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Abstract: Pronunciation inclusion plays a significant role in school textbooks, English pupils' books are designed for grades 3 to 11, and General English for (A/L), that are distributed as the sole primary resource by the government. Pronunciation is an essential skill to improve language competency. However, they often lack standardized activities and pronunciation teaching. Therefore, this study analyses the strengths and weaknesses of pronunciation activities in textbooks through own checklists based on the themes: explanation, materials, activities, evaluation, illustration, culture, varieties of English, and comprehensible input qualitatively. The textbook analysis is carried out for eight months in eight textbooks, excluding Grades 3 and G, C. E (A/L) textbook in which pronunciation is not emphasized, based on content analysis by identifying both primary and secondary textbooks carefully. Also, these activities are compared with the Teacher's Guide and internationally published books. These textbooks are embedded with some strengths and many weaknesses. Grade 3 and G.C.E. (A/L) textbooks are not embedded with pronunciation activities. Explanations are shallow and repetitive in primary grades whereas secondary grades do not consist the explanations and clues for teachers are inadequate and incorrect to some extent. Graphemes, mother tongue influences, homophones, homonyms, homographs, syllable-based reading, consonant clusters, representation of a certain letter to soft and hard sounds, intonation, and stress are neglected. In conclusion, the activities of textbooks are inadequate, inappropriate, and incorrect. Also, this study focuses on further inclusion for the future development of textbooks in terms of pronunciation and communicative skills by integrating technology in this changing world to focus on challenging areas, manipulate some strategies, and include more materials and supplementary materials.

Keywords: Analysis, Checklist, Pronunciation, Textbook activities, Themes.

NEEDS ANALYSIS OF ENGLISH FOR ACADEMIC PURPOSES FOR ELT UNDERGRADUATES

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Abstract: A needs analysis is one of the best tools to identify the EAP needs of tertiary level students. In the Sri Lankan context, there are significant drawbacks to EAP needs in writing among third year ELT undergraduates. Hence, the objectives of this study were to investigate the need of EAP in writing among third-year ELT undergraduates, to explore reflections of third-year ELT undergraduates in writing for EAP in the previous academic years and to explore the perspectives of academic staff regarding the EAP needs of the ELT undergraduates. The mixed research method was used based on purposive sampling in the research design. A questionnaire form of Google Form and focus group discussions were conducted with twenty-six third year B. Ed ELT undergraduates as well a structured interview with seven internal and external lecturers in the Department of Languages Studies was conducted to collect the required data. As for the results, it is identified that there is a need for EAP in writing among third year ELT undergraduates. Grammar, vocabulary, research skills and proofreading are the specified areas to be improved in EAP in writing among third year ELT undergraduates. Furthermore, the identified needs of third year ELT undergraduates are similar to their previous year's reflections which provide clear insight into their needs were not addressed properly in the third year. Moreover, the perspectives of lecturers significantly stated the deficiency of EAP in writing among undergraduates. In conclusion, initiating an EAP certificate course, inserting more written practices into the curriculum and self–practice are the recommendations made according to the findings of the study.

Keywords: Needs analysis, EAP, Academic writing.

A CASE STUDY OF ACADEMIC, SOCIAL AND FAMILY HISTORY AND BEHAVIOURAL SITUATION OF BELOW AVERAGE LEVEL STUDENT READERS WITH SPELLING AND WORD RECOGNITION CHALLENGES

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Abstract: Dyslexia is underrated due to teachers' ignorance, a lack of identification awareness, and educational resources in Sri Lanka. This study aims at identifying the academic, social, and family history and behavioral characteristics of student readers with spelling and word recognition at below average level. The objectives are to find out the academic, social, and family histories and behavioral characteristics. Additionally, three students were selected, and data was collected using two observational checklists with 25 and 50 key statements on a 5-point Likert scale. A first checklist with 25 statements was used to collect data from three students' primary and secondary teachers and five family members: parents, relatives. The three students were surveyed using a dyslexic screening test (DST) with 50 statements by an instructor of special learning education. The data was analyzed using descriptive analysis, and a descriptive mix method was used for identification and analysis. 57 characteristics were identified out of 75 (25+50) related to the characteristics: academic, social, family history, and behavioral, by two checklists. Findings were classified under four themes: Checklist 1 (25): 10 academics, 5 social, 5 family history, and 5 behavioral; checklist 2 (DST): 20 academics, 5 behavioral, 5 social and 2 family histories were identified.

Keywords: Characteristics, Spelling, Word recognition.

ENHANCING LEARNERS' INTRINSIC INTEREST IN ENGLISH LANGUAGE LEARNING THROUGH ORAL ACKNOWLDEGEMENT: ACNKOLDEGING STUDENTS' MINIMUM EFFORT FOR MAXIMUM IMPACT

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Abstract: The connection between the words and the human brain is intended to emphasize how miraculous the brain is. By acknowledging students orally, even for the minimum effort, may awaken their intrinsic interest (natural interest). This study investigates, how giving oral acknowledgment may enhance students' engagement and performance in learning the English language. The study used the mixed-method approach. For the first objective, the questionnaire was utilized and the data analyzed using MS excel and the analyzed data was categorized in to 5 themes: feeling discouraged, lack of self-efficacy, self -demotivation, lack of self - determination, lack of self - confidence. In the second objective, observational journals, and questionnaire were utilized. Three phases of student developmental patterns were identified by the researcher, based on the observational journal for the 15-day intervention period: Days 1–5, Days 6–10, and Days 11–15. These three phases involved the developing patterns of students' engagement level, enthusiasm and interest, gaining attention work quality, consistency with regular classroom dynamics. According to the observational journal, there was an overall 52% development in the above 3 phases. Additionally, the passive learners exhibit the greatest progress in the 3rd phase (days 11-15). Further, in the second objective, an interest scale was utilized, and the data was analyzed by the Wilcoxon Signed Rank Test, which resulted in 97.1% of respondents demonstrated a significant improvement. Cross-validation of the student's overall development was possible because both qualitative and quantitative data were used.

Keywords: Intrinsic interest, Natural interest ,Oral acknowledgement, Minimum effort

INDICES TO CONSIDER FOR FURTHER DEVELOPMENT OF DEGREE PROGRAMS: CASE STUDY-UNIVERSITY OF VOCATIONAL TECHNOLOGY, SRI LANKA

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Abstract: The purpose of this research study is to reveal the training effectiveness (Dependent Variable) (DV) of sample degree programs of the University of Vocational Technology(UoVT), over the Trainee, Trainer, and Training Environment at institutional functioning criteria of Degree programs: Independent variables (IV). Thus, this research is anticipated to study the relationship and Impact of institutional functioning criteria of selected two sample degree programs as a model to propose factors to consider in developing related strategies for relevant improvements. The study was conducted using the quantitative approach. The Independent Variables (IV) therefore, in this study are as follows: Supportive Learning Environment (SLE), Support from the Working Social Working Environment: (SWSWE), University Training Environment (UTE), Class Room Facilities (CRF), Quality of Supporting Services Relevant to Lecture Delivery: (QSLD). The Training Effectiveness of the degree programs is considered as the Dependent Variable (DV). The SPSS data analysis software was used for the analysis purposes. Accordingly, as per the results, both the degree programs show a positive Correlation between the Independent and dependent variables, and related variables are proposed to be considered when developing the strategies for development. Yet, the Bachelor of Technology in Quantity Surveying Degree program shows a significant correlation between the IV's and DV. Considering the impact of IV's to DV it shows a positive impact for all the IV's to DV for both the degree programs, and recommended the consideration of relevant IV's for strategy development.

Keywords: Degree Programs, Factors Affecting, Impact of institutional Function, Training Effectiveness.

CHALLENGES FACED BY STUDENTS IN LEARNING ENGLISH AS A SECOND LANGUAGE FOR G.C.E. O/L EXAMINATION IN PUTTLAM SOUTH EDUCATION DIVISION

W. R. A. D. Lakshani and K. T. P. C. Somarathna

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Abstract: English proficiency plays a pivotal role in shaping students' educational achievements and future career prospects. The purpose of this study is to investigate the challenges faced by students in learning English as a Second Language (ESL) for G.C.E.O/L in Puttlam South Education Division. The survey was conducted based on the data collected from six schools in Putlam South Education Division where the fail rate of G.C.E.O/L examination is more than 60% continuously over five years. This study adopted the mixed method design using quantitative data collected from 265 students of Grades 9, 10, and 11 of selected six schools and qualitative data collected from 6 English teachers through in-depth interviews. The collected quantitative data were analyzed using descriptive statistical analysis and qualitative data were analyzed using thematic analysis. The findings of the research indicated that all the participants encountered linguistic challenges such as limited exposure to four language skills, vocabulary, and grammar while they faced socio-cultural challenges such as peer pressure and lack of support. Furthermore, as educational challenges, they encounter a lack of suitable learning environment, difficult to get attention and as motivational challenges, they face a lack of interest in learning due to less motivation provided by the families. Finally, psychological challenges fear, anxiety, and negative attitudes were identified as barriers that hinder the process of learning ESL. Additionally, the findings revealed that Linguistic factors, Cultural factors, Educational factors, Socio-economic factors, Technological factors, Psychological and Motivational factors affected the challenges. The findings of this study highlight that while English proficiency remains a significant challenge for students in the Puttlam South Education Division, targeted interventions and support systems have the potential to gradually improve their language skills and overall exam performance

Keywords: Challenges, English as a Second Language (ESL), General Certificate of Education Ordinary Level (G.C.E.O/L)

THE IMPACT OF UNIVERSITY LECTURERS' ATTITUDES ON UNDERGRADUATES' ACADEMIC OUTCOMES: A COMPARATIVE ANALYSIS ACROSS EUROPE, ASIA, AND SRI LANKA

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This review paper employs a comprehensive literature synthesis approach to investigate the impact of university lecturers' attitudes on undergraduate academic outcomes across Sri Lanka, Asia and Europe. Academic databases, including peer-reviewed journals, conference proceedings, and institutional reports published between 2000 and 2022 were referred to grasp comprehensive and up-to-date studies and systematically reviewed to ensure the study coverage. Studies that specifically examined the impact of lecturers' attitudes, both positive and negative, on student performance, engagement, retention, and psychological health were the main emphasis of the inclusion criteria. Both qualitative and quantitative research were considered to gain a well-rounded viewpoint. The review also integrates extreme scenarios where lecturer attitudes significantly impacted student outcomes in the dimensions of cultural and regional differences. Finally, the findings of the entire review were categorized and compared to highlight key trends, differences, and similarities across the different geographic contexts. This approach results a substantial understanding of how lecturer attitudes influence educational experiences and outcomes both in local and global context.

Keywords: Lecturer attitudes, student outcomes, Europe, Asia, Sri Lanka

THE ROLE OF POWERPOINT PRESENTATIONS IN ONLINE EDUCATION; A CASE STUDY BASED ON UNIVERSITY OF VOCATIONAL TECHNOLOGY, SRI LANKA

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Abstract: Microsoft PowerPoint, Keynote and Prezi can be identified as most used applications to create presentations. These applications provide various kind of options which user can use to create appropriate presentations accordingly. Some options are unique to each application as well as some can be taken as common to every application. With current situation of pandemic, most of the online sessions were conducted with collaboration of presentations. So that researcher wanted to identify how these features/ options were helpful to undergraduates to learn and lecturers to teach. As undergraduates in information technology field, researcher thought that it would be better if can identify how these options are effective in learning and teaching. The aim is to evaluate the usage of PowerPoint features in lecture will increase the understanding of lectures by undergraduates and helps lecturers to teach the subject points clearly to the undergraduates. So, this study addresses to explore teaching experiences and to evaluate learning experience in using PowerPoint among undergraduates. The population of this research was around 300 undergraduates and lecturers of the University of Vocational Technology and the sample of this population was 30 undergraduates with 18 lecturers from the academic staff. The methodology is to conduct a survey using a questionnaire regarding the effectiveness of PowerPoint presentations in online education.

Keywords: Online teaching strategies, Pedagogical tools, Teaching effectiveness.

FACTORS AFFECTING TO THE SELECTION OF COURSES IN UNIVERSITY COLLEGES, SRI LANKA

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Abstract: Concerning the variation in the number of applications received per year in the university college of Kuliyapitiya Sri Lanka, the researcher has undertaken the research with the main objective of investigating the factors affecting the selection of courses in University Colleges with special reference to the university college of Kuliyapitiya Sri Lanka. This research filled the contextual gap as well. With the proper understanding of the factors affecting course selection in university colleges, relevant authorities can facilitate better undertakings in increasing the number of applications which are of utmost importance in securing sustainable positions in the competitive industry. For the study, the researcher has adopted a phenomenological qualitative research design. The study population consisted of the students at the University College of Kuliyapitiya and the sample was drawn by adopting the Krejcie & Morgan (1970) table. The study found that, among various factors, personal interests, career prospects, parental and peer influence, availability of resources, course content and curriculum, prestige and reputation, and financial considerations can significantly influence course selection. This study will enhance the understanding of the general patterns of course selection in university colleges. It will provide strategic platforms to support the decision processes regarding the attractions of candidates. A few limitations of the study include geographical limitations and the limitation of only considering the University College of Kuliyapitiya for the study.

Keywords: Courses, Factors, Selection, University Colleges.

ESL TEACHER COMPETENCE IN INTEGRATING TECHNOLOGY WITH ESL INSTRUCTION: A COMPARATIVE STUDY BETWEEN GOVERNMENT AND PRIVATE SECTOR IN-SERVICE ESL STUDENT-TEACHERS

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Abstract: The rapid development of technology has significantly introduced new capabilities across different fields, including education. It has left a remarkable mark on English language teaching, especially in English as a Second Language. In Sri Lanka, English being the second language, it is essential to integrate technology into the teaching practices to enhance the language learning. Yet, the technological competence of ESL teachers is questionable. Thus, this study focused on a comparative exploration of the technological competence of ESL teachers from government and private sectors in integrating technology with ESL instruction. This study utilized a quantitative approach and a case study design. The study sampled 30 in-service student-teachers following Bachelor of Education in English Language Teaching in a technological university in Sri Lanka. A questionnaire was used as the main data collection tool for the study. The findings indicate that they are competent in terms of basic computer and device operation skills, MS Office suite operation skills and internet and online resource utilization skills, while they are somewhat competent in digital tools and content creation skills. It is further revealed that private-sector ESL teachers are highly competent, while government-sector ESL teachers are competent in integrating technology with ESL instruction.

Keywords: ESL teachers, Technology integration, Technological competence.

PERCEPTIONS OF INSTRUCTORS ON THE USE OF EGP AND ESP IN TEACHING ENGLISH: A STUDY CARRIED OUT IN TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING INSTITUTION

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Abstract: English Language Teaching (ELT) can be divided into two main branches such as English for General Purposes (EGP) and English for Specific Purposes (ESP). EGP is practiced to provide a solid foundation for the basic usage of the English language. ESP aims to equip learners with the language skills and knowledge necessary for specific disciplines or professionals. There is a modern trend of using ESP among ELT practitioners. This study aims to identify the perceptions of instructors on the use of EGP and ESP in Technical and Vocational Education and Training (TVET) institution. The researcher focused on National Vocational Qualification level five mechatronic course at Sri Lanka College of Technology, Colombo 10. In this study, qualitative method was used. Three instructors were the participants. The data was collected through interviews. It consisted of two main sections such as Part A and Part B. Part A was about instructors' profiles. Part B was about instructors' perceptions towards the use of EGP and ESP. The collected data was analyzed thematically. The findings of the study highlighted that EGP is the stepping stone for ESP and students need EGP and after that it would be better to develop that level into ESP. It also highlighted that ESP courses should be prepared to face real-life experience in the workplace, the need of trained young energetic ESP instructors with modern teaching strategies, and also the need of activity-based learning with especially speaking and writing skills. The need of a specialized and updated English language curriculum for mechatronic students is also a very important factor.

Keywords: English for General Purposes (EGP), English for Specific Purposes (ESP), TVET institution, instructors

SUSTAINABLE TVET: THE DESCRIPTIVE STUDY ON THE BARRIERS TO DEVELOPING THE ENGLISH LANGUAGE AMONG TVET SKILL LEARNERS

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Abstract: The education provided by the TVET (Technical and Vocational Education and Training) sector in Sri Lanka does an excellent service to the country's economy and the development of a quality job market. TVET is established to serve quality education to the vocational sector to adhere to the current job market demands. Currently, the TVET has become the fulcrum of producing qualified candidates for the current world of work requirements hence the consideration of its sustainable development and growth is essential to create productive and proactive candidates for the technological world. Sri Lanka produces plenteous diploma/certificate holders mostly obtained NVQ 4 standards, in the vocational field per year from different TVET institutions. A considerable number of these educated field experts reach international companies. To work with foreign well-wishers and companies the qualified candidates must have a good command of English: if the knowledge of English is weaker the possibility of getting a job opportunity is deficient. Therefore, improving English expertise in the TVET sector is crucial to obtaining a quality education among vocational students. TVET graduates come from different backgrounds in the country and their basic diplomas and higher diplomas are being taught in their mother tongue and many face difficulties in following the higher education further as to become graduates. However, as diploma holders, the vocationally trained students must be proficient in English to abstain from giving up their career goals and acquiring higher educational qualifications. This study attempts to determine the obstacles that skill learners of the TVET sector must overcome to establish a sustainable TVET.

Keywords: Education, English, TVET

USAGE OF ICT TOOLS IN THE TEACHING AND LEARNING PROCESS IN THE TECHNICAL AND VOCATIONAL SECTOR: TECHNOLOGY ACCEPTANCE MODEL (TAM) APPROACH

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Abstract: Information and Communication Technology (ICT) in the digital age plays a vital role in the educational sector worldwide. Many ICT tools greatly contribute to various activities in the educational sector. However, the question remains whether teachers accept or reject ICT integration in the teaching and learning process. This study aims to examine the teachers' attitudes toward the use of ICT in the teaching and learning process. This study used a modified Technology Acceptance Model (TAM) to explore the relationship between teacher attitudes towards the use of ICT and the actual use of ICT. This model consists of four core constructs and seven external variables. The volunteer sampling method was adopted to choose the participants. The data collection was done through the distribution of online and printed questionnaires. Questionnaires were distributed among the teachers from five institutions. Data analysis was conducted using SPSS version 25. The study indicates that four out of seven external variables were supported by the model. The study shows that Job Relevance (JR) had a greater effect on the attitude towards use (ATU) than on Perceived Ease of Use (PEOU) and perceived usefulness (PU). Further, the study revealed that teachers' attitudes towards the use of ICT had a positive and significant influence on actual ICT use. The study found that teachers' attitudes and relevant jobs played a major role in the usage of ICT in technical and vocational education contexts.

Keywords: ICT, Job relevance, TAM

EXPLORING THE INFLUENCE OF GENDER IN THE ADOPTION OF DIGITAL PLATFORMS FOR ENTREPRENEURSHIP: A STUDY AMONG HIGHER NATIONAL DIPLOMA STUDENTS IN COLOMBO, SRI LANKA

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Abstract: The adoption of digital platforms has become a critical driver of entrepreneurial success, in rapidly evolving digital landscape especially among younger generations. This study explores gender-specific dynamics in the adoption of digital platforms for entrepreneurship among Higher National Diploma (HND) students in Colombo, Sri Lanka. Using the Technology Acceptance Model (TAM) as the theoretical framework, the study examines the role of Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Perceived Risk (PR), and Digital Literacy (DL) in influencing students' intentions to adopt digital platforms. A cross-sectional survey of 70 students selected via convenient sampling, comprising 42 males and 28 females, revealed significant correlations between key constructs and adoption intentions. While no statistically significant gender differences were observed in PU, PEOU, PR, or DL, males demonstrated a stronger overall intention to adopt digital platforms, reflecting higher confidence in their utility and ease of use. The study identifies digital literacy as a crucial enabler, with a strong positive correlation to adoption intentions ($r = 0.65$, $p < 0.01$). Conversely, perceived risks such as concerns about data security and financial loss negatively influenced adoption intentions ($r = -0.40$, $p < 0.01$). These findings underscore the need for targeted interventions to address gender-specific concerns, particularly for female students who perceive higher risks. Further, the study findings aim to foster equitable digital engagement and entrepreneurial success, contributing to Sri Lanka's digital economy growth.

Keywords: Digital Platforms, Entrepreneurship, Higher National Diploma (HND) Students, Sri Lanka, Gender, Technology Adoption.

ENHANCEMENT OF CAREER GUIDANCE FOR VOCATIONAL TRAINING RECIPIENTS OF VOCATIONAL TRAINING AUTHORITY OF SRI LANKA

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Abstract. This research evaluates the career guidance services provided by the Vocational Training Authority of Sri Lanka for vocational training recipients. The research uses a survey methodology to assess satisfaction levels and perceived benefits. The study aims to identify areas for improvement and formulate practical recommendations to improve the quality of career guidance services. Representative sample was selected from instructors and trainees, both current and past. A sample comprises of 83 administrators and 66 trainees replied to a multiple-choice questionnaire. The results were analyzed using Microsoft Excel. The results show that there is a serious need for engaging students early in their VTASL experience, with a preference for support throughout their training journey as well as the urgent need for the career guidance infrastructure enhancement. Respondents also prefer a friendly approach and creating an attractive environment that may foster positive attitude toward career guidance. The findings are valuable for policymakers, educators, and career guidance officers in vocational education, enabling informed decisions about the refinement and development of career guidance services. The research serves as a foundation for further research and advancements in career guidance within vocational education settings.

Keywords: Career guidance, Vocational education, Career guidance officers, Vocational Training Authority

GAMIFICATION AS AN INNOVATIVE TEACHING METHODOLOGY TO ENGAGE AND MOTIVATE LEARNERS FOR SUSTAINABLE TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING

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Abstract: The use of game dynamics into Technical and Vocational Education and Training (TVET) delivery has started as an innovative step to improve learner engagement and motivation. This paper reiterates the potential of gamification as a teaching-learning method within TVET, highlighting its role in crafting a sustainable learning environment. After a comprehensive review of existing literature, this paper observes the theoretical background of gamification, its applications in TVET delivery, and the challenges and opportunities it provides. The potential of gamification to improve learning outcomes, enhancing competencies, and contribute to the long-term sustainability of TVET programs could be reflected as outcomes.

Keywords: Game Dynamics, Gamification, Motivation, Teaching Methodology, Sustainable TVET.

EXPLORING LECTURERS' PERCEPTIONS ON MOBILE ASSISTED LANGUAGE LEARNING IN ESL CLASSROOMS: A CASE STUDY

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Abstract: Mobile Assisted Language Learning (MALL) refers to the use of mobile devices to facilitate language learning, a method gaining popularity globally. However, integration in MALL in English as Second Language (ESL) classrooms seems to be limited, despite widespread use of technology and devices among undergraduates and lecturers. Therefore, the research is focused on exploring lecturer's perceptions on MALL in ESL classroom aiming two objectives as to identify the mobile applications used by lecturers in ESL classrooms at University of Vocational Technology (UoVT) and to investigate the perceptions of lecturers on MALL in ESL classrooms at UoVT. The research was conducted as a case study, using qualitative and quantitative data collected through structured interviews and self-administered questionnaire occupying six internal and visiting lecturers attached to the Department of Language Studies (DLS), Faculty of Education (FE), UoVT, who teach Communication Skills I and II modules for first-year students. The collected qualitative data was analyzed using thematic analysis while quantitative data analyzed through descriptive statistical analysis. The analyzed data clearly expressed that Google Classroom, YouTube, WhatsApp, Grammarly and Zoom are different mobile applications used by the lecturers in teaching Communication Skills I and II modules for first-year undergraduates. As followed by the second objective, the diverse perceptions towards MALL such as support for improving language skills, convenience of using MALL and facilitation of MALL were identified. Even though 66.67% of lecturers acknowledged its potentiality in motivating students' others expressed doubts on the relevance and efficacy of mobile applications in teaching. These findings contribute to the broader discourse on MALL by offering practical insights into its implementation in higher education and suggesting the need for tailored strategies to better integrate mobile learning into ESL instruction.

Keywords: Mobile Assisted Language Learning (MALL), English as a Second Language (ESL), Lecturer perceptions

TRACK 2

ENGINEERING TECHNOLOGY FOR GREEN ECONOMY

A CASE STUDY ON COST-BENEFIT ANALYSIS TO ASSESS THE PROFITABILITY OF INSTALLING SOLAR PANELS AT THE IRRIGATION DEPARTMENT HEAD OFFICE IN COLOMBO

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Abstract: This paper presents a cost-benefit analysis of installing solar panels at the irrigation department head office in Sri Lanka. The objective is to reduce the electricity costs, which currently amount to approximately 2.3 million monthly. The analysis includes a comprehensive assessment of the Net Present Value (NPV) of 108,006,371.67, Internal Rate of Return (IRR) of 38%,, Payback Period of 2.57 years, and Return on Investment (ROI) of 38.06%. Results indicate that the solar panel installation would not only achieve substantial cost savings but also contribute to sustainability efforts by reducing carbon emissions. The study concludes with a recommendation to proceed with the installation based on the positive financial and environmental outcomes. This project demonstrates a sustainable approach to energy management and cost reduction.

Keywords: Cost Benefit Analysis, Internal Rate of Return, Net Present Value, Return on Investment, Solar Panel.

FACTORS INFLUENCING INTENTION TO PURCHASE RESIDENTIAL SOLAR PANEL SYSTEMS IN SRI LANKA

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Abstract: This research explores the determinants of residential solar panel adoption intentions in Sri Lanka's urban settings, focusing specifically on Colombo. Employing a quantitative research design, the study evaluates how product knowledge, perceived benefits, cost considerations, and social influence shape purchasing decisions. Data were gathered from 291 participants using a structured survey and analyzed via correlation and regression methods. The analysis highlights that perceived costs and social influence play significant roles in shaping purchase intentions, whereas product knowledge and perceived benefits do not exhibit substantial impacts. The findings explain a significant portion of the variability in purchase intentions, underlining the importance of cost-related perceptions and the role of social influence as critical factors. These insights are crucial for developing effective marketing strategies in the renewable energy sector, offering guidance for addressing cost concerns and utilizing social dynamics to promote solar energy adoption. The study advances the understanding of consumer behavior in sustainable energy solutions within urban Sri Lanka, providing actionable recommendations for solar energy providers, policymakers, and researchers.

Keywords: Solar Panel Systems, Purchase Intention

DEVELOPMENT OF AN AUTOMATED SOLAR PANEL CLEANING SYSTEM

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Abstract: The solar energy received by existing solar farms is wasted due to various reasons. One of the reasons for this is that the efficiency of solar panels is very low. The current data shows that the electricity produced by the solar panels, which have been manufactured in accordance with the current technology, is wasted in various ways. The main reasons for the losses is dust and particles, panel temperature, environmental factors, and panel conditions. Out of these, the losses due to dust and particles can be reduced by regular cleaning. Hence this research aims to develop an automated system for solar panel cleaning. Such systems are available in the market, however the existing machines have to be partially operated by humans. Through this research a system that automatically cleans the solar panels was developed, thus helping the solar panels to achieve optimum efficiency. The system consists of two basic parts. One part is moving and the other part is stationary . The stationary apart will measure the amount of light falling on the solar panels and the voltage produced. If there is a change in the voltage produced under certain lighting conditions, it identifies that there is a dust accumulation on the solar panels. Then the moving part cleans the solar panels by running the given program and following the path given by the program. Thus, the panels can produce electricity with greater efficiency than before.

Keywords: Solar Farms, Solar Panels, Technology, Machine

GREEN ENERGY AND SOCIAL EQUITY: ADDRESSING DISPARITIES IN ACCESS AND BENEFITS-A REVIEW

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Abstract: Because the international community is stepping up the pace of the transition toward greener forms of energy in order to alleviate climate change, it is important to foreground social equity so that the costs and advantages of this change are not exclusive. This review paper seeks to contextualize the relationship between green energy and social equity, with specific reference to the inequalities in access to renewable energy technologies such as solar, wind, or the use of bioenergy. It illustrates how some low-income communities are worse off in the quest to access the resources due to their economic situation, location and education levels concerning the resources. By reviewing some barriers that already exist and assessing the effectiveness of a range of projects, the paper makes practical recommendations for improving equity in the transition to the green energy. The intension is that all communities regardless of their economic background will be able to take part in the green energy revolution and be able to reap the benefits of the revolution.

Keywords: Disparities, Green Energy, Social Equity.

ELECTRO-MAGNETIC INTERFERENCE FILTER FOR ULTRASOUND SCANNER

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Abstract: Ultrasound technology has reformed various fields, from medical diagnostics to a huge range of industrial applications. However, the sensitive electronic components in ultrasound equipment are highly vulnerable to electromagnetic interference (EMI), which can reduce the quality of performance or cause malfunctions threatening patient safety. An Ultrasound EMI filter is an essential component which can be used to mitigate electromagnetic interferences generated by external sources or within the system itself. The main objective of this study is to design and implementation of an EMI filter specifically tailored for ultrasound scanners. The proposed EMI filter aims to mitigate interference by attenuating unwanted high- frequency signals while ensuring the reliability of the ultrasound signals. The newly designed filter consists of a combination of inductors, capacitors, and resistors, which have been optimized for the frequency range associated with ultrasound medical diagnosing devices. Comprehensive testing was conducted in both controlled environments and real-world medical set-ups. The results demonstrated a significant reduction in EMI, leading to improved clarity and reliability of ultrasound images. These improvements enriches diagnostic capabilities and ensures that ultrasound scanners operate within required safety margins and optimal parameters. The implementation of this EMI filter is very much important for maintaining high standards in medical imaging, especially in environments with numerous electronic devices connected. The research findings suggest that the widespread adoption of these EMI filters could be beneficial for other sensitive medical devices, contributing to better healthcare applications.

Keywords: Electro-Magnetic Interference, Ultrasound, Reliability

ASSESSING THE FEASIBILITY AND POTENTIAL OF VERTICAL AXIS WIND TURBINES (VAWTs) AS A SUSTAINABLE ENERGY SOURCE FOR REMOTE UNIVERSITY SETTINGS

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Abstract: The global energy landscape is undergoing a transformative shift, driven by the imperative to reduce greenhouse gas emissions and mitigate the impacts of climate change. Vertical axis wind turbines (VAWTs) present a promising alternative for electricity generation due to their distinct advantages over traditional horizontal axis turbines. This paper reviews the current state of vertical wind turbine technology and explores its potential for enhancing re-newable energy production at institutional level in remote settings of Sri Lanka. In the context of Sri Lanka and institutional built environment, the unique design characteristics of VAWTs, such as their ability to operate in turbulent wind conditions and their lower noise profile compared to horizontal axis turbines, are discussed. As the case study, University College of Kuliyapitiya is considered where the practicality of lighting up college streets with lamps are experimented with a model of Vertical axis wind turbine to measure the potential of using a real life model and its efficiency on the matter. The paper also examines recent advancements in VAWT efficiency and performance that contribute to improved energy capture. By evaluating technological, contextual and social factors, this paper aims to provide a comprehensive overview of vertical wind turbine technology and its role in advancing sustainable energy solutions.

Keywords: Vertical Axis Wind Turbine, Renewable energy, Institutional built environment

DESIGN AND IMPLEMENTATION OF A POWER MONITORING SYSTEM FOR INDUSTRIAL APPLICATIONS

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Abstract This research project introduces the development of an effective user-friendly power monitoring system for a leading bottling company located in the Western Province area. The aim of this project monitor the power quality of the power system in real time and to get accurate energy consumption value to calculate KPI values of the company. The system monitors the electrical system in real-time using a powerful energy analyser which is capable of measuring many parameters related to electricity. Power monitoring systems are used widely in industrial plants and buildings to analyze power consumption. For industrial plants, it is essential to measure changes of three-phase voltages, current demand, power factor, harmonic distortion, frequency, and power consumption to monitor power quality. Manual data logging is not an effective and accurate method. To solve this issue, a low-cost suitable power monitoring system was developed for the selected company. For the data collection, seven power analysers were installed in the main panel room. These power analysers are installed on two incoming bus bars and five outgoing bus bars. The real-time data measured by the power quality analyser is transferred to the programmable logic controller's (PLC) Modbus Gateway. The Modbus Gateway transfers data to PLC, which then transfers data to a local database which is established in the office via Ethernet. The developed centralized supervisory control and data acquisition (SCADA) can log all this data second by second in its database. Finally, one of the KPI values for Power Consumption per Bottle Case for the company was obtained and energy-saving opportunities were identified through this system. Using the database, power system-related issues were analysed and identified according to industry standards and suggested solutions to mitigate them.

Keywords: Power monitoring, Power quality, PLC programming

AN ASSESSMENT OF WATER QUALITY RELATED ISSUES IN POLGOLLA RESERVOIR, SRI LANKA

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Abstract: The Polgolla Reservoir, a vital water body in Sri Lanka, plays a significant role in regional water management by providing water for agriculture, drinking, and hydropower generation. This study aims to assess the current state of water quality in the Polgolla Reservoir by examining various physicochemical parameters including pH, turbidity, dissolved oxygen, nitrate, salinity, and BOD_5. Water samples were collected from multiple points within the reservoir and analyzed using standard methods. The findings indicate elevated levels of pollutants, particularly nitrate, primarily due to agricultural runoff and improper waste disposal. Additionally, heavy metal contamination was detected, raising concerns about long-term ecological impacts and human health risks. The study identifies potential sources of pollution and suggests mitigation strategies such as improved agricultural practices, wastewater treatment enhancements, and public awareness campaigns. This assessment underscores the urgent need for integrated water resource management to preserve the water quality of the Polgolla Reservoir and ensure its sustainable use for future generations

Keywords: Polgolla Reservoir, Water Quality, Mahaweli River

INVESTIGATION OF BURNED TIMBER ASH AS A PARTIAL SUBSTITUTE OF CEMENT IN SOIL-CEMENT MIX AS A BACKFILLING MATERIAL IN SMALL-SCALE BUILDING CONSTRUCTION

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Abstract: Backfilling is a critical process which is to be done after the construction of the substructure. The backfilling can be done using the same soil that has been excavated. However, if the soil lacks the bearing capacity or shear strength, then soil stabilization can be done. Soil stabilization is mainly done using cement or using lime. However, the incorporation of cement in stabilization is not a very sustainable process. Much research is being done to determine the suitable material to partially replace the cement. Among the research materials, wood ash is a priority. Cinnamon ash is commonly found in the Galle district, hence, this research is focused on determining the optimum mix ratio, when cement is partially replaced with cinnamon ash. It was found that mixing cinnamon ash decreases the compressive strength of the stabilized soil. However, when the ratio of Water: OPC: Cinnamon Wood ash: Soil is maintained at 2.5: 0.8: 0.2: 8.5 respectively, the strength decrement is only 0.4 N/mm^2. Hence, the optimum ratio is selected as the above ratio. Further, approximately Rs. 1000.00 can be saved from 1 m^3 which is a saving of 4.8% when the optimum mix is used instead of the conventional mix. Therefore, cinnamon ash can be recommended as a sustainable material to be used in partial replacement of cement in backfilling provided that the strength gained is within the required range.

Keywords: Backfilling, Partial replacement, Wood ash..

CASE STUDIES OF SOFT ACTIVE MATERIALS FOR ENGINEERING APPLICATIONS

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Abstract: This research investigates the potential of soft active materials (SAMs) as transformative elements across diverse engineering domains. Focusing on four key applications—overhead bridges, sustainable dancing floors, hybrid systems, and camera lenses—the study explores the practical implementation of SAMs to address contemporary challenges. In this study, engineering applications are explained using existing theories of soft active materials and material science with analyzing newly developed finite element models. Piezoelectric elements were integrated into an overhead bridge model to assess their potential for structural health monitoring and energy generation. With use of PZT-4 material, 0.12 millivolts were induced, under applied forces and specific boundary conditions. Sustainable dancing floors were conceptualized to harness energy from human movement through piezoelectric material integration. With typical reasonable assumptions, the estimated energy generation was 126 KJs. In the realm of hybrid systems, regenerative braking systems incorporating dielectric elastomers were modeled to enhance energy efficiency. With the use of a brake shoe comprising 1000 layers of polyisoprene dielectric elastomer, under an average braking force, per braking cycle 48 millijoules of electrical energy could be generated. The study also explored the application of SAMs in camera lens technology, aiming to develop compact, high-performance lenses through tunable refractive index materials. These case studies collectively demonstrate the versatility and potential of SAMs in addressing complex engineering problems. In conclusion, this study finds that soft active materials such as piezoelectric elements, dielectric elastomers, etc., can be used as sustainable materials which can generate a significant impact on innovation and technological advancement which helps to improve sustainable practices creating a new path to sustainable green economy in the world as well as in Sri Lanka.

Keywords: energy harvesting, piezoelectrics, soft active materials

DETERMINATION OF APPLICABILITY OF CLAY FROM THE ABANDONED TILE FACTORY YATIYANA, MATARA, SRI LANKA FOR A WALL TILE DESIGN

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Abstract: Many clay tile factories face abundance and underutilization due to newer alternatives. However, sustainable wall tile alternatives are regenerating these factories by repurposing their materials and revitalizing production lines. This approach not only revitalizes the factories but also addresses environmental concerns by promoting natural materials. By utilizing abundant clay resources, these factories can meet the rising demand for eco-friendly building materials, preserving traditional craftsmanship and supporting sustainable urban development efforts. This rebirth signifies a blend of innovation and tradition, fostering a more sustainable future for construction practices. This is an attempt to search for alternative eco-friendly wall tiles for decorative purposes with clay's strength and artistic properties. Five approaches were made to change the mix design of cement and clay percentage. The cement content started at 2.5% and increased by 2.5% for each mixture, while the clay percentages were adjusted accordingly relative to the cement content. This differs from traditional clay tiles as it does not undergo any firing process; instead, the method involves compacting the materials. The standard tests were done to identify the optimum most practical mixture. The results obtained revealed that the optimum mixture of the proposed decorative wall tile can be produced by using clay 87.5% with cement 12.5% by weight together

Keywords: Repurposing, Alternatives, Clay, Compacting, Mix design

MINIMIZING VARIATION ORDERS IN THE CONSTRUCTION OF MARRIED QUARTERS FOR SPECIAL TASK FORCE, SRI LANKA: A CASE STUDY

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Abstract: One of the problems often experienced in the construction sector is variation orders. Variation orders affect project implementation efficiency since they often cause a considerable cost increase as well as delays. Since the project of construction of married quarters for the Special Task Force, the building is essential hence efficient project management is needed for timely completion. Therefore, the study will focus on determining the factors causing variation orders in the construction of married quarters for the STF in Sri Lanka. The study will help determine what factors result in variation orders and how the orders can be curbed to avoid delays through implementation strategies. In this study, I will adopt a case study method to investigate a sample of STF married quarters construction projects. Primary data will consequently be gathered through semi-structured interviews with key stakeholders, such as project managers, consultants, and construction contractors. Further, project document and record reviews will be conducted. The analysis will involve identifying patterns and trends in variation orders and evaluating their impact on project performance, as well as investigating what brings about them. Once completed, this study will use its findings to prepare a list of suggestions to minimize variation orders. This would significantly streamline the construction process and facilitate more cost-effective and timely project delivery to all participants involved.

Keywords: Construction, Building projects, Variations, Variation Causes

ASSESSING THE IMPACT OF UTILITY CUTS PRACTICES ON THE SERVICE LIFE OF FLEXIBLE PAVEMENT IN SRI LANKA

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Abstract: Road networks of Sri Lanka frequently have post-utility installation. In order to put these services underground, several utility companies, including NWSDB, partially or completely destroy the road pavement. It is a common situation that numerous defects are created after the pavement is reconstructed. The study investigates the impact of utility cut practices on the service life of flexible pavements in Sri Lanka. Using a mixed-methods approach, it identifies the most prevalent types of pavement defects associated with utility cuts and the contributing factors. The study reveals that poor joint construction, poor compaction, and improper backfilling are the main primary causes of road defects according to the RII value of 0.813, leading to the most significantly uneven surfaces according to 0.873 RII, secondly, bumps have shown a 0.851 RII value, and thirdly, surface cracking has a value of 0.848. Utility cuts are found to have a significant impact on traffic flow, road safety, and the economy due to safety hazards and general inconvenience. The research emphasizes the total Specific measures that can be taken during the utility cut excavation and reinstatement process to minimize the likelihood of road defects are "Performance based-monitoring", it is the most significant measures, of having 0.892 RII value. The second most specific measure is "Regular inspection" with a 0.876 RII value (Rank 2). The third most specific measure is "Quality control during the construction process," with 0.852 (Rank 3) RII values. The need for enhanced coordination between utility companies and road authorities, stricter regulatory frameworks governing utility cut procedures, and improved design and planning strategies to minimize the detrimental effects of utility cuts. Implementing these measures can enhance the longevity of flexible pavements and contribute to the overall efficiency and safety of the road network in Sri Lanka.

Keywords: Utility cuts, Flexible pavement, impact, service life.

DEMOLITION WASTE MANAGEMENT OF CIDA-REGISTERED CONSTRUCTION COMPANIES IN JAFFNA DISTRICT AND POSSIBLE IMPROVEMENT STRATEGIES

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Abstract: Demolition waste comprises concrete, wood, brick, clay tile, steel, and asphalt shingles generated from demolishing structures. Jaffna district is selected as the study area. Illegal dumping of demolition waste has recently increased, and construction companies reuse the demolition waste for several purposes. It is necessary to study demolition waste management to determine whether the existing system has the quality and to save the environment. This study focuses on existing demolition waste management, the construction companies' awareness of the 4R Principle, and how it can be improved. Samples are selected from CIDA-registered construction companies belonging to the Jaffna district. It finds construction companies belonging to the Jaffna district have 'Trade-off' as the predominant practice of demolition waste management, they moderately follow the 4R Principle and they believe the government should take necessary action to improve waste management. As per the experts' opinion, durability is unpredictable while reusing demolition waste so educating, experimenting, and providing local recycling programs are the improvement strategies.

Keywords: Demolition waste management; Construction companies; 4R principle; Jaffna district

EFFECTIVENESS OF CONTRACTUAL REMEDIES IN ADDRESSING DELAY IN PROGRESS DUE TO LATE PAYMENT; THE CASE OF HISTORIC RAJAWASALA RESTORATION PROJECT IN KANDY

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Abstract: Delays in payments and progress are plentiful phenomena in the construction industry. This case study provides a perspective in exploring decisions taken to delay progress due to a delayed payment decision not explicitly covered by the contract. This is extremely true in the context of a specially designed project in Sri Lanka. The case study is used to find decisions taken in specific projects. That is, the deviation from contractual entitlements in contracts, assess their practicality, and determine the most appropriate practices in the construction industry. The study aims to analyze the effectiveness of contractual remedies in addressing such delays in the Sri Lankan construction industry. Through a qualitative research methodology, including literature review and unstructured interviews with industry experts, the study explores the impact of delayed payments on project progress, cash flow, and stakeholder relationships. The findings highlight the critical role of timely payments in ensuring project success, as well as the importance of effective contract administration and dispute resolution mechanisms. The study concludes by emphasizing the need for robust contractual frameworks that address payment terms, dispute resolution procedures, and liquidated damages to mitigate the adverse effects of payment delays. The contractor's response should be aligned with the specific contractual provisions. In this case, the appropriate action would be to pursue interest claims rather than delaying project progress.

Keywords: Delay Payment, Delay Progress, Late Payment, Contractual Entitlement, Special Cases, Construction Industry, Sri Lanka

EVALUATION OF BONDING STRENGTH AND COST-EFFECTIVENESS OF A SUBSTITUTE INTERNAL PLASTERING MIX

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Abstract: This research aims to identify an optimal plastering mix for internal wall applications that can serve as a substitute for the traditional mix used in the building construction industry. By experimenting with different proportions of cement, sand, wall filler, binder glue, and water, the study focuses on developing a mix with superior bonding strength and cost efficiency. Various combinations of these ingredients are investigated to determine the most effective mix, with bonding strength as the primary measure. A plaster adhesion test is conducted to compare the bonding strength of the new mix with that of a conventional mix used for internal plastering, and the cost variations of the newly developed mixes are also evaluated. The research identifies the optimal mix with the following ratio: 0.75 parts cement, 7.5 parts sand, 1.5 part internal wall filler, 0.1 part binder glue, and 1.5 parts water based on the volume. The findings provide valuable insights into the optimal proportions of ingredients that enhance bonding strength while being cost-effective, contributing to the field by offering an alternative plastering mix that could improve the efficiency and quality of internal wall plastering in the construction industry.

Keywords: Wall Plastering, Bonding Strength, Adhesion, Cost Optimization

A COMPREHENSIVE INVESTIGATION INTO THE APPLICATIONS, BARRIERS AND FUTURE DIRECTIONS OF DRONE TECHNOLOGY IN SRI LANKAN CONSTRUCTION MANAGEMENT

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Abstract: Technology breakthroughs have led to notable developments in the building sector, which is a pillar of societal growth. Drone technology stands out among these because it has the ability to completely transform construction management by improving accuracy, safety, and efficiency. The aim of the research study is to examine the usage of drone technology in Sri Lanka's construction industry, emphasizing its current applications, challenges, and potential future developments. A quantitative research approach was utilized to this research study. Project managers, engineers, and quantity surveyors were among the 65 construction professionals who took part in a thorough questionnaire survey; 50 of them responded. Descriptive statistical techniques were employed to analyze the data, utilizing MS Excel and SPSS software tools. The research provides insights into the current status and future prospects of drone technology in construction, focusing on the Sri Lankan context. The research study utilized a convenient sampling method. The results indicate that drones are being utilized more frequently for accurate land surveys, rapidly generate comprehensive topographic maps, and produce visual progress documentation to mitigate potential conflicts between contractors and property owners. The primary obstacles cited for drone implementation in the construction sector are substantial initial expenditures for drones and accessories, high maintenance and operational expenses (including licensing and registration), and the necessity for operator clearance from regulatory authorities. The subsequent points were recognized as future implications of drone technology in the construction sector: Technological advancements will enhance the integration of drones with block chain, 5G, and artificial intelligence. Integrating drones with BIM systems facilitates real-time updates for enhanced precision and coordination. Advanced sensors and artificial intelligence will enable drones to identify hazards, thereby improving worker safety. Although the research is geographically confined to the northern and western portions of Sri

Lanka, its findings provide significant implications for other developing nations considering the implementation of drone technology in building.

Keywords: Drone Technology, Construction Industry, Unmanned Aerial Vehicles.

A COMPREHENSIVE ANALYSIS OF THE ROLE OF DIGITAL TWIN TECHNOLOGY IN THE CONSTRUCTION INDUSTRY

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Abstract: The primary aim of this research study is to explore the application of digital twin technology within the construction industry. The objectives of the study were described as follows; to investigate the application of digital twin in construction industry, evaluate the concept of digital twin in construction industry, assess the challenges to implement digital twin in construction industry and explore the strategies to overcome the barriers of digital twin in construction industry. To achieve these objectives, the research relied on comprehensive literature findings that were gathered through an extensive review of journal articles, books, websites, and other pertinent sources. The research study was utilized a qualitative approach, ensuring a thorough examination and synthesis of existing knowledge. The study's key findings revealed that the concept of a digital twin was first proposed by NASA's Apollo 13 mission, which was intended to solve spacecraft difficulties. From simple CAD systems to complex, real-time 3D-powered models that combine many data sources for improved visualization and decision-making, DT has advanced over time. When it comes to the application of digital twins in construction, DT technology makes it possible for perfect synchronization, bi-directional coordination, and real-time updates between digital and physical assets. Lack of understanding, high implementation costs, and reluctance to embrace cutting-edge technologies are major obstacles to the adoption of digital twins. The primary strategies for digital twin technology are Construction projects may be operated and maintained more efficiently if DT is used early on. Furthermore, the validity of the research findings is reinforced by validation from industry experts, who provide critical feedback and ensure the relevance and applicability of the results in real-world construction scenarios.

Keywords: Digital Twin Technology, Construction Industry, AI Technologies.

BARRIERS AND CHALLENGES IN IMPLEMENTING MODULAR CONSTRUCTION METHODS IN SRI LANKAN RESIDENTIAL CONSTRUCTION PROJECTS

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Abstract: Modular construction methods are identified as a green, efficient, and cost-effective approach in the world. This study was conducted with the goal of identifying the factors that prevent the use of modular construction in residential buildings in Sri Lanka. Hence this study was focused to identify the socioeconomic, cultural, and technological barriers to the integration of modular building in this respect. The study employed a qualitative research approach, with in-depth semi-structured interviews conducted on respondents from the Sri Lankan construction sector, including architects, engineers, and project managers. Thematic analysis was used to assess the obtained data to uncover recurring patterns and themes in response to the problems of modular construction. Some of the key issues identified are lack of awareness and enlightenment about the modular construction method among all relevant stakeholders, ranging from building professionals to public, high initial costs, poor/reduced government support, technical constraints such as a poor infrastructure base, insufficient skilled and trained personnel, and others. According to the conclusions of this study, these problems must be solved by a collaborative effort by the Sri Lankan government, industry professionals, and educators, with an emphasis on regulations, awareness, investments in framework, technology, and skills. Practitioners can use these findings to modify policies, implement cutting-edge technologies, and provide workforce training in order to incorporate modular construction methodologies into projects and get around current problems like high initial investment, bureaucratic roadblocks, and a lack of skilled labour.

Keywords: Efficient, Green, Modular, Sustainable

MITIGATE THE IMPACTS OF OVER VARIATION IN THE CONSTRUCTION OF RESIDENCE PROJECT: A CASE STUDY IN GRAND TOWER RESIDENCIES PROJECT COLOMBO, SRI LANKA

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Abstract: This paper investigates the most of significant causes and effects contribute to the variation orders in the construction of Grand Tower Residence project in the district of Colombo Sri Lanka. So, the objective of this case study is to identify the causes of variation orders in Grand Tower Residence project, to investigate the impact of variation orders and minimize variations in residential buildings. Related data was collected based on the existing, literature reviews and consist of interviews with key stakeholders such as project managers, contractors and relevant persons involved in the construction of Grand Tower Residence project and reviewing archived project documents. The data were analyzed and formulated the findings. The results from revealed four most significant causes variation orders which are Changes of specification by owner, Substitution of materials by owner, Change of scope by owner and Changes of design by consultant. Meanwhile, the effects of the variation of orders are time and cost overrun. The findings conclude that owner is the major source of the variation orders in construction of Grand Tower Residence project and suggested that owner should have adequate planning and resources before initiating a project to avoid variation order during the construction stage.

Keywords: Variation Orders, Causes, Residential Buildings, Impacts of Variation

EXPERIMENTAL ANALYSIS OF WATERPROOFING SOLUTIONS FOR PEPPER JOINTS: A CASE STUDY AT ITC PROJECT COLOMBO

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Abstract: The research is mainly aimed at long lasting waterproofing solution for the slab joint in the ITC project by comparing following three materials; Polyurethane, Cementitious, and Polyethylene by focusing mainly on cost and durability. Dummy slabs are casted and subjected to a ponding test to evaluate the effectiveness of each waterproofing material. The ponding test was conducted for 24 hours, and height of water level measured after 24 hrs and cost per each waterproofing method was documented. Multi criteria analysis was performed using normalization to compare materials using common scale. Weights for cost and durability assigned based on expert interview with durability given higher priority. This study provides a comprehensive methodology for evaluating waterproofing materials, combining practical testing with robust analytical techniques.

Keywords: Multi-Criteria Analysis, Waterproofing, Normalization, Cost Effectiveness, Durability, Ponding Test.

USE OF COCONUT COIR TO IMPROVE STRENGTH PROPERTIES OF DRIED CLAY BRICKS

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Abstract: In Sri Lanka, most of the traditional domestic buildings, which include residential houses are based on clay bricks. Production of the traditional clay bricks involves a burning step using firewood, which contributes to deforestation, air pollution, and also emission of carbon dioxide gas. This step contributes to high energy consumption and associated costs as well. This study was mainly aimed at improving the strength characteristics of the unburnt clay cricks by incorporating coconut coir as a reinforcing phase to the same. Since burning of bricks hasn't taken place, all associated disadvantages aren't issues of the study. Visual appearance, density, water absorption, compressive strength, and thermal conductivity were the tested properties. Coir percentage was varied by 0%, 10%, 20%, 30%, 40% and 50% by volume. As outcomes, 10% coconut coir-added bricks were selected as the composition with the highest quality. These bricks show a better compressive strength of 1.761 Nm^{-2} compared to 1.654 Nm^{-2} of the clay bricks with no coir addition. However, none of the brick composition showed a favourable level of water absorption. Bricks with selected composition can be recommended to be applied in non-load-bearing applications where water attack is unlikely.

Keywords: Compressive Strength, Clay Bricks, Coconut Coir, Reinforcing Material, Water Absorption.

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DESIGNING A METHODOLOGICAL FRAMEWORK FOR A GREEN BUILDING RATING TOOL TAILORED TO SRI LANKA'S INDUSTRIAL SECTOR

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Abstract: The sustainability challenges in the industrial sector of Sri Lanka are very different due to its distinct climatic, economic, and operational conditions. Even though international green building rating tools such as LEED, BREEAM, and CASBEE exist, providing frameworks for sustainable construction, their application to industrial buildings in Sri Lanka is constrained due to the potential misalignment with local needs. The existing GREENSL rating tool, developed by the Green Building Council of Sri Lanka, though providing a foundational framework, does not spell out specific details in relation to industrial applications.

The present study has proposed a methodological framework for the green building rating tool appropriate for the industrial sector in Sri Lanka. A comparative analysis was carried out with LEED, BREEAM, CASBEE, and GREENSL to understand the gaps with regard to addressing industry-specific indicators, cost-effectiveness, and relevance to the country's tropical climate. The proposed framework integrates global best practices with localized strategies to ensure relevance, feasibility, and effectiveness.

Key findings emphasize the need to incorporate industry-specific metrics, enhance adaptability to tropical conditions, and ensure cost-efficient implementation. The framework is intended to act as a guide for policymakers, industrial stakeholders, and sustainability enthusiasts in aligning sustainability goals with practical implementation. By addressing the specific needs of the Sri Lankan industrial sector, the framework is expected to ensure environmental, economic, and social sustainability while fostering green industrial practices.

Keywords: Green building rating tools, LEED, BREEAM, CASBEE, GREENSL, Industrial buildings, Sustainability, Sri Lanka, Developing countries

ADDRESSING MAINTENANCE CHALLENGES IN SKYSCRAPER MANAGEMENT: INSIGHTS FROM SRI LANKA

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Abstract: The global demand for vertical development has risen as a solution to growing populations and land scarcity. Skyscrapers and sky cities are integral to maximizing land use while adhering to building standards and regulations. Vertical living extends beyond high-rise buildings, encompassing multi-use structures that integrate residential, commercial, and recreational spaces. Managing skyscrapers presents unique challenges due to their height, complex building systems, advanced technologies, and customer comfort requirements. This study explores the challenges faced by maintenance staff in managing skyscrapers in Sri Lanka. A total of 25 skyscrapers in the Colombo District, were identified based on the Urban Development Authority's 2021 building regulation, formed the population, with 5 selected through stratified sampling based on age, usage, and ownership. Data was collected via structured interviews with 5 maintenance managers, 10 supervisors, and 15 technicians. Secondary data were collected from sources such as literature, maintenance manuals, and standards. Data were analysed through thematic analysis and five key challenge areas namely, technical issues, resource constraints, environmental factors, safety and compliance, and organizational and logistical issues were identified. Common factors impacting building deterioration include aging infrastructure, material selection, climate factors, and design maintainability. Specific challenges were identified as the absence of maintenance manuals, spare part shortages, design flaws, extreme environmental conditions, limited adoption of new technologies, and financial constraints. The findings of the research highlight the urgent need for comprehensive maintenance strategies tailored to Sri Lankan skyscrapers to ensure their longevity and efficiency.

Keywords: Skyscrapers, Building Maintenance, Building Services.

AIR QUALITY OF AIR-CONDITIONED AND NON-AIR-CONDITIONED BUSES IN SRI LANKA

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Abstract: Buses are a commonly used and cost-effective mode of public transportation. However, they present significant indoor air pollution risks due to their ability to accommodate a large number of passengers. This study seeks to evaluate and compare air pollution levels in air-conditioned and non-air-conditioned buses, focusing specifically on biological agents as a primary source of contamination. Key factors such as carbon monoxide (CO), carbon dioxide (CO2), humidity, temperature, and dust levels were meticulously assessed as crucial contributors to indoor air quality. Elevated levels of air pollution inside buses can result in increased passenger fatigue and a higher risk of disease. Data was collected through continuous air sampling in both types of buses over nearly three hours, revealing notable differences in dust content, a major contributor to indoor pollution, between the two types of buses. While carbon dioxide levels in air-conditioned buses remained relatively stable, fluctuating between 356 and 364 PPM, dust concentrations varied from 6 to 8 mg/m³. These findings underscore the dynamic nature of air quality in buses and its potential impact on passenger health.

Keywords: Air quality, Air conditioning buses, Non- air-conditioned bus, Temperature controlling in buses, Air quality inside

COST EFFECTIVE WIRELESS GUESTROOM CONTROL SYSTEM

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Abstract: Guest room control systems have become a necessity in the modern hotels since the hotel guests now expect higher level of service. The ability to control the conditions of guest room according to the user requirement is expected by the guests. Therefore guestroom control systems are implemented in many hotels today. In this research a wireless guest room control system was developed where the control communication was done through Wi-Fi technology and cabling was used only to provide power to the devices. This system was installed in an actual room and the lighting and door access system was controlled through this system. The controlling was implemented using a microcontroller with Wi-Fi wireless communication. A touch keypad was also designed as the user interface. The system can be used as a cost effective solution for low budget hotels. The cost of the system was about 30%-40% of the similar systems available in the market. Since the system use wireless technology, it can be installed in an operational hotel with minimum disturbances to the hotel operations, because modification will not be required for the cabling in the guestroom. Furthermore any maintenance work of the system also can be carried out without interrupting the guests. This is one of the main advantages of the wireless guestroom control system since having minimum interruptions to the hotel operation is very critical for the hotels.

Keywords: Guest Room Control, Wireless Communication, Cost Effective, Wi-Fi

EVALUATING THE THERMAL INSULATION PROPETIES OF MUSHROOM PRODUCTION WASTE IN BUILDING APPLICATIONS

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Abstract: The Building construction sector is notably resource intensive, with a significant dependence on raw materials. This study investigates the potential of mushroom cultivation waste as a sustainable insulation material to mitigate environmental impact and conserve natural resources. A slab model was developed, incorporating a void filled with mushroom waste and encased in concrete, alongside a conventional concrete slab serving as the control. Following a 12-hour heat simulation, the mushroom waste slab exhibited a thermal conductivity of 0.191 W/m./k, Specific heat capacity of 320 J/ kg.K, Density of 450kg/m^3 , and thermal Resistance of 0.1571m2K/W. The results indicate that the mushroom waste slab outperforms the control slab in thermal performance, highlighting its viability as an effective building insulation materials

Keywords: Thermal Resistance, Natural Insulation, Mushroom Production

STRATEGIES TO MINIMIZE MATERIAL WASTAGE IN ELECTRICAL WORKS FOR HOTEL BUILDING PROJECT IN SRI LANKA: A CASE STUDY ANALYSIS

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Abstract: “Achieve best value for money” is the ultimate desire of the Quantity Surveying profession. When Project materials are wasted, it means that the money has been spent on resources that do not contribute to the project's progress. Therefore, every piece of material wasted represents a loss of money. The case is about the material wastage regarding the electrical works of a hotel building project in Sri Lanka and it observed from the perspective of a Quantity Surveyor in a contractor organisation. In nutshell, this case study is tended to garner positive attention to elaborate for that waste minimization strategies to mitigate the electrical works material wastage in similar kind of hotel building projects in Sri Lanka. Wastage minimization strategies were gathered from questionnaire surveys, semi-structured interviews, and related literature documents from the site. The requirement of training programs for labours to acknowledge the material wastage minimization best practices and ethics, enhance the proper communication between trade contractors and top management, proper storage arrangements, employing skill labours, providing incentives to motivate them to minimize material wastage and adapt with technological systems to avoid theft and vandalism are the key innovative strategies emphasized to minimize electrical works material wastages in from findings and analyzed questionnaire responses respect to the particular project and also analytically resulted from semi-structured interviews, the "construction stage" is the most suitable phase for implementing electrical waste minimization strategies in a hotel building project, despite from the design stage, procurement stage, planning stage and material handling and storage stages.

Keywords: Material wastage, Minimization strategies, Electrical works.

LIFE CYCLE COST ANALYSIS OF SUITABLE WALL FINISHING MATERIALS FOR RESTAURANT BUILDINGS IN SRI LANKA

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Abstract: This study evaluates the impact of material selection on the lifecycle cost (LCC) of restaurant buildings in Sri Lanka, with a focus on wall finishing materials. The growing restaurant and hotel industry in Sri Lanka is recovering from economic challenges, including the COVID-19 crisis. This research investigates how the durability and performance of wall materials influence both the initial and long-term costs of construction and maintenance. Data was gathered from 10 industry experts, with insights from restaurant constructions near the north-west and beach areas of Sri Lanka. Results indicate that while some materials have higher upfront costs, their longer lifespan and reduced maintenance needs make them more cost-effective in the long run. The findings provide valuable recommendations for stakeholders in the construction sector to make informed decisions about material selection, highlighting the importance of proper maintenance and renovation to extend the lifespan of restaurant buildings.

Keywords: Economic Impact, Life Cycle Cost Analysis (LCCA), Restaurant Buildings, Sri Lanka Construction, Wall Finishing Materials.

USE OF SAWDUST AS A CEILING-BOARD MATERIAL

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Abstract: Waste sawdust is abundantly available, and their mode of disposal causes a great menace to the environment. The use of ceiling boards made of sawdust can be beneficial as it eliminates the health hazard that asbestos sheets present. Sawdust of Teak tree (Tectona) and a commercially available latex binder were used as the raw materials. The ceiling board panels were made with four mixes, with a constant weight percentage of binder and sawdust, with a specific particle size in each mix. The used average particle size ranges are 10-12 cm, 7-10 cm, 5-7 cm and 3-5 cm for the four mixes. The variable of this research is the particle size range of the sawdust. Properties such as density, water absorption, thermal conductivity, compressive strength and sound insulation of the test panels were determined. The density of the sample panels is between 0.207 and 0.234 g/cm3. The samples have thermal conductivity and percent sound insulation in between 0.1768-0.1612 W/mK and 12.81-20.51%, respectively. The compressive strength of the panels is in between 0.2488 and 0.2622 N/mm2, and no samples were fractured. However, the maximum water absorption of the panels is 51.38%. Except for water absorption, the sample panels showed a good potential as ceiling boards. As per the outcomes, the preferred sawdust particle size range is 10-12 cm.

Keywords: Ceiling Sheets, Environmentally Friendly, Particle Size Range, Physical Properties.

COMPARATIVE EVALUATION OF MAINTENANCE APPROACHES: FROM TRADITIONAL CONCEPTS TO RELIABILITY-CENTERED CONCEPTS FOR BUILDINGS

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Abstract: Building maintenance is a most important yet neglected application to increase building lifecycle and preventing unexpected sudden breakdown in building services by mitigating deterioration of building structural (shell and core) elements and nonstructural (non-shell) elements of the buildings. Historically buildings are considering as a structures used to provide shelter from extreme natural weather conditions and predators, however, this role is evolved with the science and technological evolvement of humankind to meet the growing demand of operational efficiency, safety and comfortable a sustainable environment within the buildings. The aim of this study is to assess and compare traditional maintenance concepts such as corrective maintenance (CM), preventive maintenance (PM), condition-based maintenance (CBM), and reliability-centered maintenance (RCM) approaches, emphasizing their advantages, disadvantages, and suitability for optimizing maintenance plans for increased dependability, effectiveness, and cost-effectiveness. A systematic literature review was conducted, analyzing academic papers, case study evaluations, book chapters, industry reports, and standards related to building maintenance strategies. The finding indicates that traditional maintenance approaches like CM and PM are initially cost effective, but they are fail to address the dynamic needs of modern building systems. However, CBM and RCM used data driven insights to enhance reliability, operational efficiency, cost-effectiveness and dependability. Among these maintenance strategies RCM stands out as the optimal strategy for complex building systems ensuring a 60% – 80% reduction of system failures and a reducing maintenance cost up to 16 % -50% and significant improvements in system uptime and occupant satisfaction. This study emphasis that transformative potential of transitioning traditional maintenance concepts to RCM. Adopting RCM, especially in Skyscrapers or technologically sophisticated buildings, can enhance building operations, ensur-

ing sustainability, reliability, and an optimized environment for occupants.

Keywords: Corrective Maintenance, Preventive Maintenance, Conditioned Based Maintenance, Reliability Centered Maintenance.

AN OVERVIEW OF A SUSTAINABLE URBAN SOLID WASTE MANAGEMENT APPROACHES

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Abstract: Waste generation is an issue that is very crucial in implementing the sustainability of major concepts in the world. Therefore, municipal solid waste is among the leading category of waste. Several nations have geared their efforts toward managing Municipal solid waste as part of their countries. It has necessitated the designing of diverse solid waste management systems. These systems include various techniques such as the 3Rs of reduce, reuse, and recycle; composting; landfilling; anaerobic digestion; thermal methods; and emerging concepts. The 3Rs approach focuses on the overall reduction in the use of resources, whereas composting is the process whereby organic waste is transformed into valuable byproducts with the help of microorganisms. Still, landfilling practice is more common, especially in both developed and developing countries' land-scarce jurisdictions. However, the landfills are sanitary, having facilities to manage leachate and gases emitted. Anaerobic digestion is considered renewable energy and can curb some of the energy crises, while thermal techniques aim at dealing with non-biodegradable solid waste management. New concepts rely with the computational and mathematical modulation on managing the efficiency on the existing and newly designed waste management sites. A series of approaches may be implemented to sustainably manage the generated solid waste in the University College of Batangala premises.

Keywords: Waste Management Techniques, Solid waste, Sustainability.

ESTIMATION OF ELECTRICAL DEMAND FACTOR FOR MULTI STORIED APARTMENT BUILDINGS: CASE STUDY

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Abstract. Electricity plays a vital role in our daily lives, and understanding the demand factor is essential for accurately sizing electrical infrastructure such as transformers, cables, switchgear, and generators. However, the demand factors used for designing these systems often differ significantly from the actual demand in residential buildings, particularly in apartments. This study compares the designed and actual demand factors for low-rise and high-rise apartments. For low-rise apartments, the de-signed demand factor was 0.416, while for high-rise apartments it was 0.544. The installed capacity for low-rise apartments was found to be 45.67 kVA, and for high-rise apartments, it was 22.06 kVA. Corresponding actual demand factors were 0.24 for low-rise and 0.27 for high-rise apartments, showing a considerable difference from the designed values. These findings suggest that the current systems are underutilized, leading to inefficiencies. Additionally, the demand factors used in other countries are not fully compatible with local conditions, and a more realistic approach to designing electrical systems could lead to significant cost savings by optimizing system capacities.

Keywords: Demand Factor, Designed Demand, High-rise

DETERMINATION OF EFFECTIVENESS OF DOMESTIC SEWERAGE SYSTEM IN HIGH WATER TABLE AREA AT SATHSEVANA CHILDREN'S HOME IN MIRIGAMA SRI LANKA

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Abstract: The efficient operation of domestic sewerage systems is essential for public health, environmental protection, and community well-being. High water table areas present unique challenges for wastewater management, necessitating a thorough examination of existing systems to evaluate their effectiveness and resilience. This study investigates the domestic sewerage system at Sathsevana Children's Home in Thawalampitiya, Sri Lanka, an area characterized by high water tables due to its geographical and climatic conditions. Specific objectives include examining the impact of water table fluctuations on system performance, assessing structural integrity, and recommending actionable solutions. Site surveys and visual inspections were conducted to identify visible defects in the sewerage infrastructure. Water table fluctuations were monitored over four months using data from ten wells. Water quality was tested for E. coli contamination, and soil percolation rates were measured. The interview with the superintendent provided insights into daily wastewater output, informing system design improvements. The sewerage system at Sathsevana comprises concrete manholes, a septic tank, a brick soakage pit, and PVC pipes. High water tables during the rainy season compromise the system's efficiency, leading to potential overflow and contamination issues. Visual inspections revealed structural defects, including leakage points in the septic tank and pooling in manholes. Water quality tests indicated significant E. coli contamination, underscoring the need for immediate remediation. Water table analysis highlighted seasonal fluctuations, with the highest levels recorded in May. Immediate repair of septic tank leakage points and improvements in drainage and absorption capacity of the soakage pit are essential. Sustainable design modifications, including resizing the septic tank and enhancing soil percolation rates, are proposed to accommodate seasonal water table variations. Implementing these measures will ensure effective wastewater management and environmental protection in high-water table areas. The

study provides valuable insights into the challenges and solutions for managing domestic sewerage systems in high-water table regions. The findings and recommendations contribute to developing resilient and sustainable wastewater management practices, enhancing public health and environmental integrity in affected communities.

Keywords: Septic System, Soakage pit, High water table, Percolation.

LOW COST SOLAR POWERED DAYLIGHT TUBE FOR RESIDENTIAL BUILDINGS IN SRI LANKA

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Abstract: Daylighting provide energy efficient lighting for buildings and also improve the mental wellbeing of the occupants. This research aims to develop a tubular daylight device suitable to be used to Sri Lankan houses in order to integrate daylighting to illuminate spaces where fenestration such as windows were not available. The developed model consisted of acrylic dome, light pipe and diffuser. In addition solar panels were integrated to the tube so that it can provide illumination with LED panel powered with solar power during nighttime. Once the installation was complete the illuminance levels were measured at a height of 0.8m from floor level. With the solar tube, illuminance level of 100-200 was observed during the day, in the 12' x 15' room. At night, the 30W LED light provided average of 150 lux around the luminaire at 0.8m from floor level . It was observed that the battery required two days to fully charge and the battery was able to supply power for the LED luminaire for 6 hours. The developed prototype was constructed with locally available material in order to minimize the cost, and the cost of the prototype was about 50% when compared with commercially available solar tubes. This system can be used as a sustainable lighting device which will improve the energy efficiency of the houses while providing the improved mental health to the occupants. The performance of the system can be further improved by increasing the capacity of solar panel and battery.

Keywords: Linear Daylight Tube, Solar Powered, Low Cost, Residential Buildings, Sustainability

IDENTIFICATION OF BEST PLANT COMBINATIONS IN INCREASING THERMAL CONDUCTIVITY OF VERTICAL GREEN SYSTEMS UNDER TROPICAL CLIMATIC CONDITIONS

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Abstract: Vertical greenery systems such as green facades and living walls reduce heat transmission in buildings. The characteristics of the plants used for vertical greenery systems are important for thermal conductivity in a building. The thermal conductivity variation of three types of plant combinations grown on vertical living walls under tropical climate conditions was evaluated in the present study. Three green walls with plant combinations of succulents, annuals and perennials were used in the study. Four chambers of 1m x 1m size were constructed to test the thermal conductivity variations in the above plant combinations against a control treatment with a bare wall. The temperature variations inside and outside of the chamber walls, the surface of the green wall and the air space between the chamber wall and green wall were measured four times a day for a period of two weeks in September 2022. Inside and outside temperature changes with perennial plant combination ranges from -0.46 ℃ to 3.34 ℃, with annual plant combination from 0.06 ℃ to 1.48 ℃, and with succulent plant combination from -0.28 ℃ to 2.64 ℃. The lowest temperature of the living wall surface was shown in the green wall of the succulent plant combination. Based on the results, the annual plant combination reduced temperatures better than the perennial and succulent plant combinations. However, a combination of succulent and other plant types can also be experimented with in future research in further reducing thermal conductivity.

Keywords: Annuals, Perennials, Succulents, Thermal conductivity, Vertical green systems

COMPARATIVE ANALYSIS OF GLOBAL GREEN BUILDING RATING TOOLS: IMPLICATIONS FOR DEVELOPING A SRI LANKAN INDUSTRIAL FRAMEWORK

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Abstract: LEED, BREEAM, and CASBEE are not in application directly to these industrial stereotyped buildings in the developing countries, like Sri Lanka, due to the context difference they have from climate settings to economic and operational ones. Such buildings, which act as energy users and producers, are, therefore, required to be framed differently from that defined for commercial buildings. GREENSL has been developed by GBCSL (Green Building Council of Sri Lanka) and is the only significant rating tool for sustainability in Sri Lanka. It lacks, however, specificity and comprehensiveness for the industrial side. This study is a comparative analysis of LEED, BREEAM, CASBEE, and GREENSL in terms of what is covered in each related to industry-specific indicators, cost-effectiveness, and relevance to regional climate. This study proposes a tailor-made green building rating framework for Sri Lanka's industrial sector, taking into account local challenges and opportunities. The key findings crucially imply industry-specific indicators, better applicability to tropical climates, and cost-effective adaptation strategies. The framework is designed to bring together global best practices modified within the country to fulfill unique needs of the industrial sector in Sri Lanka. The framework will offer a resource for policymakers, industry practitioners, and sustainability advocates to advance green industrialism by bringing uniformity between sustainability aspirations and doable implementation.

This study contributes to sustainable development discourse by providing a model for developing country-specific green building standards. It underscores the importance of localized solutions for achieving environmental, economic, and social sustainability in industrial operations.

Keywords: Green Building Rating Tools, LEED, BREEAM, CASBEE, GREENSL, Industrial Buildings, Sustainability, Sri Lanka, Developing Countries, Regional Climate, Industry-Specific Indicators, Cost-Effectiveness, Tropical Climates.

IMPACT OF BUILDING SERVICES ON CUSTOMER SATISFACTION IN SRI LANKAN HOTELS

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Abstract: Due to the increased tendency of people to travel for various reasons, such as personal affairs, business objectives, and tourism activities, the hotel industry has experienced tremendous growth in both the global economy and Sri Lanka over the past 10 years. The hotel sector in Sri Lanka contributes more to the nation's net earnings as its third source of foreign cash. Hotels play a significant role in the lodging sector and have recently risen to the top of the list of industries in terms of global competition. It's crucial for hotel management to increase customer satisfaction to draw in future business.

The purpose of this study is to examine the impact of building services on customer satisfaction in Sri Lankan hotels. The study ascertains the impact of building services on customer satisfaction in Sri Lankan hotels with reference to guests who stayed in 3-5 stars class hotels around Sri Lanka. The study is reviewed 328 guests' responses related to hotels located in down south, Colombo, Kandy, Dambulla & Trincomalee via Google form.

There are three independent variables namely, safety related building services, comfortability related building services and technology related building services. Dependent variable was customer satisfaction of hotel customers. According the statistical analysis that can prove there is a significant impact of building services on customer satisfaction in Sri Lankan hotels.

The results of this study provide hotel professionals with an assessment of current methods of measuring, managing customer satisfaction and help them to realize the importance of building services to improve customer satisfaction.

Keywords: Building Services, Customer Satisfaction, Hotel Industry.

ADVANCEMENTS AND IMPACTS OF COMBINE HARVESTERS IN PADDY CULTIVATION IN NORTHERN PROVINCE OF SRI LANKA: A COMPREHENSIVE REVIEW

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Abstract: The paper explores the transformative role of combine harvesters in the paddy cultivation of Northern Province of Sri Lanka. Paddy growing is one of the backbones of Northern Sri Lanka's agrarian economy, where rice cultivation is the lifeblood of a vast majority. It is no secret that, the last few decades have seen a transformation in agricultural practices, with the introduction of combine harvesters signifying a move toward mechanisation. This review critically explores the socio-economic, technological, environmental, and social implications of these changes through the indigenous landscape of Northern province, a region attempting to re-construct its agrarian economy after civil war. Adoption of combine harvesters, which had previously taken place under international aid and development projects, provided major solutions to key problems such as labour shortages. Small-scale and track-type harvesters, along with locally modified imported machines, have proven instrumental in enhancing productivity and efficiency. However, the high costs of machinery, environmental concerns like soil compaction and emissions, and social challenges, including job displacement and shifting gender roles, have emerged as significant issues. The economic benefits of mechanization extend beyond individual farmers, fostering food security, income generation, and new employment opportunities in machinery operation and maintenance. This review highlights the need for sustainable mechanization, enhanced support infrastructure, and community-based cooperative models to address challenges. By balancing mechanization's benefits and potential drawbacks, Northern province can build a more resilient and inclusive agricultural sector, fostering long-term socio-economic recovery and environmental sustainability.

Keywords: Combine Harvester, Paddy Cultivation, Northern Province.

A REVIEW ON EXISTING TRICYCLE SUSPENSION SYSTEMS

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Abstract: A tricycle is a three-wheeled human-powered cycle which has improved stability over other types of cycles. Since it is operated by human power, the efficiency and the ergonomics factors are the important design considerations. Accordingly, different tri-cycle designs have been developed. Among them, (i). The Delta Trike, (ii). The Tadpole Trike can be identified as the most commonly available configuration. Tricycles are defined by their wheel arrangement. Delta tricycle has a single front wheel and two rear wheels. The Tadpole tricycle has a single rear wheel and two front wheels. The purpose of this study is to review the various design configurations of tricycles available in the literature. Further, the review presents the technical solutions for developing a stable tilting mechanism which can provide proper alignment of the independent wheels in all possible types of movements driving. Moreover, the paper reviews the limitations in the existing suspension system that lead to unstable and inefficient riding experience. Finally, this study provides valuable insights for tricycle designers to develop a more improved suspension system on comfort, handling, safety, and rider satisfaction for everyday users.

Keywords: Suspension System, Tricycle, Stability, Tadpole Trike, Delta Trike.

DESIGN OF AUTOMATED OIL-WATER SEPARATOR SYSTEMS TO REDUCE ENVIRONMENTAL EFFECTS IN ASSOCIATED INDUSTRIES

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Abstract: This paper overview the important of advance oil water separator technology in managing oil contaminated water in industry like Petroleum, Manufacturing and Transporta-tion. This paper give details to existing systems and their limitations and highlighting the needs for more efficient solu-tions. The study introduces novel approach by involving au-tomaton systems to improve performance of oil water separators. This method improve accuracy, minimize manual operations, reduce interceptor overloading, solid waste collecting. API Separator that are optimize for parameters like length to width ratio, depth to width ratio and horizontal velocity. The study promotes combining for integrating full automated systems with conventional separation technology to enhance operational performance reliability and environmental protection.

Keywords: Oil-Water Separator, System Automation, Environmental protection, efficient

SUGARCANE BAGASSE ASH AS A PARTIAL SUBSTITUTE FOR FINE AGGREGATE IN CEMENT-BASED PRODUCTS

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Abstract: Sugarcane Bagasse Ash (SCBA) is one of the most common types of agricultural waste, and it is obtained as a byproduct of the combustion of sugar industries. The disposal of large quantities of this waste is a critical concern in the sugar industry. Due to its availability and pozzolanic properties, it can be utilized as a partial replacement for cement or sand in concrete products. The impact of incorporating SCBA as a partial substitute for sand up to 50% by volume in interlock cement bricks was technically investigated in this study. The properties of visual appearance, density, water absorption, and compressive strength were tested after seven days of production of the bricks. A slump test was conducted for every brick mix to observe the workability. As per the results of all samples, the bricks with 10% SCBA addition were selected as the most preferable bricks. The average compressive strength of the selected bricks was observed to be 13.54 Nmm^{-2}. The selected interlock bricks can be recommended to be applied in indoor gardens and house pavements where heavy loads aren't used.

Keywords: Cement Interlock Bricks, Compressive Strength, Substitute, Sugarcane Bagasse Ash, Waste Material

DEVELOPMENT OF A NON-LETHAL WILDLIFE DETERRENT SYSTEM: ADDRESSING HUMAN-WILDLIFE CONFLICT WITH ASIAN PALM CIVETS IN AGRICULTURAL AND RESIDENTIAL AREAS

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Abstract: A nocturnal animal, the Asian Palm Civet (*Pardoxurus hermaphroditus*) is widespread throughout South and Southeast Asia, including Sri Lanka. Because of their flexibility, they frequently invade suburban and urban areas, causing disruptions, fruit theft, and property damage. Furthermore, there are health risks because civets can carry zoonotic infections. Conventional deterrent techniques, such sound repellents and electric fences, are sometimes inefficient, expensive, and unsuitable for broad application. This study describes the development of a non-lethal wild-life deterrent system intended to keep Asian palm civets out of residential and agricultural regions. By using a laser light as a visual deterrent, the system seeks to over-come the drawbacks of current techniques in a way that is both ethical and practical. The efficiency of the deterrence system was assessed during a nine-day period. According to preliminary observations, the civets were successfully scared and repulsed by the laser light, which caused them to run away. The civets avoided the region more and more as the testing went on, suggesting a successful long-term deter-rent impact. In summary, the approach that was designed turned out to be a humane and efficient way to reduce conflicts between Asian palm civets and people. The technology demonstrates potential as a long-term solution for preventing wildlife in-filtration into agricultural areas and human settlements, despite several shortcomings, such as false activations brought on by non-target motions.

Keywords: Non-Lethal Wildlife Deterrent, Human-Wildlife Conflict, Asian Palm Civet Management, Agricultural Protection.

IMAGE-BASED QUALITY INSPECTION IN METAL ROOFING SHEETS PRODUCTS USING IMAGE PROCESSING

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Abstract: Metal roofing sheets have a vital function in the construction sector, serving to safeguard and enhance the visual appeal of buildings. Colored metal roofing is highly preferred due to its exceptional durability and aesthetic appeal. It is important to guarantee the quality of these sheets. However, the existing method of inspecting them manually, which depends on human participation, is both time consuming and prone to mistakes. Progress in computer vision has led in a development of effective solutions for complex issues in industrial quality inspection processes. This study suggests the use of an automated image-based inspection system to improve the quality inspection process in the roofing sheet manufacturing industry. The paper described use image processing algorithms to identify surface defects on metal roofing sheets. The method commences with the acquisition of images of the metal roofing sheets, which is then followed by a sequence of stages comprising image conversion, denoising, enhancement, normalization, thresholding, and feature extraction. These strategies jointly improve the precision and effectiveness of the quality inspection process, decreasing the need for manual methods and reducing the chance of human mistakes.

Keywords: Image processing, Defect detection, Metal sheets.

AUTOMATION OF TRADITIONAL AGRICULTURE: ROBOT HARVESTING WITH CHALLENGES

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Abstract: Modern agriculture produces maximized yield, high profit and fulfills the human food needs. Majority developing countries provide 80% of farm power from humans while developed countries use machines. Farm mechanization is timely efficient and enhances crop quality with potential yield per unit area. Therefore, Agricultural automation including harvesting is crucial. Author presents a comparative discussion on the applications of robot harvesting for traditional Agriculture with some challenges. The study employs a qualitative methodology, focusing on content analysis of existing literature. Overall farm productivity can be significantly increased by robot harvesting while focusing on other farming activities. It replaces the manual traditional harvesting by upgrading the quantity and quality with less farming efforts. Majorly, different kinds of fruits and vegetables are harvested by robots. The discussion is mainly based on path navigation of robots, using algorithmic functions aided with sensors and cameras to detect the real time of harvesting. Robotic arms or other tools are utilized to harvest without damaging. Monitoring of crop health and nutrient deficiencies, thinning, pruning, spraying and bagging functions in green houses, orchards and open fields are performed with the automation. Research difficulties on scarcity of actual in-depth data, variations of feed-back from end users, issues on visual processing efficiency and economic aspects including initial investment and higher expenditure are the challenges on the approach. Traditional harvesting can be replaced by robotic harvesting with some challenges. Extended research based on socio-economical aspects and; crop specific, regional based and in-depth experiments are needed to enhance the technology.

Keywords: Agriculture, Mechanization, Oppositions.

ADVANCED WHEELCHAIR CONTROL SYSTEM RASBERRY PI-3-BASED JOYSTICK ANALOG AND VOICE CONTROL

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Abstract: This research aims to transform the way wheelchair control systems operate by introducing a groundbreaking approach that incorporates Raspberry Pi 3-based joystick controls and voice activation. We delve into how modern technology can enhance accessibility for individuals with physical disabilities, addressing the shortcomings of traditional wheelchair interfaces, particularly regarding accuracy, adaptability, and user experience. Central to our project is the creation of a tailored prototype that utilizes the Raspberry Pi 3 as its core. This innovative device combines joystick analog controls with a voice recognition module to deliver an intuitive and user-friendly wheelchair system. To further elevate the control experience, we have integrated an accelerometer that responds to tilts or movements in the x, y, and z axes, which enhances maneuverability in tight spots or rough terrain. The voice activation feature is particularly noteworthy, allowing users to interact with the wheelchair effortlessly through spoken commands. Utilizing the Speech to Text API, this system processes voice inputs captured by the microphone, enabling the wheelchair to understand and act on verbal instructions. Additionally, our study examines the potential for incorporating smartphone sensors, specifically leveraging the compass data to provide precise directional control. This capability is designed to instill confidence in users as they navigate their surroundings with greater freedom. Our methodology encompasses recruiting participants from our target user group, developing a custom prototype, and executing meticulous testing protocols. Test scenarios will cover both indoor and outdoor settings, emphasizing real-world applications to evaluate the system's responsiveness and adaptability. The aim of this research is to not only create an advanced wheelchair control system but also to set a new standard in accessibility innovation. The project contributes to the field of assistive technologies by addressing the unique challenges faced by individuals with physical disabilities. The

results of testing procedures, coupled with user feedback, are expected to validate the efficacy of the proposed system, marking a significant stride towards creating a more accessible and user-centric wheelchair experience.

Keywords: Voice Activation, Custom-built Prototype, Accessibility, Physical Disabilities Accelerometer, Maneuverability, Speech to Text API Smartphone Sensors, Compass Data, Direction Control, Assistive Technologies

DESIGN AND IMPLEMENTATION OF SMART SHOCK ABSORBER INTEGRATED WITH GPS-BASED ROAD CONDITION ANALYSIS

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Abstract: This research presents the design of a smart shock absorber system integrated with GPS-based road condition analysis for optimizing vehicle suspension and implementation of a performance. The aim is to enhance ride comfort, stability, and safety by dynamically adjusting shock absorber characteristics in response to varying road conditions. The proposed system leverages real-time data from GPS navigation systems to analyze road conditions such as surface roughness, potholes, and bumps. Through advanced algorithms, the shock absorbers adapt their damping properties accordingly to mitigate the effects of road disturbances on the vehicle. The integration of GPS-based road condition analysis provides a proactive approach to suspension control, enabling precise and timely adjustments to optimize ride quality and handling. Experimental validation of the system demonstrates its effectiveness in improving overall vehicle dynamics and passenger comfort, highlighting its potential for integration into future automotive platforms.

Keywords: shock absorber, suspension control, GPS-based analysis

DEVELOPMENT AND IMPLEMENTATION OF AN UPGRADED CONTROL SYSTEM FOR A MURUKKU MAKING MACHINE

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Abstract: The Previous Murukku making machine operated using Mach3 CNC software, which required users to know CNC G-codes, making it challenging for many customers. This research addresses the gap in user-friendly machine interfaces by developing an upgraded control system. The new system was created using a microcontroller, featuring an LCD, switches, and a rotary encoder, allowing users to adjust machine parameters easily. The methodology involved circuit design, programming, and integration of user interface components. Testing ensured reliability and user-friendliness. The results showed significant usability improvements, enabling operation without CNC programming knowledge. Customer feedback highlighted the ease of operation and maintenance, with many opting to retrofit their old machines with the new system. This research demonstrates the potential for similar upgrades in other industrial equipment, emphasizing user-centered design.

Keywords: Control system, Microcontroller, Murukku machine, Food production.

ERROR DETECTION OF THE TOWER PARTS IN TOWER FABRICATION INDUSTRY BY IMAGE PROCESSING

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Abstract: Power transmission lines play an essential role for ensuring the reliability of electrical power networks. The precision of each component is of utmost importance in the tower manufacturing industry, where steel components are manufactured and integrated to build these towers. Conventionally, the quality control procedure depends on manual measurements, which is a laborious and time-consuming job, particularly for intricate parts. A novel image-based quality control approach is presented in this work as a potential alternative to traditional human-based inspection techniques. The proposed methodology employs MATLAB for the purpose of digital image processing, with the objective of improving precision and decreasing the duration of inspections. Object detection, line detection, hole detection, and object reconstruction on the coordinate plane are the main stages that comprise the process. Finally, we compare the actual dimensions of the system with those in the technical drawing. The experimental results provide evidence of the efficiency and efficacy of the suggested approach, therefore emphasizing its potential to enhance the efficiency of the quality control process in steel tower manufacturing.

Keywords: Randon Transform, Image Processing, Error Detection.

1 Introduction

Overhead transmission lines play an important role in the operation of a reliable electrical power system (Albermani et.al., 2008). Power transmission towers are crucial for electricity transmission (Saddek et.al., 2023), in addition to that Steel lattice towers are widely used in civil engineering and telecommunications (Szafran et.al., 2019) . Within the tower manufacturing sector, the steel components shown in Figure 1 are produced and then joined together to build the towers.

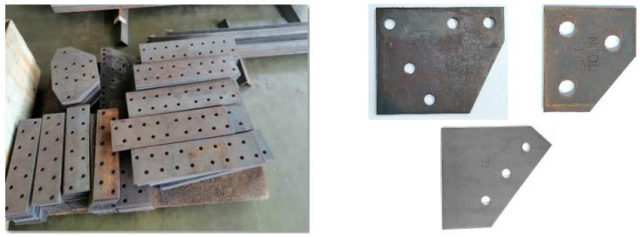

Fig. 1. Images of the tower parts.

Precision in dimensions is of utmost significance in the building process of steel towers. Companies in Sri Lanka that manufacture steel towers and buildings primarily use traditional methods for measuring the dimensional precision of tower components. The increasing demand for steel tower parts has caused a notable surge in faults, which might lead to large financial losses for businesses and negatively affect their brand image. Nevertheless, it is not feasible to carry out a thorough verification process to confirm the accuracy of every single component.

These companies incorporate sampling methodologies into their quality assurance operations instead of examining each individual component. This process involves the identification of particular components for evaluation, in which their measurements are compared to the respective design drawings. Although under professional supervision, the existing method is nevertheless prone to errors, inefficiencies in time management, and inherent biases.

In recent years, there has been an increase in the usage of computer vision systems across several industries, replacing traditional visual detection approaches. Computer vision has demonstrated its capacity to enhance productivity across multiple domains

2 System architecture

Figure 2 depicts a comprehensive block diagram outlining the complete production process of tower parts, incorporating the new automated error detection system. The following is a concise summary of the processes involved in this introduced error detection approach. During the initial stage of the procedure, a component is placed on a trolley to facilitate the capture of its top view. Afterwards, the trolley is moved into the error-detecting machine in order to capture the image. This device consists of an Image capturing chamber and a light control unit (see Figure 3).

The proposed design integrates an advanced light management system, which is essential to capturing images of high-quality. To achieve constant image quality and consistent light, four lights are strategically placed in the image capture box. This setup maintains stability in illumination, reduces the presence of shadows, improves

the appearance of depth, and enables flexibility to accommodate different sizes and forms of parts.

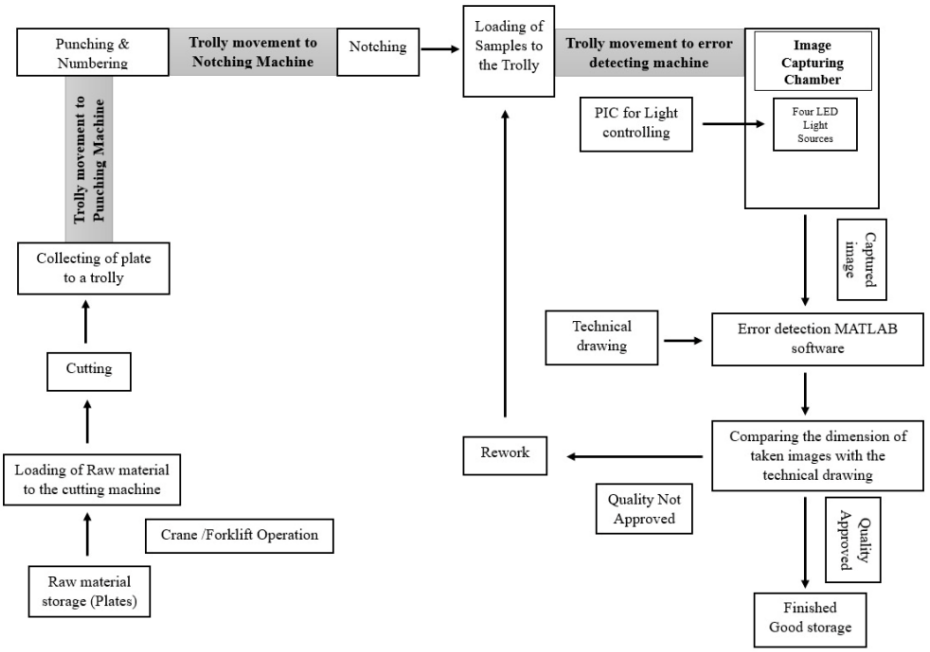

Fig. 2. Comprehensive block diagram outlining the complete production process of tower parts with new automated error detection system

Fig. 3. Prototype Design

Once a component is placed within the machine, it is captured by the camera and the resulting image is processed using a particular MATLAB programme that is designed to identify errors.

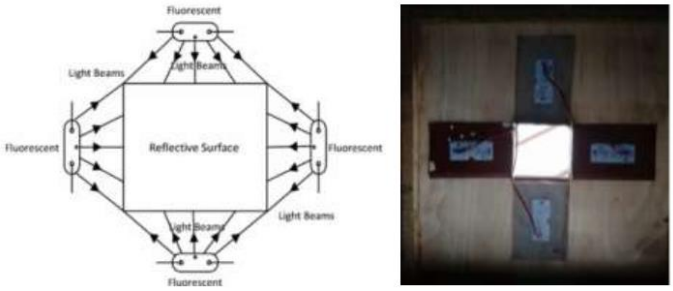

Fig. 4. Lighting Arrangement

Fig. 5. On/off states for each lamp

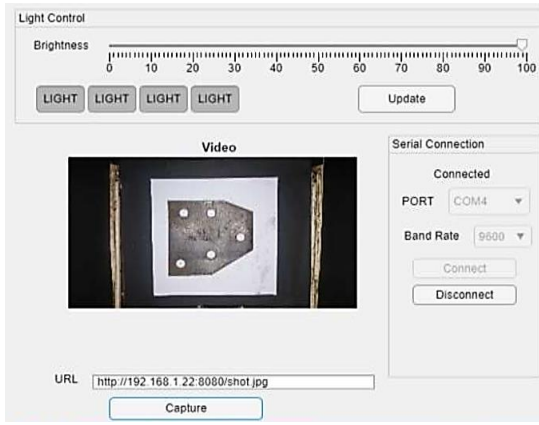

Fig. 6. MATLAB interface to control lights

3 Methodology

The processing can be divided into five distinct stages: Object detection, Line detection, Hole detection, Reconstruct the Object on coordinate plane. Finally, the actual dimensions obtained by the system are compared with the dimensions specified in the technical drawing.

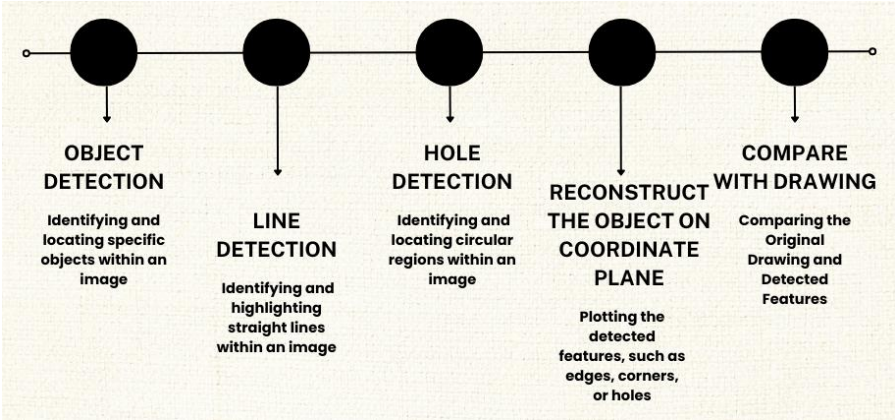

Fig. 7. Images of the tower parts

3.1 Object detection and Edge Detection

In computer vision, object detection is recognized as an essential task. Object detection refers to the process of identifying whether a given object or instance of a specific category of objects is present or not in an image. In the positive situation, the task also involves determining the exact location of the detected object, as stated in literature (Cusano and Napoletano, 2017). Simultaneously, Edge detection is a technique which denotes the process of identifying and locating sharp discontinuities in an image (Raj, 2017). Canny Edge Detection (CED), developed by John Canny in 1986, is a widely recognized technique used to extract object outlines and identify local maxima and minima in the gradient of image intensity. The valuable tool finds application in diverse computer vision and image processing tasks, such as object identification, feature extraction, and picture segmentation, due to its adaptability. This study uses the **Canny edge detection** technique together with object detection algorithms to accurately identify essential features of tower components, such as important boundaries and edges, which are required for precise measurements

Step of the Canny method

The Canny edge detection technique is a fundamental tool in image processing that employs a systematic approach to accurately identify edges. The first stage is converting the image to grayscale, ensuring that all pixels have uniform intensity. Gaussian smoothing is applied to decrease the presence of high-frequency noise. Afterwards, the gradient of the smoothed image is calculated, serving as the foundation for detecting edges. Non-Maximum Suppression reduces the number of edges

to create a more refined representation. Double thresholding classifies edges into three categories: strong, weak, and non-edges, according to the magnitudes of their gradients. The ultimate stage, hysteresis-based edge tracking, improves precision by linking weak edges to strong edges. This approach guarantees the consistent and dependable identification of edges.

After applying the Canny Edge Detection algorithm to the image, the edges are highlighted. Subsequently, the resulting edge map converted into a binary representation. The bwboundaries function in MATLAB is essential for extracting accurate object boundaries during the binary conversion process. The function bwboundaries helps outline object borders in binary images, ensuring a precise depiction of the recognised items. After applying Canny edge detection and bwboundaries, a series of contours that outline the identified objects is obtained. To enhance the detection results, a band-pass filter is utilised to systematically filter the identified objects according to certain parameters, like minimum and maximum contours. The approach involves sequentially integrating edge detection, boundary extraction, and post-processing filtering to improve the precision and dependability of object recognition in various imaging situations.

3.2 Line Detection

The process of line detection starts by examining the image for the existence of relevant features. Subsequently, the Radon Transformation is employed to transfer the image from Cartesian space to Radon space, where straight lines are depicted as peaks. The Radon data plot displays potential lines as peaks, which are determined by locating local maxima. In order to maintain precision, the post-processing stage deals with redundant or duplicate lines, hence avoiding the occurrence of multiple detections of parallel lines in the Radon data display.

3.3 Hole Detection

The "imread" function is used to load and read the image during hole detection. Preprocessing steps, including converting to grayscale, reducing noise, and enhancing contrast, are required based on the image's quality and characteristics. It helps enhance the accuracy of circle detection results. Then, the "imfindcircle" MATLAB function is utilised with specified radius range and other parameters. The 'Centre' code identifies the centre of the circle, 'radii' code indicates the radius, and 'metric' is used to rank the detected circles.The 'imshow' and 'viscircle' functions are utilised to display the identified circle on the original image. After the previous procedure, the holes are not perfectly circular. The Hough transformer is utilised to accurately detect and locate holes. This applies to circles with either a known or unknown radius. It is known in this scenario.

3.4 Reconstruct the Object on coordinate plane

In the next step, the object is reconstructed on the coordinate plane. In order to start this process, the image of the object is initially presented in binary format, indicating a representation in black and white. The process of reconstructing the features of the object, specifically lines and circles, can be described as follows: The image's center is indicated by the letter "O" in a unique blue color, along with the demarcation of a reference line in a red dashed line. The yellow "X" mark represents the Cartesian coordinates of the line, while the green dash line visually represents the detected line in polar form. The 'viscircles' function is used to redraw the detected holes, on the coordinate plane. Following this, the focus is shifted towards the depiction of lines that intersect. This stage entails the identification and filtration of duplicate intersection points, with the exclusion of those that extend beyond the boundary of the image. Subsequently, the process of visualizing the locations of intersection is carried out, and the appropriate coordinates are displayed in the command window. The proposed methodology effectively demonstrates its efficacy by employing a systematic approach that guarantees a thorough reconstruction and visualization of objects on the coordinate plane.

3.5 Compare with Drawing

First, a scan was performed along the x and y axes to identify the lowest and leftmost locations. Scanning for the lowest position in the x-direction identified the bottom point, while scanning for the lowest position in the y-direction identified the leftmost point. Subsequently, minimal values were computed from an intersection matrix. Further analysis was conducted to account for any potential rotation in the vertical (y) direction along the z-axis. a check is conducted for any rotation in the y-direction (vertical) along the z-axis.

3.6 Results and Discussion

The effectiveness of the suggested system was evaluated by testing the parts with different forms, numbers of holes, and dimensions. This section uses a selected part (see figure(a)) to illustrate the obtained results.

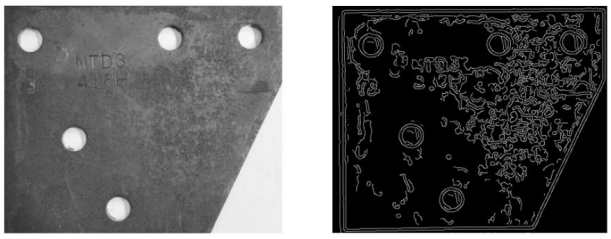

Fig. 8. (a) Image captured by the system (b) After the canny edge detection

The Canny edge detection technique, combined with object detection algorithms, was used to precisely determine the characteristics of tower structural elements. The prototype successfully identified crucial borders and edges, which are necessary for accurate measurements.

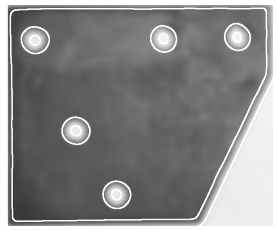

Fig. 9. Results after the object detection and band pass filter

The line detection method based on the Radon transform successfully translated identified lines into Cartesian coordinates. The corners of the tower components precisely identified with this method. The efficiency of the prototype was demonstrated by the precise reconstruction of these features in the coordinate plane.

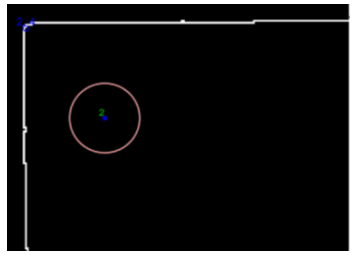

Fig. 10. Radon transformation image

In next step draw detected lines on the binary image. The “imfindcircles” tool exhibited strong robustness in the detection of holes in tower components. The precise positions of these holes were determined using the “viscircles” tool. In next step draw detected lines on the binary image(See Fig.11 and 12).

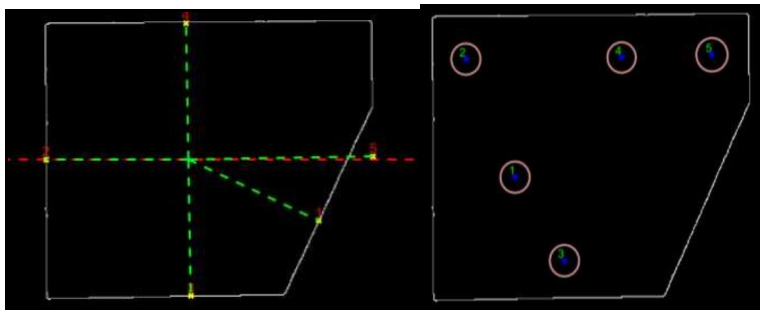

Fig. 11. (a) Detected lines (b) Detected circle with their ID

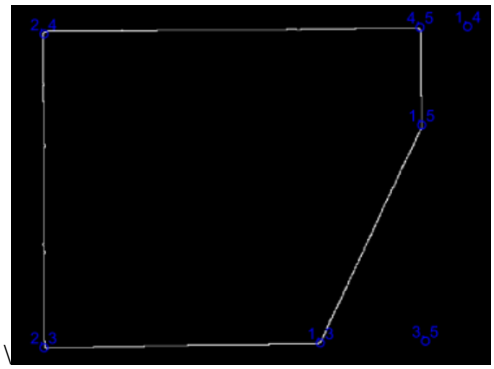

Fig. 12. Intersection of lines output

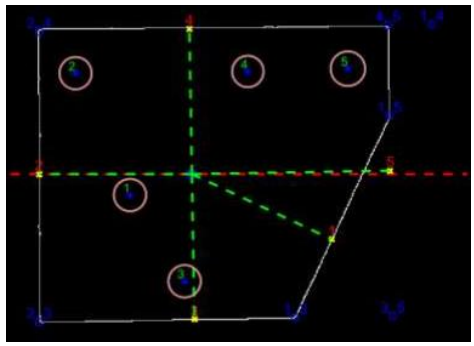

Fig. 13. All output on one image

The prototype enabled a comprehensive evaluation by comparing the detected features with the reference drawings. Specifically, intersection points and hole locations were superimposed onto the drawings, demonstrating the congruence between the prototype's outputs and the predefined specifications.

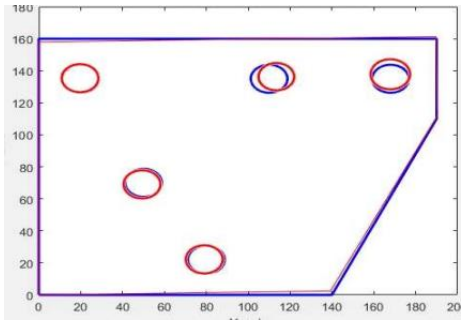

Fig. 14. Comparison between detected object and real object

4 Conclusion

Overhead transmission lines play an important part in ensuring the dependability of an electrical power supply. Precise fabrication and assembly of steel components is essential in the tower manufacturing industry to ensure the construction of towers effectively. The conventional quality control procedure depends on manual measurements, which can be time-consuming, especially for complex structures. The objective of this work is to optimize the quality control procedure by incorporating digital image processing technologies to automate the examination of steel tower components, therefore enhancing precision and minimizing human error. The methodology described in this study employs the Canny edge detection technique to identify edges and the Radon Transform for line recognition. The conversion of polar coordinates to Cartesian coordinates facilitates object reconstruction, while the imfindcircle function is employed for hole identification. Furthermore, the Hough Transform is utilized for the purpose of identifying circles, and a methodical technique is devised to identify and remove redundant lines in Radon Transform data. This procedure culminates in the identification of lines, circles, and junction points on a coordinate plane, therefore offering a graphical depiction of the examined section of the steel structure. This approach seeks to mechanize and enhance the inspection procedure, guaranteeing a high level of precision and effectiveness in quality control, which is confirmed by comparing the recorded characteristics with the technical drawings.

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DESIGN OF A FULL-BODY COVERED SAFETY AIRBAG SYSTEM FOR MOTORCYCLISTS

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Abstract: Motorcycle accidents often result in serious injuries, particularly due to the lack of adequate protection for riders. This project proposes the design of a full-body covered safety airbag system specifically tailored for motorcyclists to mitigate the severity of injuries in the event of a crash. The system integrates advanced sensors and algorithms to detect imminent collisions or loss of control, triggering the deployment of airbags across the rider's body. Key components include robust crash detection sensors, a central processing unit for real-time data analysis, and strategically placed airbags that inflate within milliseconds to shield the rider's head, torso, limbs, and back. The design considers ergonomic factors to ensure comfort and unrestricted movement while riding.

Through rigorous testing and simulations, the efficacy and reliability of the proposed system will be evaluated to meet safety standards and enhance overall rider protection. The ultimate goal is to contribute to reducing fatalities and serious injuries among motorcyclists, thereby promoting safer riding experiences. This research represents a critical step towards enhancing motorcycle safety through innovative technology, offering a promising solution to mitigate the impact of accidents and promote safer riding practices.

Keywords: Airbag system, Sensors, Algorithms.

A REVIEW ON CHASSIS SYSTEMS OF TRICYCLES

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Abstract: This review paper examines the current advancement in the design and enhancement of tricycle chassis, focusing on innovations and design approaches that enhance the performance, safety, and functionality of tricycles. This paper explores various design principles, materials, and engineering techniques employed in the construction of tricycle chassis. Key topics include structural analysis, durability, load distribution, stability improvements, rider's comfort and the integration of modern technologies such as lightweight materials. Additionally, the review highlights recent research findings and trends that address the challenges faced in optimizing tricycle chassis for different applications, from commercial use to recreational and mobility aids. By synthesizing current knowledge and identifying gaps in existing research, this paper aims to provide a comprehensive understanding of tricycle chassis design, offering insights for future research and development in this field.

Keywords: Tricycle, Tadpole, Delta, Chassis, Stability

TRACK 3

DIGITAL TECHNOLOGIES AND CREATIVE INDUSTRIES

ANALYSIS THE INFLUENCE FACTORS OF THE INDOOR PATH LOSS CALCULATION

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Abstract: Modeling the indoor path loss is an essential part of wireless communication network planning. Indoor environments, particularly workstations, are always changing. Accurate path loss models are necessary for dependable network performance and coverage. Path loss is influenced by a number of elements, including the surrounding environment, construction materials, layout, frequency range, antenna characteristics, and the presence of obstructions like furniture or walls. It is difficult to develop universal models that work in all indoor situations because of these characteristics, which introduce notable variances in signal attenuation. Furthermore, traditional models might not be adequate for present and future network requirements given the quick evolution of office designs and the expanding usage of wireless technology. The main elements affecting indoor path loss modeling are thoroughly examined in this paper, with an emphasis on how they affect the precision and dependability of radio propagation models. That specifically looks at how environmental elements like humidity, temperature, and device interference affect the path loss. The study also looks into how the different frequency bands impact to the signal behavior with different indoor settings and how structures and structural components contribute to signal degradation. The research seeks to improve knowledge of indoor radio propagation and provide useful insights for network design optimization by examining the interactions of various variables which impact for the indoor pathloss.

Keywords: Indoor Coverage, Pathloss, Model Tuning, Signal Propagation, Attenuation,

DEVELOPING A SPECIALIZED JOB BOARD FOR NVQ CERTIFICATE HOLDERS IN SRI LANKA

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Abstract: The development of the job board platform in this paper is specifically designed for NVQ certificate holders in Sri Lanka. The study shows the deficiencies of the job market to support this group, while indicating some challenges such as poor accessibility of job opportunities, inefficiency in matching processes, and poor career guidance. This proposes a user-centric web and mobile platform that connects NVQ job seekers with employers in an effective way. The iterative waterfall model was adopted for development, which includes requirements analysis, design, implementation, testing, and deployment. Advanced job-matching algorithms, targeted job listings, and career guidance resources have been integrated into the platform to make it more useful for both jobseekers and employers. Initial testing and analysis indicate that this platform can potentially reduce unemployment among NVQ holders and also make the recruitment process easier for employers. This finding shows that the proposed platform may serve as a strong bridge for job seekers and the job market in Sri Lanka, with social and economic benefits.

Keywords: NVQ holders, job board, job matching, vocational training, Sri Lanka.

NEXT-GENERATION SCHOOL BUS TRACKING: A MOBILE-CENTRIC APPROACH FOR REAL TIME MONITORING

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Abstract: The use of school buses is so common for students, as they travel long distances. However, they travel along in the school buses and the parents wait for updates at different times from the driver. It is a disturbance for the driver, but still the driver fulfills the requests of parents over the phone in the present setting. It is acceptable when the driver is not driving, otherwise there is a risk of answering the phone during the drive. The implementation of a School Bus Tracking System is crucial for enhancing safety, security, and efficiency of student transportation. By providing real-time updates of the location of school buses, the system allows parents and school authorities to monitor the journey of buses, ensuring that children reach their destinations safely. It also improves the management of student attendance by tracking when and where students board and alight the bus, reducing the risk of children being left behind or lost. Furthermore, the system's notifications features keep parents informed about their child's attendance and the bus's status, fostering peace of mind and enabling better coordination. Overall, the School Bus Tracking System not only safeguards students but also streamlines transportation logistics, making it an essential tool in modern education systems. However, there is no school bus tracking system catering to the unique requirements of Sri Lankan context for an affordable price. In this paper, a system integrated with advanced technologies providing real-time updates on the location of school buses is introduced as an Android based mobile application.

Keywords: School Bus Tracking, Smart Mobile Application, Location Based System.

AN ENHANCING PUBLIC TRANSPORTATION IN SRI LANKA THROUGH REAL-TIME TRACKING AND BOOKING SYSTEM

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Abstract: This research is about creating a Bus Tracking and Booking System designed specifically for the transportation system in Sri Lanka. The goal is to make public transportation better by using technology. The system will help users track buses in real-time and easily book their rides. The aim is to improve the way buses operate and make public transportation more modern and user-friendly in Sri Lanka. It uses advanced technologies like GPS and mobile apps to give users accurate and current info about bus locations, schedules, and available seats. It also has an easy-to-use booking system, allowing passengers to reserve and buy bus tickets without any hassle. The studies worked together with stakeholders like transit authorities to create a system that meets the specific needs of Sri Lanka. A database has been built into the system, and user-friendly interfaces, and tested everything thoroughly to make sure the system works reliably. Results from the implementation demonstrate a significant improvement in the accessibility and efficiency of bus services. Passengers can now plan their journeys more effectively, reducing waiting times and enhancing overall satisfaction. Transit authorities benefit from enhanced operational insights, enabling better resource allocation and schedule optimization. In conclusion, the Bus Tracking and Booking System presented in this research represents a technological advancement in the Sri Lankan public transportation landscape. The successful implementation of this system not only addresses current challenges but also lays the foundation for future innovations in the realm of smart and sustainable urban mobility.

Keywords: Bus Tracking, Online Booking, Public Transportation, Real-Time, User-friendly Service.

NATIVE TAMIL NEWS ARTICLE SUMMARIZATION

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Abstract: This research addresses the increasing trend of online news consumption within the Tamil-speaking community, driven by the growth of Internet technology. With the rise of online Tamil news platforms, readers can access a wide range of topics, but the absence of summarization in news articles poses challenges for efficient consumption. The research aims to employ machine learning techniques, specifically leveraging the XL-Sum model, for text summarization of Tamil news articles. The XL-Sum model comprises one million pairs of summaries and the news, annotated by professionals, covering 44 languages. Most research has focused on abstractive summarization in high-resource languages such as English, with limited work in low-resource languages like Tamil. The chosen XL-Sum model stands out as a large-scale multilingual abstractive summarization model and has been used with the custom dataset collected by the authors from selected Sri Lankan websites, consisting of 149 news and summary pairs annotated by professionals. The method involves gathering strategic data, selecting the XL-Sum pre-trained model, modifying and adapting it for Tamil, building a training dataset, re-training the model, and employing human evaluators to assess the quality of generated summaries, assigning ratings from high to medium. Key results include ROUGE scores comparing the new dataset with the existing model dataset, showing that the higher scores depend on the dataset's weight and fine-tuning the model. As an outcome, the authors can be able to release the new dataset for wider research community, providing news articles and their summarizations in Tamil from the Sri Lankan Community.

Keywords: Custom Dataset, Low-Resource Language Summarization, Machine Learning, Sri Lankan Tamil Dataset, XL-Sum Model.

STRATEGIES USED IN FILM MARKETING, CASE STUDIES IN HOLLYWOOD FILM INDUSTRY

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Abstract: Film marketing teams use different marketing strategies to promote the film, marketing strategies are important to make a film successful. In Sri Lanka some of the films had to be pulled from the theaters due to the lack of audience. The reason for that is the inadequacy of the marketing strategies used by the marketer and the appropriate marketing strategies have not been used. The purpose of this study is to find out the marketing strategies that is used in Hollywood film industry to successfully take a movie to the audience. A low level of audience engagement and possible loss of money result from movie marketers' ignorance or lack of marketing understanding. The aim is to identify and analyze the main marketing strategies used by the Hollywood film industry as well as identify a good marketing strategy for successfully marketing a film. This research based on qualitative mode. Desk studies and case studies were used for data collection. Case study was done by selecting five best box office movies earned in the lifetime and appropriate marketing strategies mentioned in secondary data. These studies show that for a movie to be successful, paid media, owned media, earned media are important part of then whole and all contribute to a complete marketing strategy.

Keywords: Film Industry, Marketing Strategies, Audience, Hollywood

DESIGN AND DEVELOPMENT OF A DATABASE-DRIVEN APPLICATION FOR SINHALA ETYMOLOGICAL ANALYSIS

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Abstract: The Sinhala language, a member of the Indo-Aryan family, is spoken by over 20 million people in Sri Lanka and boasts a rich etymological heritage shaped by influences from Sanskrit, Pali, and Dravidian languages. However, the lack of digital tools tailored for its linguistic study has hindered systematic analysis of its etymological and morphological structures. This research presents the design and development of a database-driven application that serves as a repository of Sinhala words annotated with detailed etymological information. The application classifies words into derivative, borrowed, or native categories, generates grammatical forms for linguistic exploration, and offers an intuitive web-based interface for users. The open-source platform is geared towards educational and research purposes, aiming to support advancements in Sinhala linguistic studies. The paper details the design, implementation, and validation process, highlighting the tool's potential to enhance etymological research and pedagogy**.**

Keywords: Sinhala language, Etymological Analysis, Morphological Analysis

VIRTUAL FITTING ROOM SYSTEM (FIT-ME)

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Abstract: In response to the rising popularity of online apparel shopping in Sri Lanka, the Virtual Fit-On Room System has been introduced to ensure that the perfect fit is achieved when purchasing clothes online. The uncertainty often associated with online shopping is addressed by allowing users to virtually try on garments before making a purchase. Flexibility is offered through two options: standard clothing sizes can be selected based on previous shopping experiences, or precise body measurements can be provided for a more personalized fit. An avatar model is generated based on the selected option, providing a visual representation of how the clothing will appear on the unique body shape. Prior to development, a comprehensive review of existing virtual fitting methods and challenges was conducted, revealing a significant gap in the Sri Lankan market, where such applications were lacking. User convenience was prioritized in the system's design, resulting in an intuitive interface that allows effortless navigation, virtual try-ons, and informed purchasing decisions. As the Virtual Fit-On Room System evolves, new features are expected to be introduced in response to user needs and technological advancements, positioning it as a dynamic and forward-thinking solution for online apparel shopping in Sri Lanka.

Keywords: Virtual Fitting Room, Online Shopping, 3D Avatar, Personalized Fit, E-Commerce.

DEVELOPMENT AND EVALUATION OF AN AUTOMATED STUDENT ATTENDANCE TRACKING SYSTEM USING FACIAL RECOGNITION TECHNOLOGY

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Abstract: Face recognition technology has become a critical tool in image processing, offering innovative solutions for automation in various fields. This research presents the development of an automated student attendance tracking system using facial recognition to address inefficiencies in traditional attendance methods. Conventional systems, such as roll calls and manual record-keeping, are time-consuming and prone to human error and manipulation, including proxy attendance. The proposed solution aims to digitize and streamline the attendance process, reducing administrative burdens and improving accuracy. The system utilizes Haar Cascade classifiers for face detection and a K-Nearest Neighbors (KNN) algorithm for facial recognition. Real-time video is captured through a webcam, allowing the system to detect and recognize students. Once recognized, the system automatically logs attendance and generates reports in CSV format, facilitating easy data management. To enhance user experience, the system also features text-to-speech feedback, providing audio confirmation for each recognized student. By eliminating manual intervention, the system ensures accurate and reliable attendance records, significantly reducing errors and improving data integrity. Its intuitive interface allows both students and educators to navigate the system effortlessly. Additionally, the solution is cost-effective and requires minimal installation effort, making it practical and feasible for widespread adoption. This approach not only modernizes attendance tracking but also minimizes human effort, offering a robust and efficient alternative to traditional methods. The system demonstrates the potential to transform how attendance is managed in educational institutions, addressing challenges such as time consumption and error-prone data entry with a scalable, automated solution.

Keywords: Automated Attendance, Face Recognition, Biometric Authentication.

TRACK 4

INNOVATION AND ENTREPRENEURSHIP FOR ECONOMIC RESILIENCE

GENERATIVE AI-POWERED ORGANIZATIONAL LEARNING CULTURES IN SRI LANKA AND EMPLOYEES' PERCEPTIONS

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Abstract: This study examines the integration of Generative Artificial Intelligence (GAI) into Sri Lankan organizational learning. While GAI offers the potential for personalized and effective learning, its adoption is still nascent. A quantitative research approach was adopted, utilizing purposive sampling to select 100 respondents who actively employed GAI for their further learning. Employee perceptions, influenced by factors like prior artificial intelligence exposure and organizational support, are crucial for successful implementation. The research confirms GAI's positive impact on learning efficiency and effectiveness, emphasizing the importance of organizational support, technology, and employee readiness for its successful integration.

Keywords: Employees' Perceptions, Generative Artificial Intelligence, Organizational Learning Cultures, Sri Lanka, Technology Adoption.

OPTIMIZING INVENOTRY THROUGH ABC-FSN ANALYSIS

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Abstract: Effective inventory management is crucial for optimizing resources and ensuring uninterrupted operations in utility services like water supply. This research focuses on the application of ABC and FSN methods to optimize inventory within the central north region of the National Water Supply and Drainage Board. The study aims to identify critical inventory items by categorizing them based on their consumption value and movement frequency, which are essential for making procurement and stocking decisions. By analyzing 61 inventory items, including both fast-moving and slow-moving categories, this research provides a detailed classification that highlights the areas of excess stock and potential shortages .The integration of ABC-FSN analyses helps in prioritizing inventory control efforts, thereby reducing costs and improving the overall efficiency of the inventory management process. The findings underscore the importance of tailored inventory strategies for different categories of items, ensuring that the National Water Supply and Drainage Board can maintain optimal stock levels, reduce waste and enhance operational effectiveness. This study offers a practical approach to inventory optimization that can be adapted by other utility services facing similar challenges.

Keywords: Inventory Management, Optimization, ABC Analysis, FSN Analysis

PURCHASE INTENTION OF CLOUD PRODUCTS: A STUDY OF SMALL AND MEDIUM ENTERPRISE CUSTOMERS IN LEADING TELECOMMUNICATION PROVIDER IN SRI LANKA

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Abstract: The study aims to identify the factors influencing customers' purchase intention of cloud products focusing on Small and Medium Enterprise customers in the leading telecommunication provider in Sri Lanka. Perceived value, price, brand image, and sales promotions were identified as predictors of purchase intention based on the literature. A structured questionnaire was employed to collect data from conveniently selected 217 small and medium enterprise customers in the Western Province region of Sri Lanka. Collected data were analyzed using correlation and regression analyses. As per the results of the study, perceived value and price were significant factors in the purchase intention of cloud products. Customers highly consider the perceived value when they purchase cloud products. Effective business strategies should focus on especially the value and the price to enhance the purchase of cloud-based services in Sri Lanka.

Keywords: Brand Image, Perceived Value, Price, Purchase Intention, Sales Promotion.

OPTIMIZATION OF A SINGLE SUPPLIER RAW MATERIALS INVENTORY SYSTEM IN A FABRIC MANUFACTURING PLANT

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Abstract: Inventory management plays a vital role in most of the business organizations today in the competitive business environment as there is always an associated cost component with the inventory. In any industry or manufacturing organization, control of the inventory is highly essential in order to fulfill the requirement of the raw materials, sub-assemblies and other relevancies without any shortage. If there is any shortage, that might interrupt the routine operations of the plant. On the other hand, maintaining an excess amount of inventory is also a burden most of the time. Because most of the costs components associated with the inventory rise up with the level of inventory. In this study, the in-house raw material inventory system of a specific fabric manufacturing plant is considered. In order to optimize the raw materials inventory, a simulation study is conducted with the aid of simulation software. As the results of optimization experiments an optimal reorder point is proposed, leading to a reduction in the raw materials inventory levels, and thereby reducing the overall inventory cost of the organization.

Keywords: Inventory, Simulation, Optimization.

MANUFACTURERS' PERCEPTION ON ESTABLISHING REFILLING STATIONS AS A SUSTAINABLE SOLUTION FOR SINGLE-USE PLASTICS: A STUDY BASED ON CLEANING LIQUID MANUFACTURING INDUSTRY

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Abstract: The usage of liquid cleaning products in Sri Lanka has increased phenomenally due to the increased population and urbanization while generating a large number of single-use plastic waste to the environment. It is estimated, that each year, over 640,000 metric tons of plastic leak into the Indian Ocean from Sri Lanka (Clean Cities, Blue Ocean, June 2020). The current study aims to understand the perception and readiness of Cleaning Liquid manufacturers in Sri Lanka to establish refilling stations as a sustainable solution for single-use plastic waste. In Sri Lanka, the refilling system is already in practice within the coconut oil industry, where many vendors and consumers are both familiar with and appreciative of the refilling machine service. The research used a mixed methods approach combining both qualitative and quantitative data collection, using questionnaire surveys and unstructured interviews with the managers of leading cleaning products manufacturing companies in the western province. A survey questionnaire was administered among 25 managers including technical executives from selected 5 cleaning liquid manufacturers in the Western province. The findings revealed that most cleaning product manufacturing companies have recognized the potential benefits of refill stations, including reduced packaging costs and an improved circularity of the environment. Findings further established that refilling represents a circular approach to closing the loop of consumption of single-use plastics and the ecosystem needs to be established. The challenges and constraints associated with refilling as per findings includes initial investment costs, the logistical complexities of setting up and maintaining refilling stations, inconvenience, lack of accessibility, hygiene concerns, and customer adaptation and participation.

Keywords: Cleaning products industry Refilling, Plastic pollution, Circular economy

CUSTOMER CHURN OF FIBRE RETAIL CUSTOMERS IN LEADING TELECOMMUNICATION SERVICE PROVIDER IN SRI LANKA

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Abstract: Sri Lanka's telecommunication sector has experienced significant growth, with a competitive market with multiple providers. This research aims to identify the factors affecting customer churn in a leading telecommunication company in the Sri Lankan telecommunication industry. Researchers identified service quality, price value, and competitor offer as the main contributing factors for customer churn which is the outcome variable of the study. Hypotheses were advanced as there are significant impacts of service quality/ price/ competitor offers on customer churn. Data was collected from 174 fiber retail customers of the selected telecommunication service provider through a structured questionnaire and processed those data by using correlation and regression analyses. As per the findings of the study, all predictors such as service quality, price value, and competitors offer significant effects on customer churn while service quality is the most important contributing factor. It is recommended to enhance the quality of the service to reduce customer churn and the company should pay attention to the competitor offers and the price of the product. This study will help to add something to the existing body of knowledge and to make customer-oriented decisions effectively to reduce customer churn.

Keywords: Competitor Offer, Customer Churn, Price, Service Quality.

AN EFFECT OF MAS HOLDINGS IN THE SRI LANKAN GARMENT INDUSTRY

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Abstract: In this study the Sri Lankan garment industry and MAS Holding Company considered, it can be recognized that the garment industry has been taken to a new dimension by obtaining a record income in the year 2023. The main research problem is to find out the effects of MAS Holdings on the Sri Lankan garment industry. The purpose of this research is to study the success and failure of the MAS Holding company, which is a major milestone in the Sri Lankan garment industry, and to study the nature of the Sri Lankan garment industry. The reason behind this was that MAS Holdings has positively impacted the apparel industry in Sri Lanka in the year 2023. This study was conducted specifically for MAS Holdings. Data was collected for this research study using the interview and observation methods. Information was obtained from two experts who are engaged in the garment industry. Moreover, qualitative and quantitative data were used for this study. There are various garment factories in Sri Lanka and among those various factories, only MAS Holding is used for this research. In the research study, it was found that Mass Holding has a positive effect on Sri Lanka's garment industry. This research was done in such a way that it is important for future researchers who conduct research on the country's economic development.

Keywords: Apparel Manufacturing, Fashion Brand**,** Garment Industry, International Market, MAS Holding, Positive Influence.

THE FACTORS INFLUENCING TOURISTS' SATISFACTION AND THEIR IMPACTS ON DESTINATION LOYALTY IN DOMESTIC TOURISM IN SRI LANKA

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Abstract: The objective of this study was to determine the factors that influence tourists' satisfaction and their impact on loyalty in domestic tourism in the Unnichai Pond of the Batticaloa district. Studies on tourism destination in that place were rarely available. The current study closes this research gap, which is critical for the development of sustainable tourism. The mixed research approach was used, and data were collected from 261 respondents. AMOS and SPSS were used for the data analysis. The findings of the study are discussed below. The attractiveness of a destination played a significant role in tourists' satisfaction and loyalty. Significantly, the surrounding environment, the water scene, and cleanliness were important components of the attraction. The accessibility of the destination was a wonderful feature that impacts tourists' devotion. Furthermore, a well-protected road and accessibility for food, beverages, and necessities enhanced the trustworthiness of the destination. Entertainment had a favorable impact on the loyalty of travelers, and fishing, boating, and festival celebrations, which were important components of the entertainment. Safety was one of the key factors that creates trustful tourists, which included an atmosphere that is free from fear of people, animals, and natural disasters. Additionally, travelers were pleased with their money spent on the trip. The cost of transportation and consumables were the key determinants of travelers' perception, which encouraged destination loyalty. However, there were unsatisfactory aspects, including lifeguard facilities, relaxation, kids entertainment, photo shoot risks, internet connection, service conditions, and urban transportation, that affected the destination loyalty. The current study is crucial for further research and a useful reference for policymakers in domestic tourism.

Keywords: Domestic Tourism, Destination Loyalty, Unnichchai Pond.

REVIEW ON SKIN DEPIGMENTING ACTIVITY OF COMMON MEDICINAL PLANTS USED IN SRI LANKAN TRADITIONAL BEAUTY REMEDIES

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Abstract: Cosmetology is one of the world's oldest professions and has become the most demanding field in the modern era. Skin complexion is considered one of the prominent and important features of beauty. Melanin is the main responsible pigment for determining skin color. The result of excess melanin production, distribution, or transport is known as Hyperpigmentation and it becomes one of the common aesthetic problems among people. A range of cosmetic treatments are available for the management of various hyperpigmentation conditions. However many commercially available synthetic cosmetic products lead to side effects and long-lasting health problems due to harmful ingredients. Also reported some drawbacks. In this situation, natural ingredients can be effectively used for preparing cosmetic products to obtain better outcomes. Hence the objective of this study was to scientifically emphasize the de-pigmenting effect of common medicinal plants mentioned in Sri Lankan traditional beauty remedies for the management of hyperpigmentation-related cosmetic problems. A comprehensive literature search was conducted through different scientific databases and authentic Ayurveda texts. The PRISMA checklist guided the data assessments. The results of the study summarized that most of the phytoconstituents present in these medicinal plants act as potential agents in the skin de-pigmenting process in several ways mainly including significant tyrosinase inhibitors, powerful antioxidants, and as modulating agents of different cellular signaling pathways on melanogenesis pathway. Hence these medicinal plants may play a significant role in treating skin hyperpigmentation. Further, it would provide an intuition to explore new therapeutic strategies based on data linked with traditional knowledge systems. However, the experimental effect, and safety, of the medicinal plants require further determination before studying their clinical efficacy.

Keywords: Medicinal plants, Skin hyperpigmentation, Tyrosinase.

ASSESSING THE ENTREPRENEURIAL INTENTIONS OF COSMETOLOGY STUDENTS IN SRI LANKAN UNIVERSITY COLLEGES

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Abstract: This study investigates the entrepreneurial intentions of cosmetology students in Sri Lankan university colleges through the Theory of Planned Behavior (TPB). The research aims to understand the factors driving students' intentions to pursue entrepreneurship in the beauty industry by examining how personal attitudes, subjective norms, and perceived behavioral control variables influence these intentions. Data were collected from 103 students using a validated questionnaire and analyzed using SPSS 25. The findings reveal that personal attitudes, subjective norms, and perceived behavioral control significantly influence the entrepreneurial intentions of cosmetology students in Sri Lankan university colleges. Positive attitudes toward entrepreneurship emerged as the most substantial predictor, followed by perceived behavioral control and subjective norms. These findings suggest that enhancing students' confidence, providing strong social support, and fostering positive attitudes toward entrepreneurship are crucial for developing entrepreneurial intentions. Addressing these factors can significantly enhance the entrepreneurial readiness of cosmetology students, contributing to a more dynamic and successful beauty and personal care industry in Sri Lanka.

Keywords: Cosmetology, Entrepreneurial Intentions, Theory of Planned Behavior, Vocational Education, Sri Lanka.

REVIEW OF TOXIC CHEMICALS IN COSMETICS

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Abstract: Cosmetic products play a significant role in personal care routines worldwide, including in Sri Lanka. Cosmetics are made of mixtures of ingredients. Concerns regarding the quality and safety of these products have grown due to the potential presence of harmful chemical ingredients and inconsistent product formulations. In recent years, the use of this cosmetically based personal care has increased throughout the world. Initially the cosmetics consisting of natural products. However, in present days, a high assimilation of chemical substances in formulation as preservatives, fragrances, surfactants, stabilizers are significant. The chemical additives which are used in the formulation of cosmetic products are bioactive and pose toxic effects to the human body. This study reviews current regulatory frameworks, industry practices, and consumer awareness, highlighting gaps that allow the continued use of hazardous ingredients focusing on commonly used ingredients such as parabens, phthalates, formaldehyde-releasing agents, heavy metals and synthetic fragrances. The presence and implications of such ingredients despite their potential adverse effects on human health. These ingredients in cosmetics are linked to adverse effects including endocrine disruption, carcinogenicity, neurotoxicity, immune-toxicity, geno-toxicity, skin sensitization, and environmental toxicity. Long-term exposure of these substances may lead serious health outcomes, including hormonal imbalances, reproductive and development disorders, allergic reactions and skin barrier damage. Furthermore, emerging trends in green chemistry and sustainable alternatives are discussed here as viable solutions to mitigate these risks. This comprehensive analysis aims to empower consumers, stakeholders including researchers and policymakers to prioritize health and pressing need for safer cosmetic formulations and stricter oversight.

Keywords: Biological risk, Chemical components, Cosmetics, Harmful effects, Human health, Risk mitigation, Toxics.

PROMOTING SUSTAINABLE NATURE TOURISM THROUGH VISITOR INTERPRETATIVE INFRASTRUCTURE AS TOURISM EDUCATIONAL TOOL IN HORTON PLAINS NATIONAL PARK

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Abstract. Interpretation is an educational activity which aims to reveal meanings and relationships through the use of objects, experiences and by illustrative media to communicate information to a particular audience. From the view point of tourism, interpretation provides visitors with information and education, connects people to places and focused on protection and preservation. This study has implemented to observe the availability of visitor interpretive infrastructure in Horton Plains National Park and to understand how visitor interpretive infrastructure influence on tourist education on sustainable nature tourism in Horton Plains National Park. Qualitative research approach and the case study research design have been adopted to understand the influence of visitor interpretive infrastructure through the experiences, views and ideas of particular respondents who visited Horton Plains National Park. Primary data collection has been conducted through observations and semi structure interviews with the visitors. Convenient sampling technique has been adopted to collect data from 17 semi structural interviews. Under the inductive analysis approach, the content analysis method was adopted for data analysis. Recommendations of this study focus on qualitative improvements of visitor interpretive infrastructure facilities in Horton Plains National Park.

Keywords: Infrastructure, Interpretation, Education

EXPLORING THE FACTORS AFFECTING ON TOURIST SATISFACTION WITH RIDE-SHARING SERVICES IN SRI LANKA (WITH SPECIAL REFERENCE TO COLOMBO DISTRICT)

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Abstract: Smartphones with powerful functionalities and technological growth have given tourists access to a wide range of service apps, which have transformed the tourism industry's business model. Particularly, mobility and transportation apps that assist users in navigating and using different modes of transportation, like ride-sharing services, are growing in popularity as a means of meeting the demand of tourists for urban travel in the absence of sufficient public transportation in developing nations. As a result, ride-sharing has become a necessity in the Sri Lankan economy rather than just an alternative. Since no study in Sri Lanka has examined the tourists' perception regarding the use of ride-sharing services during their trips, the purpose of this research was to investigate the factors influencing tourists' satisfaction with ride-sharing services in Sri Lanka with special reference to the Colombo district. This study used a quantitative approach, and this research was carried out by using primary data collected through self-administered questionnaires. The convenience sampling method was used to select 385 individual tourists who are users of ride-sharing services of two main service providers in the Colombo district. Reliability was confirmed using Cronbach's alpha reliability test, and collected survey data were analyzed using descriptive statistical analysis and Pearson correlation coefficient. The results of the study verified that tourist satisfaction with ride-sharing services has a strong positive correlation with both digital experience and safety. Additionally, this study provided valuable managerial implications that can aid stakeholders, policymakers, and service providers in the transportation and tourism sectors in better meeting tourists' travel needs.

Keywords: Tourist Satisfaction, Digital Experience, Safety, Accessibility, Ride-sharing Services

CHALLENGES AND OPPORTUNITIES ON ADOPTING TOURIST INFORMATION KIOSKS IN CULTURAL TRIANGLE SRI LANKA: TOURISM STAKEHOLDERS' PERSPECTIVE

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Abstract: When new technologies are developed, new technologies and applications are created. The information kiosk is a popular technological technique. The tourist information kiosk was a popular and effective technological technique in travel and tourism. Several countries used tourist information kiosks (TIK) in their travel and tourism businesses. It was an emerging technology in the travel and tourism industry. Hence, the central focus of this study was to identify the existing usage of TIK in the Cultural Triangle and explore the challenges and opportunities of adopting Tourist Information Kiosks in the Cultural Triangle, Sri Lanka. The purposive sampling method was used to collect primary data from thirty (30) tourism stakeholders in the cultural triangle of Sri Lanka. In addition, a qualitative data analytical method was employed, and the collected data was transcribed and analyzed using content analysis. The study's findings revealed that there was a problem regarding the information provided to visitors in the cultural triangle. Also, tourist information kiosks are not used in Anuradhapura and Polonnaruwa. TIK were used in Knady, but it was not utilized correctly. Environmental issues, theft, unemployment, maintenance, and updates were challenges to adopting TIK in the Cultural Triangle. Stakeholder awareness, willingness, language barriers, and inexperienced employees were opportunities to adopt TIK in the cultural triangle of Sri Lanka. Further, updating and maintaining in a timely manner, considering physical access to TIK, the TIK content should be suitable for users, implementing TIK with cover to protect it from environmental issues helps maximize the TIK experience in the cultural triangle in Sri Lanka.

Keywords: Tourist Information Kiosks, Cultural Triangle, Tourism Stakeholders

IDENTIFYING THE PSYCHOLOGICAL ASPECTS OF DIGITAL NOMADS FOR TOURISM DESTINATION MARKETING IN SRI LANKA

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Abstract: With the rapid growth of digital nomadism, understanding the unique motivations and preferences of the demographic features becomes essential for targeted marketing strategies. The major objective of this study is to understand the psychological aspects of digital nomads for tourism destination marketing in Sri Lanka through identify the specific psychological factors that influence digital nomads' decision to choose Sri Lanka as a travel destination and examine how these psychological aspects differ from of traditional travelers. This research study conducted through thematic analysis of semi-structured interviews with digital nomads to identify key psychological factors influencing their choice of destination under the desire for inspiration and creativity, work-life balance, social connectivity, and cultural immersion. The findings suggest that traditional marketing approaches are inadequate for this segment, necessitating a more nuanced understanding of their psychological drivers. Further, the findings of the study highlight the need for Sri Lankan tourism marketers to tailor their strategies by emphasizing the country's natural beauty, work friendly environments, and rich cultural experiences. This research contributes to the literature by integrating psychological theories into tourism marketing especially in the tourism niche of digital nomads, offering actionable recommendations for marketers to enhancing Sri Lanka's appeal to digital nomads through an effective marketing strategy. Limitations include the study's focus on a specific demographic and the potential for evolving trends in digital nomadism to affect the applicability of these findings over time.

Keywords: Digital Nomads, Tourism Marketing, Psychological Factors.

THE LOCAL COMMUNITY INVOLVEMENT IN DEVELOPING THE ECO-TOURISM: (SPECIAL REFERENCE TO MEEMURE TOURISM DESTINATION, SRI LANKA)

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Abstract: Meemure is a destination in the Central Hills of Sri Lanka popular among adventure tourists and day tourists looking for a nature-based rural experience. This study attempts to investigate the factors that may affect the sustainability of Meemure as a tourist destination. The main objective of the study is to examine the level of community participation in the tourism activities in Meemure which is a key step in ensuring that all other ecotourism principles are in practice. This study used both secondary and primary data, with primary data collected through semi-structured interviews and observations. A sample of 12 individuals of the host community was approached to collect primary data. Themes and patterns were then abstracted from these using NVivo thematic analysis. The implications of this research may indicate the necessity of proper involvement of the host community as the most important stakeholders of eco-tourism with respect to sustainable development in Meemure. The study further revealed that the host community in Meemure need to improve their skills and knowledge in a professional way to practice eco-tourism operations in order to attract both domestic and foreign tourists. However, due to a lack of skills and knowledge of the host community, the decline of eco-tourism in Meemure. The findings of this study further revealed that the host community should have a proper awareness regarding guests' hospitality. Furthermore, some limits for development were identified in terms of environmental degradation, cultural shifts, and fluctuations in seasonal tourism.

Keywords: Eco-Tourism, Sustainable Development, Host Community.

PRELIMINARY STUDY ON THE BRAGADI THAILAYA OF THALPATHE PILIYAM FOR DARUNAKA

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Abstract: Darunaka is the most common skin disorder affecting the scalp. The most common age group is 20-30; females are more affected than males. It's characterized by scaling of the scalp, itching of the scalp, diffuse hair falling, and exudation of the scalp in Ayurveda. It's due to the vitiation of vata and kapha dosha. This disease has a high prevalence rate and frequent relapses. According to the pilot survey, Darunaka is found to affect 63% of people. Keeping all these facts in the background, the present preliminary study to cure Darunaka is Bragadi thaila. The study was conducted in 30 clinically diagnosed patients having classical signs and symptoms in Darunaka administered with Bragadi thailaya for 14 days. When considering the type of Prakriti, vata-kapha body temperament is more prominent than kapha-pitta and pitta-vata.According to the figures. There is a significant difference between scaling of the scalp, itching of the scalp, and diffuse hair falling before and after treatments. However, there is an insignificant before and after treatment of exudation. Ayurveda pharmacodynamics properties were analyzed in ingredients of Bragadi taila under Rasa, Guna, Virya, and Vipaka. They were dominant in Tikta, Kashaya, Katu rasa, Laghu, Ruksha in guna, Ushna in veerya and Katu vipaka. When considering swarasa dravya thiktha and kashaya rasa, laghu, theekshna and snigdha guna, sheetha veerya, katu vipaka are predominant. In Kalka dravya, thiktha, kashaya, katu rasas, laugh, ruksha, and theekshna guna, seetha veerya and katu vipaka are the most prominent pharmacodynamics properties. The main ingredients in this recipe were targeted at the pacification of Vata Dosha and Kapha Dosha.According to observations and results, it can be concluded that the drug shows highly significant results in almost all the classical signs and symptoms of Darunaka effectively.

Keywords: Darunaka, Bragadi thailaya.

IMPROVING THE EFFICIENCY OF THE MTU WORKSHOP AT THE SRI LANKA NAVAL DOCKYARD, TRINCOMALEE

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Abstract: The Motor Turbine Union (MTU) Workshop at the Sri Lanka Naval Dockyard in Trincomalee is essential for maintaining and repairing MTU engines and ZF gearboxes, which power a significant portion of the Sri Lanka Navy's fleet, particularly Fast Attack Craft (FAC) and Offshore Patrol Vessels (OPV). However, recent months have seen a decline in the workshop's efficiency, leading to delays in maintenance and repairs, and consequently, an increase in the non-operational status of ships. This paper investigates the factors contributing to this decline and proposes strategies to enhance efficiency, focusing on the systematic utilization of human resources, process optimization, training and development, and resource management.

Keywords: Efficiency, Fast Attack Craft (FAC), Offshore Patrol Vessels (OPV).

UNIVERSITY WORKING STUDENTS' TIME MANAGEMENT AND ITS EFFECT ON ACADEMIC SUCCESS

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Abstract: This study focuses on the importance of time management on the academic achievements of university students in higher education and how they respond to all challenges and tasks presented by such an environment. This study uses a quantitative approach, through which the primary source of data is collected by a questionnaire and responses from 51 university-working students at the University of Vocational Technology. Secondary data were sourced from academic journals and books that provide context and insights. Three main topics emerge from the study, in areas of planning, timeliness, and work-life balance. Now the results indicate at least a 98% improvement in academic performance among students who stick to punctuality and plan out study routines. Students, on the other hand, have family responsibilities, stress, and a workload to deal with, all of which can interfere with effective time management. Furthermore, it emphasizes the need for appropriate planning and time management skills, which are necessary for both academic and personal development. Similar to the recommendations proposed by the experts, this study also concludes that educational institutions need to provide tools and training through which students can practice these abilities and thus facilitate their academic and professional growth. This study contributes to the existing knowledge on the use of time management skills to enhance academic performance and quality of student life.

Keywords: Time management, Academic success, University students

CHALLENGES OF TOUR GUIDING IN SRI LANKAN TOURISM INDUSTRY

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Abstract. Tourism industry, as the most economically viable industry in contemporary Sri Lankan economy, has been recognized as the key drive for the country's economic development. Every professional in tourism field has a significant contribution in quality of the service and the satisfaction of the guests. Tour guides as the ambassadors of the Sri Lankan culture are playing and important role in tourism industry of the country. While serving the tourism industry, it is recognized that the tour guides face numerous difficulties while performing their job role. This study attempted to analyze the key challenges face by tour guides in Sri Lanka and recommend strategic actions to overcome the challenges. This qualitative research used both primary and secondary data. Further, convenient sampling method which is a non-probable sampling technique was utilized to gather primary data. There are 39 tour guides selected as the sample. An unstructured interview was carried out as the primary data collection method followed by a critical onsite observation. Among the findings; low welfare and facilities, economic instability, lack of job security, knowledge gap and lack of social recognition were highlighted. The recommendations are made based on key challenges identified by the study. Welfare facility development as a collaborative attempt, improve financial literacy among the tour guide community, utilization of available vocational training institutes as knowledge hubs for tour guides by introducing short courses for needed knowledge areas, strategic approach in developing professionalism and social recognition for tour guiding as a profession are the main areas which the recommendations are made.

Keywords: Tour Guides, Sri Lanka Tourism, Challenges

TRACK 5

SUSTAINABLE PRACTICES FOR MULTIFUNCTIONAL GREEN ECONOMY

KEY INDICES TOWARDS A SPECIFIC PROCUREMENT GUIDELINE FOR THE WATER SUPPLY SECTOR IN SRI LANKA

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Abstract: The National Water Supply Board of Sri Lanka (NWSDB) presently practices the National Procurement Agency guideline primarily at water supply sector procurement undertakings. This practice is perceived with fundamental complications while implementing water supply projects effectively and efficiently at present practice. Thus, this research discusses necessary modifications for a specific procurement guideline for the water supply sector with key indices to address from the new procurement guideline for NWSDB Sri Lanka. Accordingly, the objectives were achieved in the light of qualitative approach, with a comprehensive literature review followed by ten semi-structured interviews done at subject experts in the National Water Supply sector. The collected data were analyzed using the content analysis. This study has been initiated with a literature review, in which nineteen uniqueness variables of the water supply projects identified with eight new variables for improvements over proposed specific guideline. Twenty one problems & challenges in tender practice with fifteen new problem variables identified. Further, twenty problems and fourteen new problem variables, attained at expert interviews. Thus, findings have precisely pointed out the need of a specific procurement guideline for the water supply sector of Sri Lanka. Strategies listed out as indices, that to be addressed at a specific procurement guideline development.

Keywords: Procurement Guideline, National Water Supply Board of Sri Lanka, Water Supply.

MAJOR DETERMINANTS OF SITE LEVEL LABORS RETENTION: THE CASE OF DIRECT SKILLED LABORS OF SRI LANKA

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Abstract: Labor is an important resource in the construction industry, since it combines other resources: namely materials, plant and equipment, and finance in order to produce construction products. Labourers should be motivated to remain at Construction Company to positively contribute towards the profitability. Labourers tend to leave, as they are no longer satisfied with the construction site, with the idea of low job satisfaction. The aim of this study was to proposed labourers' retention strategies for retain the direct skilled labourers in the construction site level in Sri Lanka. An overall view of the nature of the direct skilled labors, most critical dissatisfied factor determinants of their high turnover. The corrective measures for retention of them were identified based on the literature review and an outcome of the questionnaire survey based on the literature findings. The five-point scale ranging from 1 (not important) to 5 (extremely important) was adopted, and transformed to relative importance indices (RII) for identify importance of each factor. Questionnaire survey findings were analyzed from Related Important Index (RII) method and identified highest ranked eleven (11) determinants. In accordance to the dissatisfied factors majority of the Sri Lankan skilled direct labourers are displayed dissatisfaction at construction sites. Though, over to the above dissatisfaction determinants skilled direct labor is predicted to have tendency of leaving construction sites and as a result there may be a labour shortage. In order to avoid these circumstances, the establishments should take note of skilled labourers dissatisfaction and take appropriate action to remedy it.

Keywords: Construction Projects, Direct skilled laborers, Retention, turnover

IMPACT OF CONSTRUCTION PROJECTS PERFORMANCE ATTRIBUTES ON DOMESTIC CONTRACTORS' COST CONTROLLING ACTION OF SRI LANKAN CONSTRUCTION INDUSTRY

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Abstract: Construction Cost Management is a vital task, in achieving successful project completion. Yet, since effective cost management is achieved very rarely, substantial sum of cost overrun is frequently experienced in the performance at contractor's flanks. In this context the studying of Domestic Contractor's Cost controlling action, especially at successful project completion at preplanned projects performance expectations framework is an obligatory task at present. Therefore, this study focuses on identifying the impact of Construction projects performance expectations, on Cost Controlling action of Domestic Contractor's in the Sri Lankan construction context. A simple random sample was selected among domestic contractors, as 30 respondents out of 33 distributes have answered the questionnaires, as the response rate was 91%. Accordingly, in order to find the relationship of Independent variables (IV): Lack of Labor & Materials, Time-Cost & Quality, Improper Uses of Materials Labor-Plants, Technical Barriers and Lack of Suitable Professional Position Domestic Economic Crises, towards Dependent variable (DV): Cost Controlling Systems, results found as all hypothesizes: HA, HB, HC, HD, HE cannot be rejected as all Independent variables performing positive relationships with the dependent variable. The variables further plays with Beta values with positive impact in general, but at Technical Barriers & Improper Uses of Materials Labor, Plants it shows a negative impact on cost controlling system applications of Domestic contractors, and yet to be addressed with attention in the industrial arena.

Keywords: Projects Performance expectations, Domestic Contractors, Cost controlling methods

APPROACHES TO CONFRONT THE SRI LANKAN CRISIS AS A SUCCESSFUL LOCAL QUANTITY SURVEYOR

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Abstract: This research evolves into the great issues caused by the covid-19 pandemic & economic crisis on the construction industry in Sri Lanka. Sri Lanka was faced with two major crises as the COVID 19 pandemic, and a severe economic crisis starting in early 2022. Also it is led to shortage of essential, high inflation, and fuel restrictions, culminating in a foreign credit, default and damaging the country's financial credibility. Over the past decade Sri Lanka's construction industry has grown rapidly due to population growth and international real estate investment. It is now facing with significant challenges including job losses and a decline in projects due to rising raw material cost, fuel and power shortages and an economic downturn. Moreover, those factors affecting to the crisis include payment delays, increases expenses, exchange rate fluctuations, lack of materials and labor halted capital projects, rising interest rates and bank recovery efforts. This study intends to investigate the challenges faced by local quantity surveyors and identify effective approaches for them to succeed in this demanding environment. The research employs a method approach, quantitative data collection method with simple random sampling. Surveys will be conducted among practicing quantity surveys in Sri Lanka to gain insights into their experiences and perspectives. The data will be analyzed using statistical data analysis techniques to provide a comprehensive understanding of the issue at hand. In this data analysis revealed the highest problem which were face in the crisis such as material unavailability, price escalation, Loss of jobs and risen construction disputes. In this research, it has been focused to find out the best possible ways to face these kinds of crises as a successful local quantity surveyor and mitigate the effects of it as much as possible.

Keywords: Construction, Challenges, Economic crisis

MEASURES TO OVERCOME PROJECT COMPLEXITY OCCURRED OVER SERIES OF PROJECT REVISIONS AND OVERLAPPED VARIATIONS TRANSPIRED OUT OF CONTRACTUAL SCOPE: A CASE STUDY APPROACH

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Abstract: Scope Management, with a construction contract is an instrument binding the construction project owner and the contractor at a legal mandate to build the project alongside with a designated monitory deliberation. Thus, if not maintaining agreed constraints, project parameters then emerged to transpire a complex project. In this study a case study, project complexity occurred over series of revisions/overlapped variations on out contractual scope was analyzed for furthermore variables of complexity, later to find measures to overcome the project complexity. A literature survey was done to identify the factors of project complexity, later using interview method, those identified variables of complexity occurred over series of revisions were tested/validated to compare results. Besides, with the content analysis, fifteen (15) new variables of complexity were identified. As suggestions of recovering complexness of project with three (03) Experts interviewees found at over case. Further, the Project Architect and other consultants were suggested to prepare the final contract sum to agree (adding price escalation clauses to the contract) at the deeply discussed final design fixed. This value was suggested to be final, not again to change with further variations. This value to be signed, with a backdated signature, as final de-sign of the project. A revised contract amount shall be established and recommended to convert the project into a Lump sum contract. The comprehensive involvement of the project manager at maintains schedule, clear communication between parties, scope management, and minimizing delays in the approval process also suggested as remedial measures.

Keywords: Complex Projects, Scope, Contract sum, Cost, Variations, Contract.

APTNESS OF THE CIDA FORMULA METHOD TO MITIGATE CONSTRUCTION COST UNCERTAINTIES: SRI LANKAN CASE STUDY DURING ECONOMIC RECESSION

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Abstract: Since over the lengthiness of traditional methods, many Sri Lankan contractors use the CIDA price fluctuation formula for contract price adjustments. In this research case study method is used to identify the appropriateness of the CIDA Formula Method to Mitigate Construction Cost Uncertainties, as the case study focuses into how National Institute of Social Development (NISD) addressed cost concerns during the development of a project by using the CIDA formula approach.

With the reference of findings of research, it was identified as there is a discrepancy between actual prices escalated amount and calculated price fluctuation amount by application of CIDA formula method. After validating the secondary data from literature reviews with questionnaire and semi structured interviews at the purposive sample, it was identified that CIDA formula method to mitigate cost uncertainties is effective perhaps few adjustment in calculating input percentages and indices needed.

In the increasing of effectiveness, it was suggested to publish indices regional wise. It was also suggested to consider actual norms conducted in practically at the site when calculating input percentages . Based on the actual scenarios it is better to derive standard norms for construction industry and publish in the relevant web site. Finally it was suggested as the application of the CIDA formula method to mitigate cost uncertainties in construction industry is effective after doing adjustment to calculation of input percentages and indices . As strategies for effectiveness of application of CIDA formula method to mitigate cost uncertainties, two novel strategies identified over the case study as: based on the actual scenarios it is better to derive standard norms for construction industry and consideration of a median of actual norms conducted in practically at the site other than the literature findings.

Keywords: Price Fluctuation, Variations, Cost Uncertainties, Indices.

ASSESSMENT OF PAYMENT PROBLEMS TO SMALL-SCALE CONTRACTORS DURING THE ECONOMIC CRISIS IN SRI LANKA

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Abstract: As a result of COVID-19 pandemic and profound causes construction industry of Sri Lanka facing significant novel difficulties of performance from 2019 onward. Thus, main contractors, especially small-scale contractors often struggle with managing labor, material, equipment and finances and these financial burdens passed along the supply chain to sub-contractors and supplier, exacerbating the situation. Therefore, it is identified a significant need of assessing payment problems of small-scale contractors during the economic downturn. Thus, there is a need of determining key causes and impacts of influential problems and applying strategies in this context, as remedial management tools at mitigating the effect of payment problems on small-scale contractors of Sri Lanka during the economic crisis. Accordingly, ten (10) case studies were conducted in qualitative approach and validated the literature findings at small-scale construction projects affected by payment problems due to economic crisis from 2019, later analyzed using manual content analysis. The findings of the study identified thirty-six (36) common specific factors causing payment problems and eighteen (18) new factors by interviews. Further, twenty-six (26) common impacts on small-scale contractors during the economic crisis were identified with four (4) new factors. Consequently, the study proposes twenty-five (25) suitable strategies to mitigate payment problems with eight (8) new strategies, and analysis concluded that seven (7) strategies were unique to mitigate payment problems in small-scale construction projects during the economic crisis. This research further recommended six (6) recommendations including development of the CIDA price fluctuation with improvements of mechanisms for reimbursement of price escalations and improved payment methods.

Keywords: Payment Problems, Economic Crisis, Small-scale Contractors.

MITIGATE THE IMPACTS OF PROJECT DELAYS ON THE CONTRACTORS' CASH FLOW: CASE STUDY APPROACH

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Abstract: Most construction projects in the industry of Sri Lanka struggle with cost, quality, and time, aiming to maintenance of optimal levels in order to achieve successful project completion. Successful timely completion project, while lessening the impacts of Project Delays on the Contractor's Cash Flow is not a sole advantage to the client; it also benefits the contractor when perusing his deferent objectives. But due to the various factors, timely completion of the construction project has become a challenge, causing impacts on the Contractor's Cash Flow. Therefore, suggest means to mitigate the Project Delays which impacts of on the Contractor's Cash Flow has grown into a need at present. In the light of case study approach, this aspect was discussed, in which based on the project of "Proposed Northwestern Provincial Level Sports Complex Construction of 50m pool and pool pavilion project" as the case study for investigating insights. Thus, the causes of delays and their impact on the contractor's cash flow mitigate the impacts through a pragmatic approach was identified. As results, causes of delays and their impact on the contractor's cash flow has identified. The Impacts of project delays to the cash flow of contractor also identified through questionnaire survey, with the Mitigation actions and Recommendations acquisition of cash flow impacts also deliberated in the study from technical, commercial, and contractual points of view.

Keywords: Construction Project Delays, Impact on Contractors' Cash Flow, Causes of Delays, Mitigation Actions for Delays.

A REVIEW OF DEVELOPED LEAN CONSTRUCTION FRAMEWORKS IN THE SRI LANKAN CONTEXT

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Abstract: There is a growing necessity to thoroughly review the developed lean construction frameworks within a Sri Lankan context because most of the developed frameworks in this country were introduced at a conceptual level and in a scattered diffused manner across various construction domains. Several scholars have underscored the lack of comprehensive frameworks encompassing the entire construction lifecycle and the absence of industry-validated processes in Sri Lanka from 2012 to 2018. After 2018, a few frameworks emerged, but they exhibit significant limitations, such as insufficient transparency, biases, and reliance on limited mono or bi-evidence case studies on lean tool implementation. This study aims to review existing lean construction frameworks developed from 2012 to 2024, identifying their benefits, shortcomings, issues, and limitations through a comprehensive literature review-based approach. As one of the pioneering review studies in this area, the summarized tabular framework demonstrates the drawbacks and loopholes while providing suggestions to overcome them. The outcomes provide new thinking perspectives for novel framework development that apply in Sri Lanka and other developing countries that share the same level of lean construction maturity and characteristics. This paper will be a foundation for determining future probable areas such as: cost overrun, time delays, quality issues, risk predictability, and stakeholder management to consider in lean construction framework development in the Sri Lankan context.

Keywords: Frameworks Review, Lean Construction, Sri Lanka.

MITIGATE THE CONSEQUENCES ON CONTRACTORS' PROFIT BY VARIATIONS AT RURAL DOMESTIC RESIDENTIAL CONSTRUCTION: CASE STUDY: SME CONSTRUCTION COMPANY OF SRI LANKA

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Abstract: Variation orders are initiated for value analysis purposes to realize the balance between the cost, functionality, and durability aspects of a project and clients' satisfaction. Variations reduce costs and increase quality, and it is standard to optimize the client's benefits against the resource input by eliminating waste expenses. And other, projects with many variations cause contractors to achieve lower productivity levels. In the local context, especially in rural, scale contractors majorly involved with individual residential constructions, experience the changes of contracted design, as private clients tend to supplement with additional or deductive works at designs. Thus such situations cause a considerable amount of variations, then need to be planned and managed with strategies to manage with assumed profit margin. In this, it was studied the strategies to manage the variations to maintain the profit margin of SME contractors of residential unit constructions in Sri Lanka, in the light of qualitative study inputs. Accordingly, a case-study approach was carefully chosen instead of a SME construction company, managing a purposive sample for interviews (12) at a content analysis, to identify benefits, and strategies applied to manage the variation orders. The results highlighted as: Increasing the Profit & Overhead margin, claiming with a clear analysis of items rate breakdown, obtaining significant discounts from suppliers, and Negotiation with the client before stating variation work, with a proposal of way forward, contractor share considering the opinions of the client.

Keywords: Variation order, Contractor, Profit.

REGULATING EFFECTS OF SKILLED LABOR SHORTAGE IN SRI LANKA

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Abstract: Skill labor is a primary and necessary source for the construction industry. Shortage of skilled labor is a major problem in the construction industry. This study considered the causes, effects, and mitigation measures related to the problem of "Impacts of skilled labor shortage in Sri Lanka". A literature review was done by identify the reasons and suggestions skilled labor shortage of the construction industry in Sri Lanka and through individual and institutional field questionnaire surveys conducted. Random Sample selected from Engineers, Architects, Technical Officers, and Quantity Surveyors and client, contractor, and consultant groups. Collected data were analyzed and ranked using the Relative Importance Index (RII). Overall case study ranking indicates: Inadequate training, following with less work Experience, younger generation unwillingness to take part in industry and low motivation affects the skilled labor shortage in the construction industry in Sri Lanka, as high impacting Reasons for skilled labor shortage. Finally, suggestions were proposed to mitigate the skilled labor shortage in the construction industry: educational system and long-term training program, improving human-related factors, Analysis of the skill gap, Changing the nature of career expectations of the youth and parents, Introducing the investing, proper grading system for the skill, appropriate salary scale across the industry, improve employee motivation and satisfaction at the organizational level.

Keywords: Skilled Labor, Construction Industry, Quality of Work, Labor Shortage

INFORMAL CONSTRUCTION SECTOR IN SRI LANKA AND ITS EXISTING CHALLENGES: A WAY FORWARD FOR FORMALIZING

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Abstract: The informal construction sector has been significantly expanded over past few years and most countries' economic growth including Sri Lanka is depending heavily on the informal sector. However, when compared with formal sector, informal sector has different characteristics and faced with several challenges as lack of awareness and knowledge, lack of enforcement, lack of direct regulations, no proper documentation path, lack of credibility and high irresponsibility, absence of standards and high costs of compliance. Thus, the purpose of this study is to recommend the probable approaches to enhance the formality of Sri Lankan informal construction sector by overcoming existing challenges. A mixed research approach was adopted for attaining the research aim while conducting questionnaire survey among 100 local professionals with 84 responses and 10 expert interviews who are in both contractor and consultant fields. The findings were analyzed with visual representations by Microsoft Excel and content analysis technique. Lack of awareness and knowledge and lack of enforcement were the highest ranked challenges faced by local informal construction sector. It was recommended to improve the knowledge on legal and formal procedures and to arrange awareness programs in rural and school level technology field. Informal sector must follow some legal procedures and the government enforcement and support is essential. They can initiate with a license system and proper documentation path. Trainings, microfinance, simplified regulations and market linkages can formalize the informal construction sector in Sri Lanka.

Keywords: Informal Construction, Challenges, Overcoming.

QUALITATIVE DETECTION OF ADULTERATION IN NON-LABELED CHILI AND TURMERIC POWDERS SOLD IN THE RETAIL MARKET IN THE MATARA CITY AREA

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Abstract: The adulteration of spices is a current global issue. This study was conducted to qualitatively detect the level of adulteration in non-labeled chili and turmeric powders sold in the retail market in Matara City, Sri Lanka. Physical and chemical analyses were carried out on 60 randomly collected samples (30 each of chili and turmeric powders). Each sample weighed 40-50 g. Texture, colour and odour of each sample were assessed physically, while specific adulterants such as starch, artificial colours, sawdust and maaetanil yellow were identified through chemical tests. Moisture content was analyzed using a moisture analyzer. Foreign particles and starch adulteration were detected via microscopic observations. Control samples were prepared to match the SLS requirements and used as standards to guarantee accurate comparisons. Results revealed that turmeric powder samples were significantly pure, with 93.3% free from hazardous contaminants such as yellow lead salts and aniline dye. A considerable proportion of turmeric powder samples (10%) contained metanil yellow and starch. Chili powder samples exhibited greater adulteration rates, with 43.3% displaying physical adulteration and 23.3% containing artificial colouring. These findings emphasize the requirement of strict regulatory measures and quality control procedures to assure consumer safety and maintain product integrity in the spice market.

Keywords: Food Safety, Adulterants, Chili Powder, Turmeric Powder, Qualitative Measures

PILOT STUDY: QUANTITATIVE ASSESSMENT OF HOUSEHOLD COPING STRATEGIES IN RESPONSE TO FOOD INSECURITY IN URBAN COASTAL VILLAGES OF SRI LANKA

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Abstract: The aim of this study is to investigate Coping strategies used by food insecure households in urban coastal villages in Moratuwa municipality, in Colombo district, Western province in Sri Lanka. The study employed cross sectional survey to gather data on household demographics, food-related coping strategies and non-food-related coping strategies from 46 households. The Coping Strategies Index (CSI) score was calculated for each household to quantify the severity of food insecurity. The study investigates the links between commonly utilized coping techniques as well. Data analysis shows that the most commonly used strategies include relying on less desired and less expensive food, purchasing on credit, and lowering meal quantities. The Coping Strategies Index (CSI) score revealed substantial levels of food insecurity among tested households. The questionnaire's reliability analysis revealed high internal consistency, with Cronbach's Alpha scores ranging from 0.68 to 0.85 across parts. Correlation study found moderately favorable associations between several coping strategies, such as reducing meal size and number of meals per day. However, regression analysis did not reveal robust linkages for strategies. These findings underline the complexity of food insecurity in urban coastal areas, where households employ several interconnected strategies to cope with limited resources. Future studies should examine other factors that impact coping practices, such as social capital and community support networks, to create more effective interventions.

Keywords: Food Insecurity, Coping Strategies Index (CSI), Coastal Households, Sri Lanka

DEVELOPMENT OF SPREADABLE CREAMED COCONUT (COCONUT SPREAD)

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Abstract: Creamed coconut is unsweetened dehydrated fresh meat of a mature coconut, ground into a semi-solid white creamed coconut (coconut butter). Commercially available coconut butter has been separated as the whole coconut meat and oil according to their density as the top layer, and other solids were separated hardly in the bottom side within a few days. That was a major defect, which can lead to consumer dissatisfaction. Therefore, this study focused on finding the solution by improving the formula and enhancing the spreadability. In the preliminary research, the mixer used creamed coconut, reprocessed coconut milk powder (RPCMP), maltodextrin (MD), coconut flour (CF), and low-fat desiccated coconut (LFDC). The layer separation was detected with different formulas used above ingredients and proportions were made as M1=(55:24:7:7:7), M2 = (55:28:7:6:4), and M3 = (55:32:7:3:3), respectively. Organoleptic properties and overall acceptability were evaluated in creamed coconut samples separately using twenty (20) semi-trained panelists with a five (5) point hedonic scale and selected the best sample with higher consumer acceptance. Selected creamed coconut samples and control sample (M4) (commercially available) analysed for proximate composition and microbial analysis by using standard methods (AOAC). Sensory evaluation revealed that creamed coconut from the M3 formula (55:32:7:3:3) scored higher in the sum of ranks than the M1 and M2 for almost all the sensory attributes and overall acceptability. Results of the proximate analysis were reported 1.3% moisture, 4% protein, 29.78 fat, brix value 58, and 602.3 viscosity. Creamed coconut has a low moisture content and microbial stability was tested over 18 months. Therefore, it could be said that this product has a long shelf life.

Keywords: Spreadable Creamed Coconut, Layer Separation.

CONSUMER ACCEPTABILITY OF CEYLON DATE PALM FRUIT INCORPORATED ALCOHOLIC BEVERAGE

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Abstract. The fruit of the Ceylon Date palm (*Phoenix pusilla*), a member of the Arecaceae family, is extensively grown in southern India and Sri Lanka. This tropical fruit has a lot of promise for value-added goods because of its unique flavor profile, bioactive components, and rich nutraceuticals qualities. A study was conducted using an online survey to assess consumer acceptance of new products derived from the Ceylon Date palm. The survey included 100 participants, randomly selected and stratified by age, gender, and education level. The majority of participants (94.1%) were found to be between the ages of 20 and 24. The results showed a strong preference for an alcoholic beverage among the proposed products. Thus, two alcoholic beverage formulations (F1 and F2) based on Ceylon Date palm were developed. The beverage samples were subjected to physicochemical analysis and sensory evaluations. Using a 5-point hedonic scale, 30 semi-trained panelists assessed the samples as part of the sensory acceptability test. The F1 and F2 formulations scored identically for texture and odor, but the F2 formulation, which contained 60% Ceylon Date palm fruit, received the highest ratings for appearance, color, and taste, with a hedonic score of 4.500±0.1 for the overall acceptability. The selected F2 sample (100 ml) revealed a pH of 5.5±0.02, a Brix value of 20%±0.05, and an alcohol level of 8%±0.05, based on physicochemical analysis. In conclusion, the unique flavor and health advantages of the Ceylon Date palm-based alcoholic beverage make it a promising product for both local and international markets.

Keywords: Ceylon Date palm, Alcoholic beverage, Consumer acceptability

DEVELOPMENT AND CHARACTERIZATION OF A CORIANDER LEAF AND GREEN CHILI-BASED CULINARY SAUCE

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Abstract: Sauces are versatile liquid or semi-liquid foods, with a growing market driven by consumer demands for safety, nutrition, flavour, and adaptability. The fast-food industry's demand for spice pastes and purees has fuelled this expansion. Fresh coriander leaves spoil quickly and need immediate processing or preservation. Purees and pastes provide a convenient way to retain the colour and flavour of fresh ingredients in a semi-solid form. This research aims to develop a sauce product primarily composed of coriander leaves and green chilies, focusing on evaluating the chemical and sensory qualities of the final product while optimizing ingredient ratios and processing methods. Sauces were prepared by using the coriander leaves and green chili in the ratio T1 (100%:0%), T2 (90%:10%), T3(80%:20%), and T4 (70%:30%). A 5-point hedonic scale was used for the sensory evaluation of sauce for attributes such as appearance, colour, taste, smell, spiciness, and consistency using 32 semi-trained panellists. Based on the sensory assessment, 80% coriander leaves and 20% green chili incorporated formula (T3) was selected as the best sample. Chemical analysis of the treatment chosen revealed the following characteristics: moisture content (wet basis) - 82.19%, ash content - 2.39%, pH - 5.03, protein content - 2.39%, and total soluble solids - 13.69%. Consequently, the coriander-incorporated chili sauce was preferred by the panellists.

Keywords: Sauce, Coriander, Chili.

DEVELOPMENT AND EVALUATION OF A READY-TO-EAT KETOGENIC BAR: FORMULATION, NUTRITIONAL COMPOSITION, SENSORY PROPERTIES

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Abstract: In this study, a ready-to-eat ketogenic bar that was specially made to meet the dietary needs of people on a ketogenic diet was designed and thoroughly evaluated. Creating many formulations was part of the first step, which aimed to match the high-fat, low-carb requirements needed to maintain ketosis with the sensory aspects that mattered most to consumers. Out of all these formulations, two were chosen for a thorough sensory analysis, in which characteristics including flavor, consistency, and general acceptability were evaluated thoroughly. The combination of 52% almond flour, 30% desiccated coconut, 3% coconut flour, 4% cashew nuts, 5% peanuts, 3% dark chocolate, 1% vanilla extract, and 2% virgin coconut oil were shown to be the most effective. Potential customers found this specific combination to be the most enticing due to its exceptional sensory qualities. After being chosen, this formulation was subjected to a thorough nutritional analysis to confirm that it was appropriate for a ketogenic diet. Amount of 54.6% of the sample was found to be fat, which is in line with the ketogenic diet's objective of consuming as much fat as possible for energy. Furthermore, the protein content was found to be 15.76%, offering a moderate yet necessary amount of protein required for maintaining muscle mass and general health.

Key words: Ketogenic Bar, Ready- To- Eat, Nutritional, Health

INGREDIENT SHELF-LIFE MANAGEMENT AND SAFETY: A CASE STUDY OF CINNAMON HOTELS AND RESORTS

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Abstract: This research explores innovative approaches to managing the shelf-life and safety of culinary ingredients at Cinnamon Hotels and Resorts, a leading food service provider in Sri Lanka. The study addresses the critical need for sustainable practices in the food service industry by focusing on reducing waste, enhancing food safety, and optimizing resource use. Cinnamon Hotels and Resorts handles a diverse range of up to 2,500 food ingredients daily. Due to a lack of harmonized information regarding ingredient shelf life and storage, this high volume of ingredient turnover presents challenges to chefs related to quality control, spoilage, and microbial safety. By developing a comprehensive guidebook and a custom-built electronic database, this research introduces sustainable practices that enhance ingredient shelf-life management and reduce food waste. Initial insights were gathered through focus group discussions with industry experts at the hotel. Based on this input, all culinary ingredients were divided into 12 major categories according to origin, compiling information on shelf-life, secondary shelf-life, storage conditions, perishability, modes of spoilage, and allergenicity. The research integrates shelf-life and related data, which is partly based on published international research on Scopus, Pub-Med, Web of Science, and Google Scholar. It was partly based on hands-on experience and inputs from chefs and key stakeholders engaged in the quality and safety aspects of Cinnamon Hotels and Resorts. The research yields a guidebook (ISBN: 9786245887002) and a custom-made electronic database to assist chefs in handling food ingredients. It establishes standardized procedures for food safety, which enhances industry efficiency and contributes to economic growth.

Keywords: Allergenicity, Culinary ingredients, Food safety, Secondary shelf-life, Product freshness control..

DEVELOPMENT OF CHOCOLATE ALTERNATIVE USING AVOCADO SEED (PERSEA AMERICANA) – A REVIEW

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Abstract: With increasing consumer demand for sustainable and health-conscious food options, there is a growing interest in finding alternative ingredients to replace traditional ones. Avocado seeds, often regarded as waste, present a promising opportunity due to their unique nutritional and functional properties. This review explores the potential of avocado seeds (Persea Americana) as a novel substitute for cocoa in chocolate production. It examines the nutritional benefits of avocado seeds, highlighting their high fiber content and bioactive compounds that could contribute to a healthier chocolate alternative. The review also discusses the various processing methods required to transform avocado seeds into a viable chocolate product, including techniques to address their inherent bitterness and achieve desirable texture and flavor. Furthermore, it assesses the sensory characteristics of avocado seed-based chocolate and its market feasibility compared to traditional chocolate. Challenges in production and consumer acceptance are addressed, along with future research directions for advancing this innovative approach. Overall, the review provides a comprehensive overview of avocado seeds as an eco-friendly and nutritious alternative in the chocolate industry.

Keywords: Avocado Seed, Chocolate Alternative, Innovation, Sustainable, Nutrition

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EVALUATION OF THE EFFICACY OF NATURAL SPICES AS PRESERVATIVES IN CHICKEN SAUSAGES: NUTRITIONAL, MICROBIAL, AND SENSORY IMPLICATIONS OF GARLIC, CLOVE, AND CARDAMOM

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Abstract. The study evaluated the impact of garlic, clove, and cardamom on the nutritional and antimicrobial properties of chicken sausages as alternatives to curing salt due to carcinogenic concerns. Sausages were prepared with garlic (T1 - 20g/Kg), clove (T2 - 20g/Kg), and cardamom (T3 - 20g/Kg), while the control used curing salt (T4 - 0.5g/Kg). Sensory evaluation, conducted by 30 untrained panelists using a 9-point hedonic scale, showed T1 (garlic) and T3 (cardamom) had superior sensory attributes. T1 had the highest moisture (67.14%) and protein (10.27%) content, while T4 had lower moisture and protein but higher fat. T4 exhibited the highest microbial growth, while T1 had the lowest. pH increased in T1 and T4 but decreased in T2 and T3 over 21 days of storage at -18°C. Coliforms were undetected in all samples. The study concluded that garlic, clove, and cardamom showed significant antimicrobial properties, extending shelf life to 21 days, with garlic offering the highest nutritional benefits and lowest microbial growth, suggesting it as a viable natural alternative to curing salt.

Keywords: Antimicrobial, Curing Salt, Natural Preservatives, Sausages, Spices**.**

EXPLORING FAST FOOD CONSUMPTION PATTERNS AND PREFERENCES AMONG UNIVERSITY STUDENTS IN COLOMBO, SRI LANKA

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Abstract: This study investigates the fast-food consumption behaviors, attitudes, and preferences of students in a Vocational University, Colombo, Sri Lanka. The research focuses on the weekday cohort, consisting of 450 students, with a convenient sample of 100 students. Data was collected through an online questionnaire, covering demographics, fast food consumption patterns, and attitudes toward fast food. The analysis was conducted using descriptive statistics. The respondents were principally male (62%), with mean BMI values of 21.9 for males and 20.5 for females, and average waist measurements of 81 cm for males and 76 cm for females. The findings reveal that 54% of students consume fast food daily, with 21% indulging in fast foods more than once a day. An additional 46% reported occasional fast-food consumption. The study highlights the significant role of fast food in the daily lives of students, with 69% maintaining normal BMI. Gender differences were observed, underscoring the need for targeted interventions. The study highlights taste as the primary driver of fast-food consumption, with convenience and affordability also emerging as significant factors. Notably, 86% of respondents strongly agreed that fast food is more economical than restaurant meals. These findings offer valuable insights into fast food consumption patterns, attitudes, and their implications for nutritional status enabling suitable interventions to promote healthier dietary choices among university students.

Keywords: Fast food consumption, University students, Dietary habits, Sri Lanka.

DEVELOPMENT OF ORGANIC CHEMICAL FREE VARNISH FROM CASHEW NUT SHELL LIQUID

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Abstract: Cashew Nut Shell Liquid (CNSL) is a renewable and versatile natural product derived from the shells of cashew nuts, which is underutilized in Sri Lanka. Market available varnishes are comprised of organic chemicals that are harmful to human health. In contrast, naturally derived products will have better market acceptance. Cashew nut shells were collected from Wanathavilluwa of Puttalam district and Eravur of Batticaloa district in the month of June 2024. Shells were powdered and stored in high density polyethylene container until use for extractions. 1kg of shell powder was extracted with methanol in Soxhlet apparatus for 6 hours, the extraction solvent was recovered and the yield of CNSL was measured. The extracted CNSL was treated with calcium hydroxide at ambient temperature to produce limed-CNSL product. This product was used to formulate oleoresinous varnish using double-boiled linseed oil. Vegetable turpentine oil is used as a solvent. The varnish produced was subjected to analysis per the Indian Standard (IS) 525-1986 and other scientific data to evaluate their performance. Acid value 2.5, flash point 26℃, specific gravity 0.981, density 0.97 g/cm³, viscosity at 30℃ 28.5 cP, refractive index at 25℃ 1.33, Various stages of drying were determined as per ASTM D1640/D1640M-14 (2022); however, the sample was taken 72 hours. Results proved that the varnish complied with IS requirements. However, it exhibited lower drying property. The study highlights the use of CNSL as a key ingredient in the development of sustainable and environmentally friendly industrial products in the manufacturing of organic chemical free varnish. The successful development of CNSL-based varnish opens opportunities for further development, reducing reliance on synthetic chemicals and improving environmental sustainability in industrial coatings and varnishes.

Keywords: CNSL, Indian standard, Varnish

DETERMINATION OF NUTRITIONAL AND FUNCTIONAL PROPERTIES OF SRI LANKAN TRADITIONAL FERMENTED RICE

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Abstract: This study analyzed the nutritional and functional properties of Sri Lankan traditional fermented rice (Diya Bath), focusing on the impact of fermentation duration (8, 12, and 16 hours) on the proximate composition of three rice varieties: Red Rice (RR), Fragrant Rice (FR), and Raw Nadu (RN). The proximate analysis revealed specific trends. Ash content exhibited minor fluctuations, with FR increasing from 0.45% to 0.46%, while RN and RR showed marginal changes from 0.42% to 0.365% and 0.39% to 0.358%, respectively. Protein content was relatively stable, ranging from 2.1% to 2.5% across all varieties, with RN consistently exhibiting slightly higher levels. Crude fat content increased in FR and RN, reaching 11.3% and 13.2%, respectively, while RR decreased to 10.7%. Moisture content showed a significant decline across fermentation durations, with reductions from 29.8% (FR), 30.1% (RN), and 27.0% (RR) at 8 hours to 19.0%, 18.2%, and 19.9%, respectively, at 16 hours. Microbiological analysis highlighted RN as the most effective substrate for lactic acid fermentation, achieving the highest lactic acid bacteria (LAB) growth (7.3×10^7 cfu/g after 16 hours), while FR was the least suitable (5.3×10^7 cfu/g at 16 hours). ANOVA results confirmed significant variations in moisture content across the fermentation durations ($p < 0.001$), with the highest moisture content recorded at 8 hours, followed by 12 and 16 hours. Fermentation duration influences the proximate composition and microbial activity of rice varieties. RN rice is ideal for lactic acid fermentation, with potential for optimizing production. Future research should explore biochemical processes to improve the nutritional and functional qualities of fermented rice.

Keywords: Fermented rice, Fermentation duration, Lactic acid fermentation, Proximate analysis.

SENSORY AND QUALITY ASSESSMENT OF A NOVEL ZERO-WASTE MARMALADE USING JACKFRUIT SEED BARK (JACK FRUIT SEED ARILS)

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Abstract: Harnessing agricultural by-products can lead to innovative and sustainable food options. The outer bark of jackfruit seeds, known as jack arils, is a fiber-rich and essential nutrient that remains largely untapped. Although jack arils are not commonly consumed, the research aims to change that narrative by introducing a delightful marmalade made from fresh jack arils, sugar, passion fruit peel, and pectin. This unique product promotes health and celebrates the potential of underutilized ingredients. Careful tests and experiments were conducted with various ingredient ratios, ultimately resulting in a well-textured marmalade featuring a harmonious blend of components: PEC consists of 75.2% jack arils, 18% sugar, and 6.8% pectin, while PAS is made up of 70% jack arils, 20% sugar, and 10% pectin. Sensory evaluations involving 30 panelists yielded positive results for odor, color, taste, texture, and overall acceptability. It confirms its quality with a pH level of 4.3 and Brix values that range from 67. The results revealed that the zero-waste jackfruit seed bark marmalade was well-received in terms of taste, featuring a unique blend of sweet and tangy flavors and an appealing texture. The marmalade exhibited good microbiological stability, and its nutritional content demonstrated a rich source of dietary fiber, antioxidants, and essential minerals. Although sensory at-tributes like aroma and texture were slightly different from conventional marmalades, they were considered acceptable by the panel.

Keywords: Jack arils, Zero-waste solution, Sensory quality, Valued-added marmalade.

DEVELOPMENT OF CASSAVA CAKE WITH CARROT JAM

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Abstract: Cassava is a calorie-rich vegetable that contains plenty of carbohydrates and key vitamins and minerals. It may boosts a person's gut health by helping nurture beneficial gut bacteria, helps to reduce inflammation and promote digestive health and helps to reduce inflammation and promote digestive health. It also improves metabolic health, reduce the risk of obesity and type 2 diabetes and improve blood sugar management. The aim of this study was to investigate the potential of two types of food: the first one is cassava cake to reduce the gluten percentage in cake and second one is carrot jam to increase the nutrition value of jam by using vegetable (carrot pulp 65%, sugar 35%) Initially the cassava was dried in dehydrator for 4 hours at 600^0C (1400F) and was ground into flour. Then three trials with control were carried out to find out the best combination of composite flour mixture. Three levels 100%, 80%, and 60% of cassava flour was incorporated with cake and 0% control. Each cake was filled with carrot jam layer. Appearance, Aroma, Color, Taste, Softness, and Sweetness were evaluated as sensory attributes using 5 points hedonic scales by untrained panel of 50 members. After carrying out the sensory evaluation on four treatments 80% cassava flour cake with carrot jam was selected as the most preferred sample. For the selected sample proximate analysis, moisture content, ash content, fat content, protein and brix were evaluated. Moisture 10.90%, ash 1.53%, fat 19.97%, protein 5.28 and brix 69.83 was observed for the selected sample. At last, the cassava flour incorporated cake did not negatively affect the cake properties. Therefore, cassava flour incorporated cake can be recommended for consumption.

Keywords: Bakery product, Cake, Jam, Cassava, Carrot, Gluten.

DEVELOPMENT AND SENSORY EVALUATION OF HEALTY BISCUITS INCORPARATING KIRI ALA (*Xanthosce sagitifolia*) FLOUR

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Abstract: Biscuits are a widely consumed ready-to-eat baked snack that is made by using wheat flour, fat, and sugar as main ingredients. Although the association of wheat consumption with health issues such as celiac disease leads to exploration of composite flours in biscuit production. This study was aimed at developing a healthier biscuit with high sensory attributes by incorporating Kiri Ala (Xanthosoma sagitti-folium), a flour rich in dietary fiber, vitamins, and minerals. Kiri Ala is also well known for its potential health benefits, such as lowering blood sugar levels and reducing the risk of cardiovascular diseases. Biscuit formulations were prepared using Kiri Ala flour, wheat flour, sugar, eggs, Astra, corn flour, baking powder, and salt. Four treatments were developed by changing the proportions of Kiri Ala flour (50%, 40%, 30%, and 25%) and wheat flour (0%, 10%, 20%, and 25%), while keeping the percentages of other ingredients constant. Sensory evaluation was conducted using a five-point hedonic scale with 30 un-trained panellists. The biscuit containing 25% Kiri Ala flour and 25% wheat flour was selected as the best formulation through Friedman test analysis, emphasizing significant differences ($P<0.05$) in sensory at-tributes, including colour, appearance, taste, texture, aroma, and after-taste. This formulation had a moisture content of $3.5 \pm 0.2\%$ and an ash content of $0.2 \pm 0.34\%$. Also, aerobic plate count and yeast and mold count did not exceed the limit, which fulfils the SLS specification for biscuits during the 60 days storage period. The incorporation of 25% Kiri Ala flour resulted in an innovative biscuit product with a bunch of health benefits, offering potential to meet the growing market demand for healthier biscuits.

Keywords: Kiri Ala, Wheat flour, Sensory evaluation

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