INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT IN CIVIL ENGINEERING (ICSDC - 2023)

16th - 18th February 2023

CONFERENCE

ABSTRACT BOOK

Organized by:
Department of Civil Engineering
Mehran University of Engineering & Technology, Jamshoro

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"Integrating Innovative and Sustainable Developments in Civil Engineering"

This theme is exclusively designed to attain the goal of integrating innovative developments in the discipline of civil engineering which is a major attraction of present time. The aim of ICSDC-2023 is to provide a platform to present and discuss all the cutting-edge research and scientific results related to Civil Engineering.

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Editorial and Review Board

Preface

Mehran University of Engineering and Technology (MUET), Jamshoro is known for producing high quality engineering graduates for many years. This university is now considered a distinguished public sector engineering university at the national & international level.

The Department of Civil Engineering is the largest department of the University in terms of infrastructure, student enrollment and faculty. It provides essential and advanced engineering education according to the requirements of the field. The vision of the Department of Civil Engineering is to become an institution that provides state-of-the-art education to aspiring civil engineering graduates, and to evolve as a research-based solution provider to the civil engineering industry.

Department of Civil Engineering in collaboration with Higher Education Commission and Pakistan Engineering Council, organizes 3rd International Conference on Sustainable Development in Civil Engineering (ICSDC-2023) in Mehran University of Engineering and Technology, Jamshoro Pakistan from 16 to 18 February, 2023. This time the conference is being organized with a novel theme of "Integrating Innovative and Sustainable Developments in Civil Engineering". This theme is exclusively designed to attain the goal of integrating innovative developments in the discipline of civil engineering which is a major attraction of present time. The aim of ICSDC-2023 is to provide a platform to present and discuss all the cutting-edge research and scientific results related to Civil Engineering. This conference provides opportunities for the delegates to exchange novel ideas and experiences to establish research and business relations and to catch global partners for future collaboration.

The conference encourages collaborators from academia arena as well as industry professionals to present their original research of top-notch quality. The forum assembles keynote speakers, authors and participants from educational and industrial sectors to present and debate on various challenges faced by the stakeholders in the domain of Sustainable Civil Engineering.

ICSDC 2023 has been triumphant in attracting National and International participants and speakers from public and private organizations.

Acknowledgement

The organizing committee of ICSDC 2023 acknowledges the collaboration and support of Higher Education Commission (HEC), Pakistan Engineering Council (PEC), DHA City Karachi, Sardar Muhammad Ashraf D.Baluch (Pvt.) Ltd., The Palm Builders and Developers, MM Pakistan, Sumaya Builders, MUET FM, and MYHC Construction Company to make this event successful.

The active participation of the National and International Keynote Speakers, Authors, Participants, Session Chairs and Co-Chairs, Organizers, and Teacher Coordinators are highly appreciated who made the event eminent.

High gratitude for the rigorous efforts of conference organizing committees.

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International Keynote Speakers

PROF. DR. DOUGLAS BARRETO

Prof. Barreto is an Adjunct Professor at the Department of Civil Engineering at Federal University of Sao Carlos, Brazil. His core research emphasizes on Constructive Systems responsible for the discipline of Building Installations. He has wide experience in Civil Engineering construction especially in "Building Systems", "Sustainable Built Environment" with a focus on rational use of water in buildings and alternative energy. He has conducted numerous studies on pathology solutions in building systems in addition to technical work of restoration of historic sites. He has authored several national and international articles on building systems and is also a member of Regional Council of Engineers.

ABSTRACT

EFFICIENCY OF CITIES AND BUILDINGS – MAIN ASPECTS FOR ACHIEVING THE UN SUSTAINABLE DEVELOPMENT GOALS (SGDs)

Considering that in the last decade the world as a whole has been dedicating itself to the issue of sustainability in cities and buildings as a way of mitigating the environmental impacts resulting from human activities. The UN Sustainable Development Goals are of the greatest importance in this sense, enabling a systemic view of various aspects that influence the dynamics of Cities and Buildings, with three SDGs directly related to cities and buildings respectively SDG 6 Clean Water and Sanitation; SDG 7 Affordable and Clean Energy; and SDG 11 Sustainable Cities and Communities.

According to information contained in "UN - The Sustainable Development Goals Report - 2021, it is observed that for SDG 6, 2 billion people lack safely managed drinking water, 3.6 billion people lack safely managed sanitation, 2.3 billion people lack basic hygiene. For SDG 7, 759 million people lack access to electricity and accelerated action on modern renewable energy is needed — especially in heating and transport sectors. The indicators for SDG 11 show that the majority of the more than 1 billion slum dwellers reside in three regions: 370 million in Eastern and South-Eastern Asia; 238 million in Sub Saharan Africa; and 226 million in Central and Southern Asia.

Thus, it is of great importance to understand and discuss ways and actions to improve these indicators, which have not yet reached uniform levels in countries, especially in developing countries, which are far behind, and needing actions to reach adequate levels. Is urgent implementing efficiency instruments related with energy, water and others that results in a displacement of these indicators, making cities and buildings more efficient and sustainable? Some energy efficiency actions in buildings can be mentioned, such as the adoption of environmental certification, the use of more economical equipment, rational use of water and others. In cities, the trend is for the concepts of smart cities to be incorporated, which monitor various parameters, such as traffic and pollution level, public lighting and others. It is noteworthy that environmental issues affect the world indiscriminately and affect all countries, so acting in order to achieve these goals is a matter of priority order for all.

PROF. DR. NORWATI JAMALUDDIN

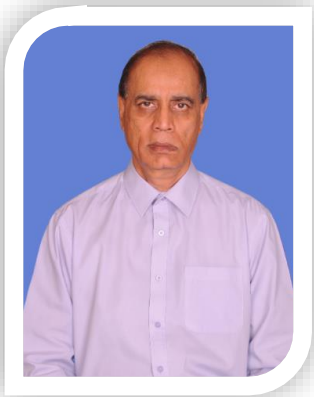
Dr. Norwati Jamaluddin is an Associate Professor in department of Structural and Material Engineering, Faculty of Civil & Environmental Engineering, Universiti Tun Hussein Onn Malaysia (UTHM), Malaysia. She has completed Masters of Structural Engineering from Universiti Teknologi Malaysia (UTM), Malaysia (2003) and PhD from University of Leeds, United Kingdom (2011). She has also served as a Structural Engineer (as part of Industrial Attachment) in HLA group of Companies. Her research interests include Steel Structural, Composite Steel Concrete Structures, and Finite Element Modeling. Moreover, she has been part of following professional societies: CSM, IAPS, MSSA, BEM, & MPA. She also has vast experience in the field of Management while serving in Fakulti Kejuruteraan Awam dan Alam Sekitar.

ABSTRACT
RESEARCH AND DESIGN DEVELOPMENTS IN CONCRETE FILLED STEEL TUBE COLUMN STRUCTURES

Composite columns possess many significant advantages over conventional reinforced concrete and steel structures. Its growing use in the case of structural and architectural applications is predominantly owing to the significant advantages of the structure, such as high load-carrying capacity owing to the blend of properties of differing materials in the structure (Ellobody et al. 2006; Wang et al. 2004). Steel is the most versatile traditional construction material and well known to provide high reliability in terms of its consistent quality and full efficiency when placed under tension whereas the concrete is efficient in compression. Concrete-filled tubes column, hereafter referred to as CFT, are being increasingly used as a structural element, especially in seismic zones, as it offers a number of significant advantages. The structure exploits the characteristics and overall configuration of the structure elements; steel offers high tensile strength, ductility and construction speed, whereas the concrete provides high compressive strength, stiffness and cost reduction. Another notable advantage associated with the use of composite columns is construction cost saving, as the steel tube can serve as a formwork to the

concrete core. With the concrete-filled column profile, the opportunity to erect the steel frame after filling in the concrete material provides the advantage of saving both time and cost. The concrete infill can be from various concrete types, the normal weight concrete (NWC) and now with the concern of structure weight, the presence of light concrete weight concrete seems to be the choice. Another form of concrete which is the self-compacting concrete (SCC) adds more advantages to the CFT columns. The lightweight concrete, with the main characteristics in decreasing the weight and density of the material has significant changes that improve properties of concrete, both in placement and application. Since the lightweight concrete in form of SCC, same basic constituent materials for conventional concrete can be used but with the addition of various admixtures or fine materials with the objective to increase the cohesiveness and required rheological properties for SCC. Recent development of foam concrete as concrete structures has attracted the interest among the researchers due to the sufficient durability, excellent fire resistance and good thermal conductivity and it is categorized as a sustainable material. It is also the most popular lightweight material in the construction and industries. Nowadays, there are many formulations of concrete which provide various properties with the main ingredients which are aggregate, cement, and water. Recently, interest has developed all over the world in using a variety of wastes to make concrete more environmentally friendly. Cement production incorporated with waste materials compared to natural resources provide significant impact in term of reducing the carbon dioxide emitted and energy used for the production. It is also a practical solution to the pollution problem. The usage of waste material such as bottom ash and fly ash could be seen as brilliant way to minimize the use of natural sources for fine aggregate in concrete as well as preventing pollution. The production of bottom ash and fly ash from coal fired electric power plants; generate tons of combustion waste every year, mostly lightweight "fly" ash and heavier "bottom" ash that settles on the floor of the boilers and the bulk of this ash goes straight to landfills. The bottom ash is coarse, angular and its size ranging between fine gravel to find sand. The particle size distributions shown that bottom ash composed of relatively well graded and coarse angular particles ranging in sizes that corresponds to the sizes of small gravel to fine sand. The development of the CFT column structures now has evolved in various aspects, the types of the tube and the types of concrete infill. These developments have been made to improve the structure performance, especially in terms of strength and workability of the structures.

PROF. DR. NASIR SHAFIQ



Dr. Nasir Shafiq is currently working as a Professor in Structural Engineering and Sustainable development at Universiti Teknologi PETRONAS, Department of Management & Humanities. Apart from research and academics, he is actively involved in administrative positions. His current portfolios include Director of Sustainable Resources Mission Oriented Research (MOR), Chairman Innovation Committee and Chief Editor of the Research Bulletin RESINEX. The administrative positions main KPIs are research management at MOR level, strategic and business planning, monitoring of IP filing, Research Commercialization and Technology Licensing. His areas of expertise are Environmental Humanities, Social Ecology, Education for Sustainable Development, Higher Education Teaching & Learning, Sustainability Communications.

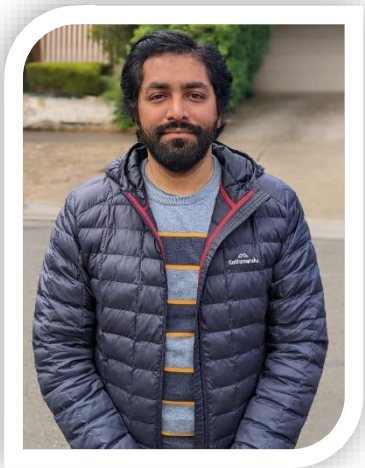
ABSTRACT

HOW COULD CONSTRUCTION INDUSTRY IN PAKISTAN EMBRACE CIRCULAR ECONOMY

The global statistics show that a tremendous amount of solid waste from multiple sectors is being generated every year; the 2020 data estimated that about 2.24 billion tons of solid waste were generated. It is calculated that on an average per person per day, footprints of 0.74 kilograms vary from country to country. Europe, Australia, North America, and other developing countries have established many programs for waste management to protect the global environment. Despite all these efforts, more than 50% of the generated solid waste is mismanaged and dumped into landfill areas, creating pollution and other environmental impacts. With the implementation of 17 sustainable development goals (SDG) in Paris 2015, many governments have pledged to strategize the deep carbon reduction agenda in their respective economies. In this respect, the concept of circular economy is embraced in business strategies, and all industrial sectors collaborate in solid waste trading. The construction industry is highly resource-consuming and has much potential to valorize waste from other industrial streams. Pakistan is facing many challenges in managing its urban expansion within the SDG framework. Therefore, the admiration

of the circular economy through industrial symbiosis for the construction industry will not only facilitate the tremendous amount of solid waste management, particularly in Karachi, but it will create many tiny industries and jobs. This talk will discuss a framework that could be helpful for policymakers and construction professionals to bring the construction industry towards circular economy.

DR. JAMAL THAHEEM



Muhammad Jamaluddin (Jamal) Thaheem is a Senior Lecturer of Construction Management at Deakin University, Australia. Previously, he was an Assistant Professor of Construction Engineering and Management at the National University of Sciences and Technology (NUST), Pakistan. He has a PhD in Cultural Heritage with research focus on project risk management from the Polytechnic University of Turin, Italy and a Bachelor of Civil Engineering in Civil Engineering from Mehran University of Engineering and Technology, Pakistan. He has research interests in risk management, construction engineering and management, sustainable development, and behavioral and decision aspects of the built environment. With over 100 indexed publications, based on Scopus citation data, over 2% of his publications have been ranked in the top 1% most cited publications worldwide, 9% of his publications have been ranked in the top 5% most cited publications worldwide and over 17% of his publications have been ranked in the top 10% most cited publications worldwide. He was awarded the "Best Teacher" at NUST and received merit scholarship for his PhD from the Higher Education Commission, Pakistan

ABSTRACT
CIRCULAR BUILT ENVIRONMENT – A NEW PARADIGM FOR SUSTAINABLE CONSTRUCTION

The impact of construction industry on the global resource base is phenomenal. From consuming resources to providing basis for development, the construction activity is at the core of human development and global resources consumption. The typical linear take-make-dispose model has been since long the modus operandi of the construction industry. Despite efforts at minimizing the impact of this model through better waste management, this model is inherently not sustainable. In an effort to learn from the nature and applying the tenets of circular economy, the built environment's journey to adopting circularity is promising – in spite of the apparent

challenges and barriers. In this talk, we'll discuss the evolution from the linear to circular model, possible advantages and challenges to its adoption, and the sustainable way forward.

PROF. DR. NUR IZZI MD YUSOFF

Dr. Nur Izzi is currently working as Associate Professor in Department of Civil Engineering, Universiti Kebangsaan Malaysia. He is a committee member for Transportation Science Society of Malaysia (TSSM) and a member of some other professional bodies such as the Board of Engineers, Malaysia (BEM), Road Engineering Association of Malaysia (REAM), Road Engineering Association of Asia and Australasia (REAAA) and Association of Asphalt Paving Technologists (AAPT). His main research interest is on pavement materials, construction, design and rehabilitation and road safety. Dr. Nur Izzi has published more than 100 technical papers and supervised more than 30 postgraduate students. He also serves as a regular reviewer for more than 400 papers submitted for high and reputable journals. In addition, he is serving for an editorial member for International Journal of Pavement Research and Technology (IJPRT), and Journal of Engineering and Shock and Vibrations.

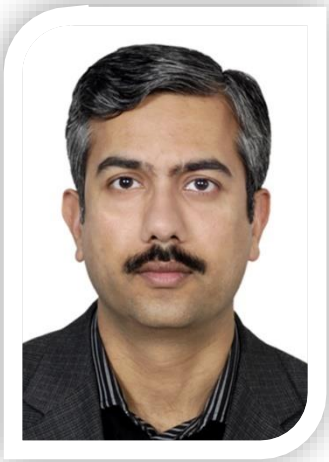
ABSTRACT
RECENT DEVELOPMENT OF SUSTAINABLE ASPHALT TECHNOLOGY

A sustainable pavement can be defined as a pavement that minimizes environmental impacts through the reduction of energy consumption, natural resources and associated emissions while meeting all performances conditions and standards. Realizing the importance of this issue, sustainability elements of each material used in construction of flexible pavement will be discussed. This session starts with a brief introduction on historical background of ancient and modern highway worldwide, followed by the discussion on sustainable term in the context of pavements. Tips for improving sustainability from various types of materials such as aggregate, bituminous binders and asphalt mixtures' point of views also will be discussed, together with some real examples in selected areas/regions. It cannot be denied that sustainable pavement certainly requires more capital to build, but on the long run it is economic, friendly to the

environment and better for the society. Other two interesting topics that gains interested among paving scientists and researchers; namely perpetual pavement and innovative asphalt technology will also be discussed towards the end of this session.

National Keynote Speakers

PROF. DR. NAVEED AHMAD



Dr. Naveed Ahmad, currently working as a Professor in Department of Civil Engineering UET Taxila. He has done his PhD and Post-doctorate from the University of Nottingham, UK. Dr. Ahmad has worked as a key member for the development of "Taxila Institute of Transportation Engineering (TITE)" at CED UET Taxila. He also has worked as a Focal Person in various International Research Collaboration between TITE, UET Taxila and Hasselt University Belgium. He remained Member in joint consortium (NHA, NUST, UET Lahore, and UET Taxila) for improvement of asphalt mix design technology for Pakistan and delivered several invited talks/lectures to organizations like NHA and FWO on the subject of Transportation Engineering. He remained a member in Panel of Experts for Government's five-year action plan for technical co-operation in Highway Engineering between China and Pakistan. His areas of expertise are: Study of surface properties and interfacial adhesion, characteristics of pavement materials, effects of material modifications on their adhesive bond strength, and moisture sensitivity of these materials.

ABSTRACT

DURABILITY/MOISTURE SUSCEPTIBILITY OF ASPHALT CONCRETE

Asphalt mixture is mainly used for the construction of roads throughout the world. Large amounts of capital are spent for construction and maintenance of roads. Water is one of the major contributors towards the damage of road structure. It is considered as the worst enemy of a pavement structure by directly causing a distress or indirectly magnifying a distress and hence damaging the road structure. Asphalt mixture loses its strength in the presence of water either through loss of cohesion within the bitumen or loss of adhesive bond between bitumen and aggregate. All the conventional techniques that are used for the determination of the moisture susceptibility of an asphalt mixture assess the material as a whole by using some mechanical testing technique without taking into account the individual physicochemical characteristics of both the bitumen and the aggregates. The surface energy properties of the materials, which are

used to quantify their interfacial adhesion, play an important role in the final adhesive bond strength between these materials. Similarly, it is important to understand the effect of presence of air voids in asphalt mixture. Percent air voids in the asphaltic concrete are specified for two stages; air voids for the mix design (Job mix formula), and air void in the field (in-place air voids after the final compaction/construction of the pavement). The air voids/pores in an asphalt mixture are generally divided into three categories; permeable pores, dead end pores, and isolated pores. Selection of right amount of air voids is of great significance for an asphalt mixture to survive. Right understanding and combination of the highlighted durability parameters can greatly contribute towards the development of a powerful material screening protocol/tool for selection of bitumen-aggregate combinations and gradations that are less susceptible to moisture damage.

PROF. DR. RIZWAN FAROOQUI

Prof. Dr. Rizwan Farooqui is serving as Professor and Co-Chair at the Department of Civil Engineering, NED University, Pakistan. He has a Ph.D. degree in Construction Engineering and Management from Florida International University USA; an MS degree in Structural and Construction Engineering from National University of Singapore; and a B.E. degree in Civil Engineering from NED University. Prof. Farooqui has over 20 years of research, teaching and construction industry experience in the USA, Pakistan, Singapore, Dubai, Qatar and Ethiopia. Few of his major accomplishments include: Development and implementation of a construction process re-engineering model for Ethiopian Construction Industry; Development of a strategic model for improvement of construction project management education, research and practice in Pakistan (a Pak-US collaborative grant), development of the M. Eng. Program in Engineering Management (with specializations in construction management and industrial engineering management) for NED University; and development of the B. Eng. Program in Construction Engineering for NED University.

ABSTRACT
CONSTRUCTION 4.0 – CONCEPTS AND EMERGING TECHNOLOGIES

Construction 4.0 is the counterpart of industry 4.0 in the AEC industry since 2013. In a nutshell, it's the **Digitization**, **Automation, and Integration of** planning, design, execution construction processes in all phases of a construction project. In recent years, due to the rapid development of the fourth industrial revolution and new platforms of information technologies, intelligent systems have received widespread attention in many industries and have brought the potential to improve the efficiency of the construction industry. These facts led to the appearance of a new concept in the construction industry called Construction 4.0. Construction 4.0 – the reality of connecting the owner and contractor, the field to the office, and the physical aspects of a project to the digital side of the project. The last decade has witnessed unprecedented changes in the

technologies and processes involved in the construction industry. The philosophies associated with Industry 4.0 now reverberate in construction 4.0. Digitalization and interconnectivity in the cyber-physical systems of the sector are at the heart of such transformation. Construction 4.0 brings to the table a plethora of technologies and associated processes over the construction project lifecycle. This keynote will deliver an address on Construction 4.0: Concepts and Emerging Technologies. The keynote will provide insights into the meaning of construction 4.0, and the different aspects of its successful implementation in the construction sector. Overview of key technologies with sample applications in Construction will be discussed such as BIM, Digital Twins, AR/VR, Sensors, Drones, IoT, AI etc.

PROF. DR. KHAN ZAIB JADOON

Prof. Dr. Khan Zaib Jadoon is currently working as a Professor and Head of the Department in Civil Engineering at International Islamic University Islamabad, Pakistan. He received his PhD in the field of Water Resources Engineering from Université Catholique de Louvain, (UCL) Belgium. Dr. Jadoon is leading the water resources engineering research group and supervising a research team focuses on interdisciplinary cutting-edge research and innovation in surface and groundwater hydrology. His areas of special interests revolve around groundwater and hydro geophysics, from unsaturated zone hydrology to aquifer storage and recovery, and use of non-invasive geophysical methods to monitor subsurface flow and transport processes. He remained an active team member in different internationally funded research projects. Dr. Jadoon worked in different capacities including PI, Co-PI as well as collaborator in projects involving HEC funded NCGSA, NRPU projects and international funders such as BMBF Germany, Forschungszentrum Juelich, Germany, LBNL USA and Saudi national grant. Dr. Jadoon is a member of Environmental and Engineering Geophysical Society (EEGS), European Association of Geoscientists and Engineers (EAGE) and as a senior Program Evaluator (PEV) of Pakistan Engineering Council for Outcome-Based Education (OBE). He has published more than 70 peer-reviewed articles in journals and international conferences proceedings, having cumulative impact factor of around 100 with h-index of 15.

ABSTRACT

IMPLEMENTATION OF SMART GROUNDWATER MONITORING SYSTEM FOR SUSTAINABLE GROUNDWATER MANAGEMENT

Groundwater has consistently offered a dependable source of high-quality water for human use. In terms of global groundwater consumption, Pakistan ranks fourth. The situation in Pakistan has worsened as a result of the government subsidizing power for agricultural use, which allowed for

the development of numerous tube wells around the nation and the ensuing high groundwater depletion. There are two main challenges for sustainable groundwater management. First, considerable groundwater depletion has been caused by rising withdrawals to meet growing human needs, which is typically not observed due to the high expense of the monitoring system. Data limitations and the application of regional groundwater models for future prediction is the second issue. To track the in-situ real-time dynamics of groundwater depletion, a smart groundwater monitoring system with Internet of Things (IoT) capabilities has been created and tested in this study. Each groundwater monitoring sensor is coupled to an integrated module that comprises of a wireless transceiver using Long Range Radio (LoRa) technology and a microcontroller. The readings from each LoRa-enabled module are combined at one (or more) gateways, which are then linked to a central server—typically over an IP connection by the centralized server. The smart groundwater monitoring system's sensors were calibrated in a lab setting using changes in water levels in a 3-meter water column. To enable a remote real-time assessment of groundwater level monitoring, a network of low-cost groundwater sensors was installed in the region. In order to achieve social benefits (promote equity among groundwater users), economic benefits (optimize pumping, which reduces energy costs), and technical benefits (better estimates of groundwater abstraction) for sustainable groundwater management, the smart and resource-efficient groundwater monitoring system helps to reduce the number of physical visits to the field and also enhance stakeholder's participation.

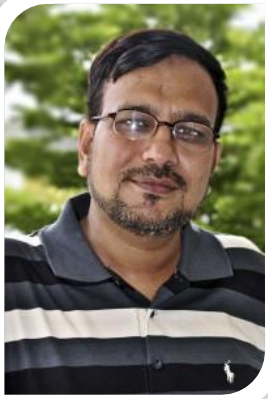
PROF. DR. KHAN SHAHZADA

Prof. Dr. Khan Shahzada is currently working at the Department of Civil Engineering, University of Engineering & Technology, Peshawar. He has done his Ph.D. in Structural/Earthquake Engineering from the same university. His specialization is Seismic Risk Assessment of Buildings, Vulnerability Assessment of unreinforced and confined masonry buildings, Hazard assessment, Development of fragility curves for different types of buildings, and risk assessment of existing buildings. He has published a book on SEISMIC RISK ASSESSMENT OF BUILDINGs also.

ABSTRACT
SUSTAINABILITY-BASED INNOVATIONS IN CONSTRUCTION MATERIALS AND STRUCTURES

Shelter is one of the most basic rights of humans. For a comfortable and relaxed living, the shelter should be sustainable, strong, and safe. For the achievement of these goals, the material evolution era produced ample improvements at material and structural levels. Further, Pakistan lies in one of the seismically active regions where earthquakes in the past caused catastrophic damage to structures and human lives. To cope with this, competitive masonries like brick, dry stack, cellular lightweight concrete, solid and hollow concrete masonry are seismically evaluated using different structure typologies including unreinforced, confined, and retrofitted structures. Most of these results are validated numerically. Moreover, some of the masonries are assessed for blast loading both numerically and experimentally. RC frames and infill walls are assessed through quasi-static and shake table loading and proposed effective ways for its improvement. Strengthening of different structures is performed using different techniques including ferrocement overlay, engineered cementitious composite, external steel elements, and other Indigenous materials. Additionally, significant work is done at the material level using different additives to replace cement in concrete which includes wheat straw, bagasse ash, bentonite clay, rice husk ash, silica fume, waste glass, and marble powder. Based on the above experimentations, different materials are commercialized at the country level and improved based on the recommendations extracted from these studies.

PROF. DR MUHAMMAD JAVED IQBAL



Associate Professor Dr. Muhammad Jawed Iqbal is currently working as Director Academics and Head of Transportation Engineering Department at National Institute of Transportation, a constituent institute of National University of Sciences and Technology (NUST), Pakistan. Dr. Jawed has more than 25 years of experience in various disciplines of Civil Engineering. His research interest includes Traffic Safety, Transportation Master Planning, Mass Transit Planning, Transportation Management, Congestion Management, Highway Design and Road Safety Audit. Dr. Jawed has taught traffic engineering and geometric design courses at MS and PhD level and carried out research to more than 25 students. He has number of publications to his credit, published in journals of international repute. Dr Jawed also attended postgraduate course in Disaster Management from AIT, Thailand. He is member of various professional engineering bodies.

ABSTRACT

ESTIMATING THE COST OF A ROAD TRAFFIC ACCIDENT IN PAKISTAN USING HUMAN CAPITAL COST APPROACH

Road safety is one of the leading causes of deaths in Pakistan and situation of road safety in Pakistan is worrisome. Thousands of people died, and millions got injured due road traffic accidents every year in Pakistan. The road traffic accidents not only cause physical losses, but economic losses and emotional losses are also associated with it. The survival of a family is questionable whose bread earner died or severely injured in RTA. The main objective of this study is to estimate the average cost of a road traffic accident using Human Capital Cost Approach at each severity level (fatal, major and minor accident) in Pakistan. For this purpose, accident data was collected from rescue 1122 and National Transport Research Centre (NTRC). Reported RTA data, population data and data of registered vehicles were obtained from Pakistan Bureau of Statistic. Collect Questionnaire survey was conducted to collect the data on medical cost, vehicle damage cost, vehicle downtime, judicial system cost and ERS. The RTA data depicts that 4% fatal,

23 %% major and 73% minor RTAs occurred in the study area. It also depicts the major cause of RTA is over speeding and carelessness. The average age of death in RTA is 32.54 years and 65% of death victims of RTA are of less than 40 years of age. The morning peak of RTAs is 7:00 a.m. to 9:00 a.m. and evening peak of RTAs is from 4:00 p.m. to 7:00 p.m. The cost estimation using human capital cost approach shows the average economic losses of Rs. 6.2 million, 1.4 million and 0.039 million occurred in case of fatal, major and minor RTA respectively. The analysis of data as per Islamic laws show the average compensation cost in case of RTA (Katal-e Khata) is Rs. 12.6 million in terms of camels and Rs. 17.45 million in case of Dinar (gold coins). While iRAP method shows the average loss in case of fatal crash is Rs.12.3 million and in case of non-fatal RTA the losses are Rs 3.074 million. The analysis shows the total losses incurred in Punjab due to RTAs is Rs 188.5 billion that is more than 1 % of the GDP of Punjab and 11.21 % of the budget of Punjab.

PROF. DR.-ING. SAQIB EHSAN

Prof. Dr. Saqib Ehsan is a prominent expert and research scholar in the domain of Water Resources Engineering, currently rendering his services as Professor (Civil Engineering) at NFC Institute of Engineering & Fertilizer Research, Faisalabad Pakistan (affiliated with the UET Lahore). After graduating in Civil Engineering from UET Lahore in April 2002, he completed his MSc in Water Resources Engineering & Management in November 2004 and PhD in Civil Engineering (with specialization in Hydraulic Engineering) in March 2009 at Stuttgart University, Germany. He has valuable experience of teaching and research both at undergraduate and postgraduate level. He has total teaching/research experience of more than 20 years including more than 13 years' experience at post-PhD level. His areas of interest/expertise are Risk Analysis of Hydraulic Structures, Disaster Management, Water Resources Management, Hydraulic Engineering, Hydrology, Hydrogeology/Groundwater Management, Flood Control, Floodplain Management, River Engineering, Numerical Modeling and Rehabilitation of Structures. In addition to his multiple research papers in refereed/indexed journals and conferences/workshops, he has also published a Book (International Edition) titled as: "Evaluation of Life Safety Risks Related to Severe Flooding". He is reviewer of many national and international journals. He is also member of various national and international professional organizations/associations. Currently he is actively engaged in various collaborative research projects in the domain of Civil Engineering funded by foreign institutions.

ABSTRACT

DETAILED STUDY TO INVESTIGATE POSSIBLE GROUNDWATER RECHARGE OPTIONS FOR CITIES IN PAKISTAN

This research involves a detailed study to explore the possible groundwater recharge options for cities in Pakistan. It highlights the significance of storm runoff for groundwater recharge in urban areas. Due to excessive withdrawal of groundwater in urban areas, the groundwater table is

significantly depleting each year. A proper storm water drainage system should be functional in order to collect the storm runoff from different parts of an urban area. As Case study, the Gujranwala city in Pakistan has been taken into consideration. The city has strong potential for a storm water drainage system. Each year a significant amount of storm runoff in Gujranwala city is not utilized due to unavailability of a proper storm water drainage system. Different aspects of hydrology and hydrogeology of this city have been thoroughly studied and using the available information about deep confined aquifers in the city area, the design considerations for tube wells have been elaborated. Various options for groundwater water recharge in the city area have been investigated and a typical design of an inverted well in the city area has also been proposed. This study strongly recommends the concerned authorities to first provide a suitable storm water drainage system in Gujranwala city and to investigate the feasible options of groundwater recharge. This research is intended to provide useful guidelines for studying the feasibility of groundwater recharge techniques in urban areas of Pakistan and also other parts of the world.

DR. SHAMSHER SADIQ

Dr. Shamsher Sadiq is an alumnus of the MUET and currently serving as Assistant Professor at Department of Civil Engineering, Mirpur University of Science and Technology (MUST), Azad Kashmir. He earned Ph.D. degree in Civil Engineering (Major: Geotechnical Engineering) from Hanyang University, South Korea and B.E. degree in Civil Engineering from Mehran UET Jamshoro. He is currently working in range of areas: Energy Geotechnics, Soil-Structure-Interaction, Geotechnical Earthquake Engineering, Numerical Modeling in Geomechanics, Seismic Hazard Analysis and Ground Response Analysis, Tunneling in Soil and Rock and Landslide Hazard Assessment. He has also been involved in various R & D projects in South Korea, US and Pakistan. Currently, he is a PI and Co-PI of two HEC funded projects involving the development of seismic site amplification factors and amplification model for shallow bed rock sites of Pakistan.

ABSTRACT

EVALUATION OF SEISMIC SITE AMPLIFICATION CHARACTERISTICS OF SHALLOW BED ROCK SITES CONSIDERING PAKISTAN'S LOCAL PROFILE DATA

Current seismic provisions in Pakistan, seismic site classifications, and corresponding site amplification factors (BCP 2021) refers ASCE/SEI 7-05, which are based on the local site conditions of Western United States with low impedance contrast, deep sites, and high seismicity conditions. The use of these deep sites-based amplification factors to the shallow sites may not be appropriate to capture shallow sites' response. This study performed a non-linear site-specific response analysis suite to compute the amplification characteristics for the six (06) representative shallow bedrock sites generalized from 457 datasets of Islamabad, Pakistan. The computed amplification factors are compared with code-based design estimates; it is found that code-based guidelines underestimate amplification factors at a short period whereas overestimating at an extended period. Further, this talk shares the way forward for developing amplifications factors for Pakistan considering local geotechnical site profile database.

Sustainable Construction and Project Management

ID 10: Sustainability Assessment of Civil Engineering Projects: The Case of Pakistan

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ABSTRACT

Physical infrastructure projects such as road networks, housing, health and education facilities play important role in the development of a region. The projects help in improving the quality of life of the masses of the region. All such projects are related to a civil engineering which consume lot of government budget. Due to poor economy and financial constraints many developing countries like Pakistan prefer to invest in sustainable projects only. Ministry of Planning Development & Special Initiatives allocate funds for the projects under Public Sector Development Programme (PSDP). Every year, thousands of projects are submitted to the ministry for seeking funds. Although, the ministry considers economic, social, and environmental aspects of a project for accepting and allocating funds, but these are just descriptive statements lacking scientific and statistical approaches. Technical sustainability of a project is important, too. Moreover, there is no quantitative sustainability assessment available with the ministry to accept or reject civil engineering projects. The purpose of this paper is to investigate the existing criteria of the ministry for approving PSDP projects. We also propose a statistical model for assessing the sustainability in civil engineering projects with the help of literature review and test the proposed model empirically in the local context of Pakistan. The success and sustainability of a civil engineering project largely depends on the provided site information such as topographic. Therefore, the role of Survey of Pakistan being the national surveying and mapping organization of the country is also explored in assisting to make civil engineering projects technically sustainable.

KEYWORDS:

SUSTAINABILITY, CIVIL ENGINEERING PROJECTS, ASSESSMENT, SCIENCE AND TECHNOLOGY, PAKISTAN

ID 30: Green Retrofitting of Building via BIM-based Sustainability Optimization using DesignBuilder: A Case Study

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ABSTRACT

Green Retrofitting is a major development in the achievement of UN Sustainable Development Goals (SDGs 3, 7, 9, 11, 12 and 13) in the construction sector. The construction industry consumes around 55 percent of Pakistan's annual energy and is the country's most energy-intensive sector. It is, therefore, significant to devise a novel and effective model of green retrofitting of current buildings based on Building Information Modelling (BIM) which aims to optimize energy consumption to effectively meet diversified climatic concerns and to promote sustainable structures. This research aims to reform the existing building by modifying the design parameters for an inefficient building envelope based on obtained simulation results to optimize the overall energy consumption. BIM tools, such as Autodesk Revit and DesignBuilder have been used for the development of the building model, running energy simulations, and evaluation of the optimized energy-efficient design by comparing different design alternatives. After a detailed analysis, this research has concluded that the existing building is consuming a high amount of annual energy and has come up with a list of 'green' solutions i.e., optimal designs with the help of BIM tools which possess advanced algorithms for an effective optimization process. The proposed optimal design proposes 46% of energy saving in total. In this study, the design variables selection has been fulfilled according to the local environment sustainability. The implication of this research is the provision of more accurate energy usage guidelines during the maintenance or renovation of the building.

KEYWORDS:

GREEN RETROFITTING, BIM, ENERGY ANALYSIS, ENERGY OPTIMIZATION, SUSTAINABILITY

ID 34: Adaptive and Sustainable Design for Building Construction Considering Climate Change

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ABSTRACT

The two most crucial factors that are constantly taken into account while developing or building any new infrastructure in this day and age are sustainability and resilience. In a similar manner, this project centers on the same idea of sustainability and resiliency in order to construct a 10-story structure that will serve the function of a multipurpose community center equipped with cutting edge technology and carefully selected construction materials in order to lessen the number of harmful emissions and to keep a balance in both the structural strength and the environment. The design process has involved choosing the primary building material, the type of construction used, the building plans, and the carbon footprints that selected building materials are generating. The building's planned design is also be assessed for structural soundness, environmental sustainability, and resilience. The outcomes are compared to an existing structure in the same domain for the critical evaluation and effective decision-making. As a result, this compilation also includes a complete and in-depth analysis of how the suggested construction is more robust and sustainable. The preface also includes information on the building parts, such as the materials used to contrive the structural as well as the nonstructural members. In the end, the suggested design is monitored based on its structural qualities to ensure its stability and resilience. In order to successfully propose a sustainable and resilient design for the building of a multipurpose 10-story community center, a comprehensive and optimal set of recommendations is provided.

KEYWORDS:

SUSTAINABILITY, RESILIENCY, CONSTRUCTION, CLIMATE CHANGE

ID 56: Construction Waste Management Potentials of Building Information Modelling (BIM): A State-of-the-Art Review

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ABSTRACT

With the rapid increase in population in the last couple of decades, construction activities increased significantly which led to the depletion of natural resources. Traditional practices in the construction industry with unprofessional labor and mismanagement had been the main obstacle during the project lifecycle. Also, procurement handling is one of the main problems which leads to construction waste. The construction industry needs to adopt new techniques to maximize productivity efficiently. Here, Building Information Modelling (BIM) being sophisticated, data-rich, and intelligent technology can play a vital role in optimizing the cost and time. Indeed, much has been written on how to enhance on-site waste management and recycling activities, but there have been few attempts to address the use of BIM for waste minimization in design procedures. This study provides suggestions regarding the prevention/reduction of waste generated due to construction activity and highlights some key features for sustainable development. The relationship between BIM technology and construction waste management was analyzed. Time and cost evaluation was studied briefly to showcase the outcomes of the research. BIM has created strategies to reduce building waste throughout the design and pre-construction phases. This paper discusses the origins of construction waste, current waste reduction strategies, and the possible application of BIM to design out waste.

KEYWORDS:

CONSTRUCTION INDUSTRY, BIM, WASTE MANAGEMENT, SUSTAINABLE CONSTRUCTION

ID 57: Building Information Modelling (BIM) based Framework for Construction and Demolition Waste Estimation and Management

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ABSTRACT

Modern day world gives huge importance to sustainable construction and demolition (C&D). Governments and companies all over the world, are striving to develop methods, which reduce waste. A good step is to reduce, reuse and recycle (3R principle) construction and demolition waste. Essential for these activities is to have proper estimates of waste, that would be generated during construction and demolition of structures. Current practice in construction industry compromises on accurate estimation and audit of waste produced and recycled in construction and demolition. Considering this anomaly, this research was conducted to develop a BIM based system, for better waste estimation. The system was aimed to estimate total waste produced, along with classifying waste that could be recycled and that must be disposed on building demolition. Initially, available waste estimation systems and their limitations were analysed. Consequently, a waste estimation was performed on a residential building model designed in Revit structures software. Successively, the data from Revit was input to a software programmed in C++ language. The software estimated waste that could be recycled and that needs to be disposed if that building is demolished. The cost of material that would be saved on recycling that material, is also calculated by the software in the process. The results show that the proposed framework completes the endeavour for an effective waste estimation method. This framework is useful for governments and companies working towards waste estimation and reduction.

KEYWORDS:

CONSTRUCTION INDUSTRY, BIM, WASTE MANAGEMENT, SUSTAINABLE DEVELOPMENT

ID 62: Cost Analysis and Economical Suitability of Prefabricated Concrete Structures in Building Construction

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ABSTRACT

Construction industry of Pakistan has a great contribution in uprising the GDP of the country. When compared with the construction industries of some developed countries of the world it still lacks in utilizing the modern methods of construction. Most of the organizations are relying on traditional ways of construction and are not ready to equip themselves with the advanced techniques of construction that may help them do their projects more effectively and efficiently. Prefabrication is the future of modern and sustainable construction which can maximize the capability of constructing the structures without compromising not only the time, cost and quality of project but also the environment. Prefabrication is rapidly increasing in construction, and previous researchers have identified various positive impacts of prefabrication on projects. However, prefabricated construction is less preferred over traditional methods of construction in Pakistan. Therefore, a comparison is required between conventional RCC building and a prefabricated (precast RCC) building to unearth the potential benefits of adopting prefabrication on overall cost of project. To achieve this, a BIM based multi-dimensional model of conventional and prefabricated building is developed using Autodesk Revit. A detailed comparison between both the methods of construction with respect to material, labor, transportation and time made the benefits of prefabricated construction clear over conventional construction. Prefabrication method is 84% faster and costs about 13.46% less than conventional method of construction. This comprehensive contrast will help to better understand and encourage the construction industry to move towards the prefabricated construction.

KEYWORDS:

RCC STRUCTURES, PREFABRICATION, ECONOMICAL SUITABILITY, BUILDING INFORMATION MODELLING (BIM).

ID 64: Green Retrofitting of an Existing Building Envelope by Integrating BIM-Based Maximum Thermal Comfort Model: A Case Study

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ABSTRACT

Green retrofitting is defined as "Any sort of modification in an existing building, that are completely or partially occupied, to improve overall comfort in terms of all while benefiting the client's wallet". Pakistan experiences extreme hot and cold seasons throughout the year, buildings need to be adaptable to the climate to improve the thermal comfort of the inhabitants. Through advanced technologies, Building Information Model (BIM) and energy simulation tools, thermal comfort and its impacts can be evaluated at the conceptual and early design stages, will provide design teams with rich, comprehensive data to evaluate comfort thermal conditions in order to provide acceptable comfort levels. A systematic approach to create a building information model of an existing building has been employed and utilized for the purpose of retrofitting or refurbishment. The aim of this research is to improve thermal comfort of existing building by modifying the design parameter of an inefficient building envelope based on obtained simulation results to explore a variety of design alternatives of thermal comfort and overall comfort demands. A case study of an existing building is examined by Autodesk tools, such as Revit & Green Building Studio (GBS) are used for creating the building model, running thermal comfort simulations & evaluations of various orientations, ventilation, passive design to perform parametric analysis by comparing different design alternatives. The Research examination indicated that large proportion of effective heat insulation & well-oriented building can be achieved through green retrofitting by adoption of BIM technology for maximum thermal comfort. This research revealed many findings which could be useful to set future direction for improvement of thermal comfort in many areas of Province in Pakistan during renovation of buildings.

KEYWORDS: GREEN RETROFITTING, BIM, THERMAL COMFORT, ADVANCED TECHNOLOGIES, EFFECTIVE HEAT INSULATION, SUSTAINABILITY, THERMAL DEMANDS

ID 71: Framework for Enhancing the Adoption of Green Buildings Construction in Pakistan

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ABSTRACT

The world is adopting Green Buildings to increase the efficiency of buildings and curb rapid climate change. However, Pakistan is facing a series of challenges in the adoption of green buildings. This research work aims to assess the barriers inhibiting the adoption and propose remedial measures followed by developing a suitable framework to mitigate the barriers. To find the barriers, research work from prominent past studies was conducted. Semi-structured, structured surveys were conducted with field experts, construction professionals, and concerned government officers for data collection. Further, semi-structured interviews were conducted to propose possible remedial measures. The research findings suggest that currently, the adoption of green buildings in Pakistan is at a low level. Moreover, this study investigated 35 barriers after validation from construction practitioners. The SPSS program generated results were evaluated, and 20 barriers were observed as critical. A few of the top barriers were observed to be: Lack of awareness among people about green building practices, lack of green building codes and regulations, and high initial investment. Therefore, to eliminate barriers, literature-based adoption measures were analyzed, and results suggested that maximum involvement of clients, government, and institutions is required. The proposed framework consists of each of the barriers examined during this research work and remedial measures for those barriers. The framework will help institutions, policymakers, and construction practitioners to enhance the adoption of green buildings in Pakistan. This will also benefit the readers and researchers for their research work in green buildings.

KEYWORDS:

GREEN BUILDINGS, FRAMEWORK, CONSTRUCTION INDUSTRY, ADOPTION, BARRIERS, PAKISTAN.

ID 110: Challenges in Implementing Constructability in Construction Industry – A Systematic Review

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ABSTRACT

Constructability is an effective managerial strategy that has been employed in the construction industry that enables to achieve earlier benefits concerned with cost, time, and quality. This novel concept facilitates the completion of overall success of project's desired goals. However, recent shifts in socioeconomic conditions and swift technological advancements have caused torsions in the construction industry. This comprehensive analysis investigates the various challenges and the application of constructability in the construction industry globally. A systematic review was conducted to address various issues including trends, applications, and more specifically the challenges towards constructability implementation. The review found that constructability is of utmost prominence owning to recent advancements in the industry such as after the integration of Building Information Modelling (BIM) for more recent complex designs and growing environmental challenges in the construction industries. This review study would enable industry stakeholders in accordance with existing and future trends and also provide thorough future directions to mitigate challenges for the implementation of this novel concept.

KEYWORDS:

CONSTRUCTABILITY, CONSTRUCTION INDUSTRY, IMPLEMENTATION, STAKEHOLDES, PROJECT MANAGEMENT

ID 117: Limitations in Current Construction Practices of Public Sector Building Projects in Sindh

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ABSTRACT

Undivided attention is being driven by labor productivity in today's era. The main and the foremost concern of any organization is its labor productivity. The discovery of factors impacting construction productivity has been the subject of much research. For a very long time, research have sought to identify the key elements influencing building productivity in various nations. Continuous work in this approach has led academics to identify a wide range of factors. While the subject of this paper is however has been limited to Sindh province of Pakistan only. The construction industry of Pakistan is swelling with each passing day thus labor productivity is of the major concern. This paper aims at exposing the key weakness in current construction practices being employed in various building projects of Sindh. For this purpose, 135 questionnaires, after a rich literature survey, were distributed among the industry experts and the obtained results were analyzed and then ranked in Statistical Packages for Social Sciences (SPSS). It was revealed through the results that 10 factors chiefly influence the labor productivity which are shortage of unskilled labor, payment delay, less salary, insufficient modern tools, delay in delivery of material at site, material shortage and quality, labor absenteeism, equipment breakdown, experience of contractor and construction technology. At the end of the study, it is recommended that a framework maybe developed based upon the factors given above to improve the labor productivity in public sector building projects of Sindh.

KEYWORDS:

LABOR PRODUCTIVITY, CONSTRUCTION INDUSTRY, SINDH, WEAKNESSES, PUBLIC SECTOR

ID 119: E-Procurement and Supply Chain Performance in the Construction Industry of Pakistan

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ABSTRACT

Technology-based service is no longer an afterthought for public and commercial businesses in today's dynamic, competitive, global economic climate; rather, it is a need. E-procurement has been successful in many industries and has played a significant role globally. It has so far entirely dominated Pakistan in terms of displaying a stepped-wise technique for its adoption at each stage of projects. After achieving success across the board in different projects, e-procurement began to attract the interest of numerous researchers in its application to construction projects. The literature study, however, reveals that many of the studies conducted in this field are limited to particular regions. Thus, there aren't many observational studies on the role of IT in the supply chain cycle. The aim of this study is to identify the e-procurement factors that affect the performance of supply chain management in Pakistan's construction industry. The study adopted the use of questionnaires and interview schedules to collect primary data. The research also adopted a descriptive design to collect quantitative and qualitative data that describes the effects of e-procurement factors on supply chain performance. For this, a questionnaire was designed consisting of 15 questions and collected data from 110 experienced workers. Data were analyzed in SPSS 25. The data of the questionnaire survey showed the importance of factors that affect the supply chain performance and ranked them according to mean and standard values. From the analysis results, it was found that the 15 factors of e-procurement positively effect on supply chain performance. The review, in this way, suggest that the organizations should come up with policies on the adoption of e-procurement factors and provide basic resources and leadership in the adoption of e-procurement.

KEYWORDS:

E-PROCUREMENT, SUPPLY CHAIN MANAGEMENT, CONSTRUCTION INDUSTRY, PAKISTAN AND PRODUCTIVITY

ID 122: Causes of Conflicts Due to Contractual and Technical Problems in Building Construction Projects

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ABSTRACT

In the competitive and complex environment of the building construction industry, individuals with diverse perspectives, abilities, and building process expertise engage with one another. Due to the presence of such contentious circumstances, conflicts are inevitable. It is necessary to identify the root causes of construction conflict in order to establish an effective mitigation strategy. This research analyses the causes of conflict resulting from technical and contractual problems. Contractual duties bind professionals to work as a team to achieve the project's objective and construction industry involves in more contracts than other industries. Due to the widespread use of contracts in construction sector, complexity and conflict are unavoidable. According to the results of this research, inadequate definition and specification of the precise scope of contract, the client's inability to pay according to the contract, and changes in the initial cost commitment under the contract are top three causes of conflicts due to the contractual problem. It is clear from previous studies that conflict due to technical problems directly affects construction project time and efficiency. So, it is very important to determine and rank most important causes of conflict due technical problem. The study shows that sudden swings in market prices, inadequate site management, and problems in supply chain and procurement are the top three causes of conflict due to technical problems. The research methodology involves extensive literature review, preliminary mapping, interviews and a questionnaire survey. The data were analysed through SPSS. In total, 46 causes of conflicts due to technical and contractual problems are determined and ranked in later stages.

KEYWORDS:

CONFLICT, CONSTRUCTION INDUSTRY, CONTRACTUAL PROBLEMS, TECHNICAL PROBLEMS

ID 123: Tasks and Practices Involved in Conceptual Phase to Improve Construction Productivity

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ABSTRACT

The growth of the construction industry is primarily determined by the quality and productivity of construction projects. Project productivity is one of the most important factors to be considered during the conceptual phase of the project. Proper productivity planning during the conceptual phase of a project leads to project completion on time and with high quality. This study aims to evaluate the impact of significant tasks in the conceptual phase on project productivity, as well as related best practices related to the conceptual phase of a project that enables required site productivity and overcome conceptual phase issues. An extensive literature review of articles obtained from various research databases was conducted to identify conceptual phase tasks and practices associated with construction industry. A questionnaire survey completed by construction industry professionals was used to collect data for the study. The data were analyzed with SPSS and found that Consents and Permits; Financial Strategy; Project Planning; Contract Strategy; Project Management Team; Construction Philosophy; Procurement Strategy; and Design of Temporary and Permanent Structures are major tasks in the conceptual phase of construction projects. The study also reported fifty best practices related to the task in the conceptual phase. Implementation of these practices will be helpful to increase site productivity.

KEYWORDS:

CONCEPTUAL PHASE, PRODUCTIVITY, ESSENTIAL TASKS, CONSTRUCTION PROJECTS

Sustainable Material and Innovative Structures

ID 19: Effect of Industrial Waste on Mechanical and Durability Performance of concrete

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ABSTRACT

Production of concrete for construction of structures like buildings, highways and bridges require huge amount of cement and aggregates. Consumption of large amount of cement not only affects the natural environment but also strength of concrete. On the other hand, due to heavy concrete production for construction industry causes depletion of natural resources like fine and coarse aggregate. It motivates this study to be undertaken in order to utilize waste materials in concrete instead of aggregate and cement. This study investigates the mechanical and durability performance of concrete by partially replacing fine aggregate with coal bottom ash and cement with fly ash. To achieve this objective, concrete was produced with OPC type-I cement, fine aggregate passing #16 sieve, coarse aggregate of size 10mm, CBA and FA locally available were used. An optimum dosage level of fly ash (15%) was selected from preliminary testing and used together with CBA at various dosage level ranging from 0-35% as fine aggregate replacement. Cubes and cylinders were cast and tested against compressive, tensile, carbonation and sulphate attack test at the end of required curing age. Findings of this study suggest that mechanical performance were significantly improved at 25% CBA level but not higher than that of conventional concrete mix, it is because the CBA has porous nature and need extra amount of moisture for complete hydration which can be achieved with longer curing durations. Furthermore, the durability of concrete was also found to be improved in terms of carbonation and sulphate attack.

KEYWORDS:

COAL BOTTOM ASH (CBA), FLY ASH (FA), MECHANICAL PROPERTIES, DURABILITY PROPERTIES

ID 21: Effect of Magnetically Treated Water on Workability and Compressive Strength of Concrete

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ABSTRACT

Concrete is one of the major constituents in the construction industry throughout the world. Different methods and materials have been used to enhance its properties like workability and compressive strength. In order to enhance the properties of concrete, magnetized water in concrete is used in this research to improves the workability and compressive strength of concrete. Also, this magnetically treated water reduces the need of cement content required for the specified compressive strength value. When water is exposed to the magnet of different intensities showing improvement in workability and compressive strength compared to conventional concrete. Five different concrete mixtures were made in total, four of which used magnetized water and one of which used ordinary tap water. The 0.8, 1.4, 2.0, and 2.4 tesla strengths of the permanent magnets utilized to create the magnetic water were tested. The results of tests on the slump, compressive strength, density, and water absorption for all five mixes showed that the production of concrete with magnetically treated water resulted in enhanced compressive strength and improved workability. Furthermore, concrete was found to be denser and less water absorbent when above mentioned magnetic intensity levels were used.

KEYWORDS:

MAGNETICALLY TREATED WATER, COMPRESSIVE STRENGTH, WORKABILITY

ID 36: Finite Element Analysis: Method, Verification and Validation

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ABSTRACT

The computer-aided engineering tools are being used for the last two decades. The use of advanced finite element tools for innovative and efficient concrete structure design is not common due to the lack of high-performance computing facilities and trained personnel. In this paper, a successful example of a finite element model (FEM) model is presented and discussed. The numerical model was validated using the experimental results, which are based on reinforced concrete (RC) specimens under low-velocity impact load. The impact was applied by a drop-weight tower with a 6 kg drop-weight at a 1-meter drop-height. The FEM showed good agreement with the experimental results and gives a consistent prediction of the displacement and failure behaviour compared to experimental results. This paper presents a summary of the detailed investigation using the finite element tool and demonstrates the suitability to study and predict the impact response of reinforced concrete members.

KEYWORDS:

FINITE ELEMENT ANALYSIS, STRUCTURAL ENGINEERING, BUILDING INDUSTRY

ID 37: Properties of Concrete Incorporating Recycled Aggregates: A Sustainable Approach

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ABSTRACT

Sustainable construction goal is to protect the environment and is being widely adapted. This study investigated the performance of concrete cubes prepared with recycled concrete aggregate that are obtained from the concrete research institutions. The samples are prepared with normal aggregates concrete (NAC) and recycle aggregates (RAC) at multiple water-cement ratios. Based on the comparison of compressive strengths of NAC and RAC, it was concluded that recycle aggregates have the potential to replace the normal aggregates if prepared at higher water cement ratios.

KEYWORDS:

RECYCLED AGGREGATE, TESTED AGGREGATE, COMPRESSIVE STRENGTH

ID 39: Effect of Coir Fiber on Flexural Strength of Concrete Maintaining Uniform Workability

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ABSTRACT

Concrete has significant compressive strength, while it lacks tensile strength. The research is going on to improvise the tensile strength and flexural strength of concrete. Mostly natural fibers are very useful to achieve that goal. Coir Fiber has proved to be beneficial for enhancing the flexural strength but reduces the workability of fresh concrete significantly. That's why, by using a super plasticizer with coir fiber, we can cover both areas. The aim of the research is to determine the effect of coir fiber on the flexural strength of concrete while maintaining constant workability by use of super plasticizer and to obtain the right amount of fiber for the Optimum results. The constant workability of 40±5mm was achieved by using a super plasticizer with the help of a hit and trail method fixing the amount of plasticizer for every proportion of fiber used. Beams for each proportion of coir fiber, 0%, 0.4%, 0.8%, and 1% (by weight of cement) were casted and cured for 28-days, then flexural strength was determined. The Flexural strength increased by 21%, 25%, and 15.24% with a fiber proportion of 0.4%, 0.8% and 1% respectively, in comparison with plain concrete. The Optimum results were found at 0.8%. It was concluded that a significant increase in flexural strength was observed with the inclusion of coir fiber. The results show coir fiber can be used to enhance the flexural strength of concrete.

KEYWORDS:

FLEXURAL STRENGTH, COIR FIBER, SUPER PLASTICIZER, CONSTANT WORKABILITY, CONCRETE

ID 46: Structural Performance of GFRP Reinforced Concrete Frames

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ABSTRACT

The importance of sustainable materials can be realized from the fact that much of the research is being done to incorporate new materials into various components of civil engineering structures without compromising their integrity and strength. The introduction of Glass Fibre Reinforced Polymer (GFRP) reinforcement amalgamated with conventional steel in a concrete structure assures more strength and durability in structural components. The aim of this study is to give engineers a better understanding of GFRP rebar as flexural reinforcement so that they can have a better understanding of using it as a sustainable material. In this paper, a comparative study of Glass fiber reinforced polymer reinforcement and conventional steel reinforcement was made using Abaqus FEA Software. Two Models of three stories were simulated in the software and tested under seismic and uniform loading conditions, the first model having GFRP reinforcement in beams and conventional steel in the columns, while the second model is completely reinforced with conventional steel. The results show that under same reinforcement ratios GFRP model outperformed the ordinary steel by reducing the story drift by 23 % and beam deflection by 18 %, also the cost of reinforcement is significantly reduced because of its light-weightiness. The study concluded that the use of Glass-fibre reinforced polymer (GFRP) in beams is better in terms of benefit-added with better seismic behavior.

KEYWORDS:

FIBER COMPOSITES, GFRP REINFORCEMENT, STRUCTURAL PERFORMANCE, ABAQUS, SUSTAINABILITY

ID 47: Determination of Pozzolanic Activity of Buffalo Dung Ash to Utilize as Cement Replacement Material in Concrete

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ABSTRACT

Increasing construction activity around the globe has raised the demand for cement to 4.4 giga-tones/year, making it costlier, and its consumption second to water. Meanwhile, a tone of clinker produces a tone of CO_2 on a large consumption of natural resources of raw materials and energy of 10–11 EJ/year, which is why an affordable and environmentally sustainable substitute for cement is needed today. Pakistan possesses more than 30 million buffalos. Each can produce up to 15 kg of dung per day, resulting in 450 million kg of dung produced in Pakistan alone. This study is conducted to investigate and introduce a new cement substitute for concrete, prepared from local waste, i.e., Buffalo dung. For this purpose, five buffalo dung ash samples were prepared by calcining the dung in a muffle furnace for 1 hour at 400°C, 500°C, 600°C, 700°C, and 800°C, and after cooling, sieving through a No. 100 sieve. The Strength Activity Index was determined as per ASTM C311. The results showed that developed ash at 600°C has maximum Strength Activity Index of 94.2%, meeting the ASTM C618 standards for pozzolanic material, which was further confirmed by X-ray Fluorescence analysis. Furthermore, when 5%, 10%, 15%, and 20% of this ash were used as cement substitutes in concrete, the compressive strength increased by 11.2% on 10% substitution compared to control mix. Based on the parameters investigated, it was found optimal to replace 10% of the cement in the concrete with buffalo dung calcined at 600°C for 1 hour.

KEYWORDS:

BUFFALO DUNG ASH, POZZOLANIC ACTIVITY, XRF, CEMENT REPLACEMENT MATERIAL

ID 49: Effect of Various Cement Brands on the Properties of Concrete

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ABSTRACT

Pakistan as a developing country cannot sustain more economic losses, thus different comparative studies are needed to point out the flaws in the available cement brands for the constructions to be durable for long service life which will eventually reduce the demand for cement in the future. This research work seeks to examine the differences in different cement brands make for the compressive strength and workability of the resulting concrete. The four most used cement brands in the surroundings were taken into account for this research project i.e., DG, Falcon, PakLand, and Lucky. Firstly, all these brands' Physical Properties i.e., Fineness, Normal Consistency, and Setting time were assessed according to the ASTM standards i.e., C184, C187, and C191, and keeping differences aside all of them had results within the ASTM standards. An interesting pattern between the Fineness and Setting time of different cement brands was noticed; the finer the cement was the less time it took for its final setting time. Secondly, and most importantly all brands of cement were evaluated for their Compressive strength and Workability according to the ASTM standards i.e., C39, and C143. Concrete cylinders 100mm*200mm in dimensions were cast with three replications for 3, 7, 14, and 28 days of curing respectively with the same water-cement ratios. Compressive strength of 15N/mm^2 was targeted for these cylinders. The slump obtained from these brands of cement was also within the already specified range i.e., 1-3 inches.

KEYWORDS:

PAKISTAN, CEMENT, CONCRETE, ASTM, COMPRESSIVE STRENGTH, WORKABILITY

ID 51: Effect of Cow Dung Ash and Recycled Coarse Aggregate on Hardened Properties of Concrete

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ABSTRACT

With the increase in urbanization the use of concrete is drastically increasing day by day, resulting in diminishing of natural resources of concrete. The production of cement requires huge process and a lot of resources, not an environmentally friendly, therefore in this research it is partially replaced with Cow Dung Ash (CDA). Cow Dung has many uses in the village, it is commonly used as fuel and its ash is thrown away as waste. Coarse aggregate is replaced by recycled concrete used as a recycled coarse aggregate (RCA), obtained from dismantled structures, to save natural resources of aggregate and recycle concrete waste. Cement was replaced by 5% of CDA and coarse aggregate was replaced by 10, 25 and 45 percentages of RCA to investigate their effect on compressive strength, water absorption and dry unit weight of concrete. Concrete was prepared using 1:2.15:2.93 proportions at 0.53 water-cement ratio as per ACI mix design. Compressive strength was determined at 7 and 28 days of curing while water absorption and dry unit tests were performed at 28 days. It was observed that the Compressive strength of RCA-CDA concrete decreases with increase in percentage of RCA. Water absorption increases and unit weight of hardened concrete decreases in all replacements as percentage RCA increases. It is concluded that, Cement and Coarse Aggregates can be replaced by CDA and RCA in concrete by 5% and 10% respectively.

KEYWORDS

COW DUNG ASH, RECYCLED AGGREGATES, CONCRETE, COMPRESSIVE STRENGTH, WATER ABSORPTION, UNIT WEIGHT.

ID 72: Investigate the Effect of Locally Available Jute on Properties of Concrete

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ABSTRACT

Jute fibers are easily available natural fiber. In this research work jute fiber is added 0%, 0.1% 0.2% and 0.3% by weight of cement. Cubes of 100mmx100mmx100mm cast with ratio of 1:1.5:3 at w/c 0.55 and cured for 7 days and 28 days. The aim is to check effect on compressive strength, workability, and density of concrete. 20mm and 40mm lengths are used to analyze their effect separately. Workability is checked by slump cone method. Density is obtained after 28 days of curing. Results show the maximum compressive strength at 7 days and 28 days is found at 0.2% fibers. Overall strength for 28 days is increased by 1.2% 20mm fiber and 5.9% 40mm fiber with increase of fiber content. Workability is reduced from 70mm to 30mm at 20mm fibers and 70mm to 20mm at 40mm fiber with increase in fiber content. Density is reduced 0.9% (from 2448 kg/m^3 to 2424 kg/m^3) at 20mm fiber and 1.2 % (from 2448 kg/m^3 to 2418 kg/m^3) at 40mm with increase of fiber content. It is concluded that with increasing fiber content strength is increasing which is independent of fiber length. Density and workability decrease with increase in fiber content and fiber length.

KEYWORDS:

JUTE, COMPRESSIVE STRENGTH, FIBERS, WORKABILITY, DENSITY.

ID 73: Compressive Strength of Concrete with Silica Fume as Partial Replacement of Cement

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ABSTRACT

The production of cement in factories has a detrimental environmental impact, and to lessen its impact, the use of silica fumes is partially substituted for cement. Silica fume (SF), a byproduct of silicon and ferrosilicon smelting, is useful to develop high-concrete strength. The use of this by-product in concrete contributes to the sustainability of the construction industry. In this research, the compressive strength of concrete is investigated by partially replacing cement with silica fume. The four mixes of 1:2:4 with a water binder ratio of 0.5 were cast at replacement levels of 0%, 7%, 11%, and 15% by weight of cement. Moreover, the compressive strength was determined at 7, 14, and 28 days after curing. As result, it was discovered that the compressive strength was maximum after 28 days of curing when the silica fume was partially replaced by 7%. Additionally, after 7 percent of silica fume, compression strength reduced.

KEYWORDS:

SILICA FUME, CEMENT, CONCRETE, PARTIAL REPLACEMENT, SUSTAINABILITY, COMPRESSIVE STRENGTH

ID 74: Exact Solution of Timoshenko Beam Equations Subjected to Varying Loads – a Generalization

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ABSTRACT

The recent trends in civil engineering and particularly the structural analysis, do not only demand use of ancient mathematical tools to better understand the working and stability of structures under different realistic situations, but also concern with the sustainable use of methods to minimize the computational effort and automate the computations to address more complicated structures quickly without compromising on the accuracy. This work emphasizes the utility of mathematical tools for exact profiling and direct analytical expressions for the solution of Timoshenko beam (TB) equations. The usual methods are worked out under different loads on TB equations to finally provide general expressions of rotation and displacement profiles of the beam. The developed exact analytical expressions are not load specific and can be applied directly on any type of load in the realistic sense without having to adopt the usual mathematical methods each time. The exact solutions are obtained for the four most important types of varying loads. MATLAB was used to create a graphical representation of the rotation and displacement parameters of the TB model. The proposed equations are accurate and have been validated successfully to produce the expressions which are in line with the existing literature. Thus, a long-term ease-of-approach has been suggested in this study for concrete sustainability in the studies involving the beams.

KEYWORDS:

TIMOSHENKO BEAM, EXACT SOLUTION, ROTATION, DISPLACEMENT, VARYING LOADS

ID 76: Determination of Manning's Roughness Coefficient of Locally Manufactured Pressed Clay Brick

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ABSTRACT

Manning's coefficient for each type of canal lining material is a pre-requisite to compute the frictional losses and discharge flowing to the fields according to the crop-water requirements. Nowadays, a lot of canals are being lined in Pakistan with the costly cement concrete putting a heavy financial burden on the national exchequer. Keeping in view the possible economic benefits, it was decided to work for the replacement of cement concrete with some efficient and cost-effective material. Though value of Manning's roughness coefficient is available in literature, but it does not specify the particular type of brick. So, the major focus of this research is the pressed clay bricks manufactured by Zaman bricks company located in Tando Hyder town of Hyderabad district as this company manufactures export quality bricks. The research is being carried on Mobile Bed Model tank apparatus available in the Hydraulics laboratory of the Department of Civil Engineering, Mehran University of Engineering & Technology, Jamshoro. The model section is transformed into rectangular section with the sectional parameters as per limitations of the apparatus. Flow meter has been calibrated to give a real value of discharge flowing in the channel. Manning's coefficient is determined to be 0.0160 through the observed data. Comparative analysis of cement lining and brick lining is carried out to ascertain the benefit cost ratio. It is concluded that this research helps to recommend the bricks as a replacement of the costly cement concrete lining based on the benefit cost ratio.

KEYWORDS:

MANNING'S ROUGHNESS COEFFICIENT, CEMENT CONCRETE LINING, PRESSED CLAY BRICK LINING

ID 84: Experimental Investigation of Eco-Friendly Concrete Made of Bentonite and Dolomite (Muzaffarabad Kamsar Quarry Dust)

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ABSTRACT

In this study, the effect of bentonite (BT) and dolomite (DT) on the mechanical and microstructural properties of concrete was evaluated on nine mixes. Cement was replaced with bentonite and dolomite by weight with varying mix ratios. The mixes are divided as: M1 (Control mix), M2 (2.5% BT), M3 (2.5% DT), M4 (5% BT), M5 (5% DT), M6 (10% BT), M7 (10% DT), M8 (2.5% BT and 2.5% DT), and M9 (5% BT and 5% DT). Concrete specimens were subjected to compressive, flexural, and split tensile strength tests after 7, 14, and 28 days. The internal structure of concrete was examined by using scanning electron microscopy (SEM) to determine changes in hydration products. Mechanical test results show that addition of bentonite (2.5%, 5% and 10%) lead to increase in compressive strength (6.31%, 8.94% and 13.15%) respectively. Similarly, the addition of 2.5% and 5% dolomite enhanced compressive strength by 10.52%, and 8.94% respectively. However, the addition of 10% dolomite reduced compressive strength by 6.8%. Replacement of cement with dolomite and bentonite individually also showed a small contribution to flexural and split tensile strength. The mixes containing dolomite and bentonite exhibited low compressive, flexural, and split tensile strength compared to the control mix. Microstructural analysis shows that the addition of bentonite and dolomite filled the microstructure and refined the internal pores contributing to compressive strength. In addition, the replacement of cement with bentonite and dolomite enhanced the formation of CSH gel.

KEYWORDS:

BENTONITE, DOLOMITE, MECHANICAL PROPERTIES, MICROSTRUCTURAL ANALYSIS

ID 97: Effect of Recycled Porcelain-Ceramic Aggregates on Concrete: A Review

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ABSTRACT

Due to recent increasing industrialization and urbanization, effective management of waste is one of the most problematic issues constantly faced by today's world. By reducing the degradation of natural resources brought on by the extraction of natural aggregates, ceramic waste from construction sites presents a sustainable and efficient endeavor for environmental problems. A profusion of research has been attempted to analyze the suitability of ceramic wastes from various sources as a possible alternative to natural aggregates in concrete. This paper provides an organized and contemporary review of ceramic aggregate concrete physical and mechanical properties. Based on conducted review research it can be said that ceramic aggregate concrete has identical physical and mechanical attributes to conventional concrete. It has been highlighted that ceramic aggregates can be used to create medium and high-strength concrete in place of natural aggregate. This also revealed that the compressive strength, permeability properties, bond strength, etc. of the concrete utilizing ceramic aggregate exceeded the necessary standards, confirming the feasibility of using ceramic waste as a successful alternative to natural aggregates in structural concrete. However, there is a need to explore the mechanical properties of ceramic waste concrete structural members to comment on its sustainability for structural applications.

KEYWORDS:

CERAMIC WASTE AGGREGATE, CERAMIC AGGREGATE CONCRETE, PHYSICAL PROPERTIES, MECHANICAL PROPERTIES, DURABILITY, REVIEW

ID 107: Effect of Acid and Chloride Attack on Durability Properties of Mortar Containing Fly Ash

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ABSTRACT

This paper represents the detailed experimental investigations on durability properties of cement mortar cubes containing various dosages of fly ash. Cement was replaced with 5%, 10%, 15%, 20% and 25% fly ash. Different tests of durability such as water absorption test, acid attack test, and chloride penetration test were performed at 28 and 90 days. It was noticed that the addition of 10% fly ash reduced the water absorption capacity of mortar by 31% and 15% at 28 and 90 days respectively, however, an increase in fly ash dosage beyond 10% increased the water absorption capacity of mortar. The addition of 25% fly ash in mortar showed 42% and 46% more resistance to acid attack individually after 28 and 90 days of immersion in acidic solution. Similarly, the addition of 25% fly ash in cement mortar reduced the chloride penetration by 33% and 27.8% at 28 and 90 days respectively due to a reduction in porosity. The microstructural analysis of samples show that the presence of optimum dosage of fly ash in cement has increased the formation of CSH gel which filled the micro-pores and improved the durability characteristics of cement mortar which suggests the potential use of fly ash in reinforcing mortar in extreme environmental conditions.

KEYWORDS:

FLY ASH, CEMENT, ACID ATTACK, CHLORIDE PENETRATION

ID 112: Utilization of Bacterial Concrete for Repair Works

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ABSTRACT

Concrete is the primary material used in construction industry all over the world. Unfortunately, due to the nature of its usage concrete often faces situation in which it loses its strength and becomes cracked. Water seeps into concrete through these cracks and cause issues such as steel erosion which leads to lose of concrete strength over time. To overcome this critical issue concrete needs to be reinforced with a method that allows it to self-repair these cracks through an automatic and environmental friendly approach. Traditional methods such as application of crack healing binder agents and repair works are used for concrete repair, but these actions cannot be applied in all situations and most of them are not environmentally viable. Thus, to overcome this issue the biological function of calcite precipitation which produces calcium carbonate, a natural binding agent found in a bacterial strand called Bacillus Sphaericus is utilized. Consequently, the development of a Self-Healing Concrete also called as Bacterial Concrete or Living Concrete and investigation of its effects was crucial. The aim of the study is to check the survival of the bacteria namely Bacillus Subtilus in concrete with the presence of carrier compound and investigate the self-healing mechanism of the organism and its effects on mechanical properties of concrete.

KEYWORDS

SELF-HEALING CONCRETE, BACTERIAL CONCRETE, REPAIR WORKS, CRACK HEALING

ID 114: Enhancing Mechanical Properties of Concrete Using Industrial Waste Materials

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ABSTRACT

The construction industry is currently investigating unused products suitably and operationally which would minimize the use of cement and concrete constituents (natural resources) and eventually reduce the cost of production, known as green concrete. An intelligent solution is to use waste materials as a substitute. The waste marble dust powder and glass powder are types of solid waste from various sources (Marble processing and glass cutting process). These can be utilized as alternatives to concrete constituents. This research focuses on enhancing the mechanical properties of concrete by replacing cement with Waste Marble Powder (WMP) and replacing sand with waste glass powder(WGP). 0%, 5%, 10%, and 15% cement was replaced by waste marble powder, and10% of sand was replaced by waste glass powder. It was concluded that the compressive strength and split tensile strength of concrete increased, and workability was improved by adding 10% waste glass powder (obtained from dry processing) as sand replacement at early ages. The compressive strength and split tensile strength at 7 days and 28 days decreased by replacing waste marble powder with cement, and workability also decreased. The cumulative effect of these wastes improved the mechanical properties. There is a strong relationship between the strength and quantity of waste glass powder and waste marble powder.

KEYWORDS:

WASTE MARBLE DUST, WASTE GLASS POWDER, COMPRESSIVE STRENGTH, SPLIT TENSILE STRENGTH, SUSTAINABLE CONCRETE, SOLID WASTE MATERIALS

Smart Methods of Irrigation, Public Health, and Geotechnical Engineering

ID 15: Water Monitoring System Using Internet of Things IOT: Critical Review

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ABSTRACT

Current advancements in sensor networks are crucial for environmental remediation. The Internet of Things (IoT) connect numerous devices that may share and collect data. IoT expands its capabilities to include environmental concerns in addition to the automation sector by utilizing industry 4.0. Polluted water has emerged as one of the most serious dangers in latest days since drinking water has been contaminated and polluted. Contaminated water may trigger a variety of illnesses in humans and animals, affecting the ecosystem's life cycle. Therefore, effective management and monitoring of available resources of water is need of the hour. This review paper includes the use Internet of Things (IoT) technology enabling efficacious monitoring of water system to manage and save scarce water resources. The traditional method to monitor water quality and quantity has been quite difficult task involving large amount of labour and cost. But the IoT application slashes human involvement and most of the procedural decisions are made by algorithms. Thus, smart methods for investigating water contamination are becoming increasingly significant with advancements in sensors, communication, and IoT technologies. Water monitoring system (WMS) is a low-cost and feasible system that uses IoT technology to analyse the quality of drinking water. Use of IoT tools for water monitoring will be a step in the right direction. Even though there are many great technological advancements for the surveillance of water quality, the research field is still challenging. This article aims to unveil the recent research for developing intelligent, energy-efficient, and highly effective water monitoring systems that will allow for continuous monitoring of water in less privileged areas of Pakistan. This article will assist researchers and administrative organizations in starting pertinent investigations of water in rural areas by utilizing a water monitoring system (WMS).

KEYWORDS: INTERNET OF THINGS (IOT), WATER MONITORING, SENSORS USED FOR WATER MONITORING

ID 33: Impact of Lime on Compaction Characteristics of Jamshoro Shale

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ABSTRACT

The most complex problem for any civil engineering construction is when the structure, which is laying on weak soil. Jamshoro shale is an example of such problematic soil that expands when comes in contact with moisture and shrinks back when it dries. This phenomenon is very critical for the structures and road networks built on shale causing settlement and cracks. Such kind of soils must be stabilized by chemical or mechanical techniques to make them strong enough to carry the loads and resist settlement and cracking. The stabilization of the ground is a sustainable approach. In this research, the treatment of lime with shale has been carried out to observe the modifications of the geotechnical properties of the soil. Different proportions of Hydrated Lime 0%, 7%, 8%, and 9% were mixed by the dry weight of the soil to investigate the effect of lime on the compaction and plasticity characteristics of the shale. Various tests such as the modified proctor test, liquid limit, and plastic limit tests were performed in the laboratory. From the results, it was observed that the properties of Jamshoro shale such as plasticity index, optimum moisture content, and maximum dry density (MDD) were improved. This suggests that lime can be used as an economical and eco-friendly stabilizing agent.

KEYWORDS:

SOIL STABILIZATION, LIME, COMPACTION, EXPANSIVE SOIL, PLASTICITY.

ID 60: Geotechnical Properties of Expansive Soil Improved with Alkali-Activated Brick Dust

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ABSTRACT

Expansive soils are susceptible to shrinkage and swelling with change in the moisture content. Problematic soils underneath a foundation can cause potential hazards for any civil infrastructure. The most common and economical technique for enhancing the properties of these soils is utilizing admixtures. In this research study, the effect of alkali-activated brick dust on the geotechnical properties of expansive soil was examined. The brick dust was activated with Potassium Hydroxide (KOH) and added to the soil at 30%, 40% and 50% by weight. Sieve analysis, Atterberg limits, compaction test, swelling index and unconfined compressive strength were carried out for the untreated and alkali-activated brick dust treated expansive soil. The plasticity index of expansive soil treated with 30%, 40% and 50% alkali-activated brick dust, decreased by 23%, 39% and 44%, and swelling potential by 67%, 126% and 146% respectively, when compared to the untreated soil. Furthermore, the unconfined compressive strengths (UCS) of 231 kPa, 348 kPa, 464 kPa and 510 kPa were achieved for the untreated soil, and soil treated with 30%, 40% and 50% alkali-activated brick dust respectively. The maximum dry density of soil treated with 30%, 40% and 50% alkali-activated brick dust increased by 6.50%, 10.27% and 14.60% respectively, when compared to the untreated sample. Based on results of the study, increasing the percentage of alkali-activated brick dust with soil tends to reduce the liquid limit and swelling potential, also increase the compressive strength. The study suggests that alkali-activated brick dust can be applied to enhance the properties of expansive soil

KEYWORDS:

EXPANSIVE SOIL, BRICK DUST, PLASTICITY INDEX, UNCONFINED COMPRESSIVE STRENGTH

ID 81: Determination of Water Requirements and Irrigation Scheduling Using Cropwat for Some of The Major Crops in Sindh Pakistan Model

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ABSTRACT

Due to population growth and increasing urbanization trends, there is a shortage of water around the world. Irrigation systems are critical for increasing crop output and ensuring food security. The purpose of this study is to calculate crop water requirements and irrigation scheduling for some major crops in Sindh using the CROPWAT model developed by FAO of United Nations. In this regard, selection from among the major crops cultivated in the Sindh province of Pakistan was made in such a way at least one crop from each category be included in this research. Accordingly, Wheat as Rabi, Rice as Kharif, Sugarcane as Perineal and Chili and Rape-seed Mustard as cash crops were selected. CROPWAT model calculates crop water requirements and irrigation scheduling from existing or new climatic- and crop-information. The Input crop data for CROPWAT software was obtained from various online resources and published information, whereas, climatic data incorporated in the CLIMWAT tool attached with CROPWAT was utilized. In addition, the software used average rainfall data of the particular years for each crop observed at DRIP Tandojam metrological station. The results of water requirements for the crops were obtained through CROPWAT model are: Wheat (352.1 mm); Rice (1662.5 mm); Sugarcane (2184.5 mm); Chili (714.4 mm); and Rape-seed Mustard (475.6 mm), while those by lysimeter were: Wheat (415 mm); Rice (1633 mm); Sugarcane 2150 mm); Chili (808.9 mm); and Rape-seed mustard (424.87 mm). These results delineate that there is decrease in crop water requirement of Wheat, Rice, Sugarcane and Chili to the tune of 15%, 1.5%, 11.6% and 1.7%, respectively, whereas an increase of 12% for Rape-seed mustard.

KEYWORDS: CROP WATER REQUIREMENT, IRRIGATION REQUIREMENT, IRRIGATION SCHEDULING, CROPWAT MODEL.

ID 108: Reservoir Modeling By Using Hec-ResSim - A Case Study of Tarbela Reservoir

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ABSTRACT

Reservoir modeling is the process of creating a three-dimensional representation of a given reservoir based on its petrophysical, geological and geophysical properties. Reservoirs storage capacity reduces significantly by sediment deposition, and it directly affects the releases from the reservoir and water availability at power intake. In this research, reservoir modeling has been carried out by using HEC-ResSim for Tarbela reservoir as case study. Tarbela reservoir is the backbone of Pakistan's agriculture sector and economy. The model was calibrated for year 2008 and validated for year 2010 in terms of outflow and power generation and model runs were made for different past flood events. The results show close comparison between simulated and observed outflow and power values for different scenarios. On the basis of 30-year histogram cycle, the future prediction of releases/outflows, power/energy generation in year 2035 has also been done. After 2035, Tarbela reservoir is expected to become the run-off the river type project due to decrease in the gross storage capacity. As per simulated results of the projected scenario (2035), the releases/outflows from reservoir and energy generation will increase in summer season by 7% and 36% respectively and decrease in winter season by 50% and 37% respectively. Further, the reduction in gross storage capacity due to sedimentation would result in the reduction of annual energy generation by 6.5% in year 2035. It is suggested to utilize HEC-ResSim model to estimate the impact of reservoir storage capacity on future outflows, power/energy generation for other reservoirs in the world.

KEYWORDS:

RESERVOIR MODELING, HEC-ResSim, FUTURE PREDICTION, TARBELA RESERVOIR, ENERGY GENERATION, FLOODING SCENARIOS

Intelligent Systems in Highway and Traffic Engineering

ID 11: Exploring the Issue of Transportation Within MUET, Jamshoro

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ABSTRACT

This research explores the issue of lack of quality and climate friendly transportation service for students at Mehran UET Jamshoro. To investigate this research question, quantitative research approach was used, and a structured questionnaire was designed to collect data from 453 students enrolled in MUET Jamshoro through convenience sampling technique. In response 385 students from the university fill out the survey questionnaire. Simple Descriptive Graphical Representation was done by the help of SPSS. The study results reveal that students studying at MUET Jamshoro do face grave difficulties while commuting within the university premises. The existing hourly point service, provided to students by university, to travel to different departments within the university premises can only be availed at specific hours and is nor environment friendly neither cost effective. Pakistan, a country which is already facing an irreparable economic crisis and a climate change disaster are a daunting reality. Hence, the survey results emphasize the dire need of a sustainable, environment friendly and cost-effective transportation system in the university, which will eventually generate revenue and cut the fuel cost.

KEYWORDS:

SUSTAINABILITY, TRANSPORTATION, ENVIRONMENT

ID 28: Development of Guidelines for Road Safety Education – A Way Forward Approach in Motorizing Countries

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ABSTRACT

As per the statistics of World Health Organization (WHO), every year, approximately 1.24 million fatalities are observed due to the traffic accidents. This is due to the increased number of vehicles in major cities, particularly due to the urban population. Traffic accidents, as an outcome of this phase is one of the serious problems, in densely populated cities which unfortunately has not been given proper consideration by decision makers. Hence, it is required to adopt a certain mechanism of road safety fulfilling the requirements of daily commuters. Road safety is basically the manmade problem hence its respective solutions should be manmade. The specific group in this context is in real need to critically synchronize the possible factors of road safety in line with the effectiveness of road safety education. Amongst number of cities of Pakistan, Karachi is exposed with significant number of road crashes. It is essential for the practitioners to brainstorm about the development of guidelines for road safety education as an initiation. The aim of the research is based on the focus on reduction of number of accidents in Karachi city. In order to achieve stated aim, this could only be possible with an intellectual way of road safety education featuring similar qualitative assessments. This research is a way forward to identify a model for the effective adoption of road safety education tool as an implicit requirement of Karachi. It may include strategic planning and improved guidelines for different phases of education.

KEYWORDS: ACCIDENTS, SAFETY, KARACHI, ROADS

ID 29: Comparative Analysis for Base Materials of Flexible Pavement through Standard Combinations of Aggregates and Lab Procedures

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ABSTRACT

Significant improvement in the construction of road infrastructures play a vital role for substantial growth in the economy of country. This factor is continuously taken into account by identifying the solutions within the context of flexible and rigid pavements. These types of pavements are presented with modifications in terms of their basic constituents which are aggregates, bitumen and concrete. Besides that, considerations for aggregates may be accumulated with different set of combinations ensuring the interlocking and durability between the layers. In addition to that, the results may also reveal with the suitability of effective aggregate material focusing incurred cost. This paper presents the standard lab investigations on combinations like 100% fresh aggregates, 50% fresh aggregates + 50% Reclaimed Asphalt Pavement (RAP) material and 100% RAP against flexible pavements. The lab procedures are deployed to recommend the selection of material on the basis of quality and cost constraints idealizing an example of 1km road section. The standards approached are ASTM and AASHTO guidelines while experimentations include sieve analysis, LOS Angeles abrasion test, aggregate impact value test, specific gravity, water absorption test and soundness test. The outcomes of the research are carried out using trends of aggregate materials by graphical illustrations. Similarly, due to the limited use of recycled materials in developing countries like Pakistan, the said research may be taken as reference work for stakeholders. Further, the area is interlinked with decent work/ economic growth and climate action amongst prescribed sustainable development goals.

KEYWORDS:

PAVEMENT, FLEXIBLE, COST, STRENGTH

ID 38: A Systematic Review on Congestion Pricing Solutions to Tackle the Urban Traffic Congestion

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ABSTRACT

Heavy traffic causes not only a loss of time but also an increase in local pollutants and carbon emissions. These emissions have been linked to environmental change, as well as local health effects such as asthma and cancer. This means that not only people in the driver's seat but also those who live near motorways or congested roads are tolerating the consequences of traffic. Congestion charges are a method of concurrently addressing these concerns that have proven to be beneficial in a number of cities throughout the world. Covering the vast literature from 1990s to 2022, this article primarily focuses on how the congestion charges came into existence in different forms and different regions, the acceptability among public, the evolution of solutions in the form of tolling and cordon pricing, the usage of different algorithms along with the technological instruments. The evolution and current practices in some of the most popular urbanized metropolitan areas of the world are also highlighted. In the end, article is concluding with a review of current situation of congestion pricing schemes in Pakistan.

KEYWORDS:

URBAN TRAFFIC CONGESTION, CONGESTION PRICING, ENVIRONMENTAL SUSTAINABILITY

ID 59: Effects of Waste Engine Oil and Crumb Rubber on Physical Properties of Bitumen

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ABSTRACT

Bitumen is widely used material in roads, exhibiting black color and sticky consistency and is known for its versatile use and thermoplastic nature. In recent years, predicting road life has been an arduous work due to increasing traffic, global warming, and ever-changing stresses on pavements. Meanwhile, a large amount of Waste Engine Oil (WEO) and vehicle tyres from a variety of automobiles is disposed of into the atmosphere as a hazardous waste. Relatedly, heavy metals and huge capital involved in sustainable treatment of these materials have been challenging. Therefore, this study aims to analyze modified bitumen using (WEO) in combination with waste Crumb Tyre Rubber (CTR), thus reducing bitumen use and making bitumen a sustainable material. During the characterization of modified bitumen, the following WEO concentrations were utilized: 3%, 5%, 7%, and 9%, as well as the following CTR concentrations were adopted: 5%, 7%, 9%, 12%, and 15%. The properties of modified and unmodified bitumen were compared. It was found that the blend of 5% CTR and 9% WEO exhibit the highest penetration value and lowest softening temperature of all the samples examined. As a result, this mixture can be used to reduce the excessive brittleness of bitumen to a greater extent. Moreover, after modification, the flash and fire point values have increased while the ductility and specific gravity values have decreased. In summary, the modified bitumen has shown promising results in terms of physical changes in bitumen.

KEYWORDS:

MODIFIED BITUMEN, CRUMB TYRE RUBBER, WASTE ENGINE OIL, PHYSICAL PROPERTIES, SUSTAINABILITY

ID 61: Empirical Analysis of Level of Service Based on Users Perception at Hyderabad Toll Plaza

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ABSTRACT

Sustainable development requires a well-developed public transportation system. The relationship between efficient transportation systems and urban sustainability has been demonstrated in a variety of studies. Level of service is one of the most important parameters that measures the operational performance of a transport system and ensures the smooth and safe movement of people and goods with minimum delay and discomfort. At the toll plazas, the traffic congestions occur due to multiple factors which results in slower operating speed, prolonged travel time and delay, thereby affecting the fuel consumption on road, as a consequence, leading the environment to further deterioration. Therefore, this research aimed to establish the level of service perceived by the users at Hyderabad toll plaza, located on M9, Pakistan, and to identify the factors for the improvement of level of service for smooth and sustainable traffic movement. For that, a questionnaire is designed and a total of 150 responses are collected. Specifically, the data is collected only from the car vehicle users. By carrying out the Importance-Satisfaction (IS) Analysis, Delay and Percentage of trucks and buses were found out to be the most important variables rated by the users. Furthermore, the ordered probit model results were developed and validated. It was found that there are a number of factors that govern the perceived level of service at the toll plaza.

KEYWORDS:

USERS PERCEPTION, LEVEL OF SERVICE, HYDERABAD TOLL PLAZA, ORDERED PROBIT MODEL

ID 109: An Expert System for Disputes Avoidance in Highways, Public Sector Projects of Pakistan Construction Industry

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ABSTRACT

Construction industry, "a term that includes activities associated with the construction of physical infrastructure and associated activities" plays a vital role in the economy of the country. The International Construction Industry (ICI) (14 April 2022) published a report, which estimated that global construction industry valued US$13.6 trillion last year and anticipated to reach US$15.2 trillion in 2022. The ICI also evaluated the major economic significance on Gross Domestic Profit (GDP) contribution 14.3% in 2021 and expected 14.8% at the end 2022. The contribution of ICI globally labor force is 7%. Its contribution in Pakistan labor force is almost 30% to 35%, participating directly or indirectly. This research is focused on identifying the issues and their root causes that are giving rise to disputes in Pakistan's construction industry road development projects. Expert System (ES) is a piece of intelligent computer software, employed in various technical fields nowadays. The purpose of this study was to create a framework for an expert system for suggesting appropriate and controllable actions to prevent disputes during road construction projects, founded by unstructured interviews and questionnaire survey from most experienced stakeholders. Therefore, the KBES aids in the avoidance of disputes in road construction projects. The created KBES will aid clients in proposing appropriate measures for controlling significant problems and their underlying causes that result in disputes.

KEYWORDS:

DISPUTES, HIGHWAY/ROAD PROJECTS, CONSTRUCTION INDUSTRY, AVOIDANCE STRATEGIES, CONTROLLING MEASURE, KNOWLEDGE BASED EXPERT SYSTEM

ID 111: USPCAS-W Initiative of Bicycle & Its Closure

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ABSTRACT

The ultimate goal of this study was to discover the main reason behind the discontinuation of the USPCAS-W bicycle project at Mehran UET in Jamshoro. To address this research question, a structured qualitative interview questionnaire based on the 9 components of the business model canvas was constructed. Purposive sampling technique was used to decide the sample size of two, as there were only two people associated with USPCAS-W initiative of bicycle. Data was gathered through a qualitative research technique, interviews. Thematic analysis was used to analysis the data and results were generated through atlas.ti. The results of the research indicate the main reason behind discontinuance of USPCAS-W Initiative of bicycle that was the lack of funds. Because of this very reason, they couldn't execute the program properly and decided to discontinue it.

KEYWORDS:

SUSTAINABILITY, TRANSPORTATION, SYSTEM FAILURE

Sustainable Urban Planning and Architecture

ID 25: Measuring the Covid-19 Impact on Urban Development Patterns Considering Spatial Modelling

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ABSTRACT

Cities are home to the majority of the world's population and are centers of economic growth and innovation. However, the high concentration of people and activities in cities makes them vulnerable to various stressors such as natural and man-made disasters. Pandemics have shaped the way cities are organized and designed. In the wake of the widespread, one-hand planet is being clean on the other hand, impacting livability within different urban development patterns globally. However, Hyderabad city, Pakistan is also experiencing the same challenges of Covid-19. This study aims to measure the impact of covid-19 on urban development models with regard to spatial modeling. Covid-19 cases and their impacts on different patterns of urban development were assessed as well as analyzed the causes behind the increase in covid-19 cases in different urban areas. GIS techniques were adopted to digitize existing urban development patterns and spatial data attributes were examined to highlight formal and informal urban settlements. Then, Covid-19 data of different peak time intervals (May-2021, August 2021, February – 2022, and January 2022) data were taken from the Sindh Government's Health departments to observe the number of cases in urban settlements. Various indicators also examined causes impacting different urban settlements. Results revealed that mostly Hyderabad city is laid on informal settlements whereas inhabitants of formal settlements are much aware of the recent Covid-19 pandemic therefore the maximum number of cases reported in planned urban development patterns.

KEYWORDS:

COVID-19; URBANIZATION; FORMAL AND INFORMAL SETTLEMENTS; GIS; SPATIAL MODELING

ID 44: Bio-Climatic Architecture for Rural Area of Hyderabad- A Sustainable Approach

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ABSTRACT

In the perspective of the developing requirement for energy utilization in Pakistan, the building construction sector consumes the largest amount of overall energy and destroys the ecosystem which can be reduced by using renewable energy resources. The proper adjustment of the architectural concepts to the climate is one of the basic characteristics of Bio-climatic architecture. Thus, it has a strong connection with nature. In this research, the rural area of Hyderabad, Sindh, has been selected as a case study of research. Hyderabad faces different problems such as energy crisis, solid waste management, non-availability of clean water and environmental deterioration. Design considerations for a bio-climatic house for agriculture-based people are studied in this research. The results suggest that renewable energy resources should be used to generate energy. In addition, passive design techniques and energy-efficient techniques should be used in the design. By adopting different architectural factors of bio-climatic buildings thermal comfort can be achieved in the house. This research encourages analyzing and taking benefit of environmental conditions around buildings to maintain perfect living conditions within the building through minimum consumption of energy.

KEYWORDS:

BIO-CLIMATIC ARCHITECTURE, RENEWABLE ENERGY & EMERGING TECHNOLOGIES, PASSIVE DESIGNS, ENERGY EFFICIENCY.

ID 52: Analytical Assessment of Urban Stress in Public and Cooperative Housing Schemes with Perspective on Neuro Urbanism: Case Studies of Johar Town and WAPDA Town, Lahore City, Pakistan

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ABSTRACT

Urbanization is accelerating at a meteoric pace around the globe. Over the last couple of decades, urban living has been evolving and going through several societal changes. Modern-day urban living and nurturing have conspicuously manifested stress and exposed them to several mental health-related problems. This research explores and compares the various factors leading to stress in two major planned housing schemes in Lahore; Johar Town & WAPDA Town. It focuses on figuring out the perception of stress among the residents of these areas. Various stress factors were identified by a comprehensive literature review and a structured questionnaire was designed to collect primary data. The data analysis finds that both the public and cooperative housing schemes, despite being planned and equipped with certain facilities, fail to contribute to healthy urban living. The findings suggest that major contributors to stress are related to travel patterns, insecure outdoor environments, traffic noise, and socioeconomic conditions of the residents. The study is unique in its scope and implementation as it emphasizes the need to pay special attention to this area of research and positively contribute to sustainable development goals (SDG) 11 and 16.

KEYWORDS:

URBAN STRESS, PLANNING, PEACE AND JUSTICE, SUSTAINABLE COMMUNITIES

ID 75: Measuring the Impact of Urbanization and Land Use Changes on Agricultural Land: A Case Study of Qasimabad Taluka, Hyderabad City

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ABSTRACT

The rapid urbanization is causing several environmental and climatic challenges around the globe including Pakistan. Many cities in Pakistan are facing adverse issues due to urbanization that needs proper identification and mitigation. By considering the condition of urban areas of Pakistan, this study has conducted to measure the land uses changes in Qasimabad Taluka of Hyderabad city, Pakistan during last twenty years and how much agriculture land is converted into built-up. The investigation included both subjective and quantitative methods. Arc GIS programming was used to develop subjective results, in which the managed order of the investigation territory's images was experienced. The results revealed that Hyderabad city is considered as regional hub for physio-socio-economic activities, therefore the people living in other areas of Sindh province tends to migrate to Qasimabad taluka, Hyderabad city to avail better life style, employment and education facilities. As a resultant, the agriculture land at the outskirts of Qasimabad is rapidly converting into built especially for housing purposes. This rapid transformation of land has detiorated urban climate and created hygienic problems due to the over-burden on civic amenities and mismanagement of land. The study suggests that the concerned authorities should take necessary action to stop this transformation land and save our environment.

KEYWORDS:

URBANIZATION; LAND USE CHANGES; ENVIRONMENTAL AND CLIMATE CHALLENGES, QASIMABAD TALUKA, GIS

ID 79: Urban Renewal of the Commercial Areas: A Case Study of Jhelum Cantonment

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ABSTRACT

The study primarily concentrates on the idea of urban renewal, a vital component of urban renewal, as well as the development and current state of commercial areas in the Jhelum cantonment area. Moreover, the research study identifies the cantonment acts and building byelaws, which have been studied to analyze the development trend in the commercial areas of the Jhelum Cantonment. The study's main objective is to enhance the built environment through the replacement of old or underutilized urban areas with new construction, the provision of adequate transportation and community amenities, the encouragement of building rehabilitation and preservation, and the enhancement of nearby sites of architectural, cultural, or historical interest. To gather the data for this study, a mixed methodology was used, and in-depth land use surveys, on-site observations, and stakeholder interviews were all conducted. AutoCAD and ArcGIS applications were used to evaluate the data that was gathered. The findings demonstrated that the Cantonment was thoughtfully designed in a gridiron layout to meet all the needs of the local civilian population as well as the military. In contrast to the disorganized and unhygienic native commercial areas, an area known as Kazim Kamal Road and Sarwar Roads was set aside for the Pakistani traders. This was deemed vital for meeting the locals' everyday needs in an organized manner. Ironically, Kazim Kamal Road and Sarwar Road, which were supposed to be well-organized shopping centers, are today jam-packed and disorganized.

KEYWORDS:

URBAN RENEWAL, COMMERCIAL AREA, JHELUM CANTONMENT, MIXED METHODOLOGY, AUTOCAD, ArcGIS

ID 118: Window Views in Urban Setting: Impact on Apartment Dwellers in Hyderabad

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ABSTRACT

Pakistan has the highest rate of urbanization among South Asian countries. Apartment buildings have been recognized as a characteristic type of urban housing due to the increasing intensity of land use in urban areas. In Hyderabad, one of the neglected aspects of urban living is the neglect of window design, orientation, and view through the window in apartment buildings. Windows are the primary means of communication between the inside and outside of the building. This paper highlights the significance of window views in urban setting. Furthermore, the purpose of this research is to investigate the impact of window views on apartment dwellers in Hyderabad. A case study was conducted on an apartment in Qasimabad, along with a questionnaire survey based on the residents' preferences for windows views and how the existing setting affects their emotions. After analyzing literature, conducting a case study, and completing a survey questionnaire, results suggest that window views promote pleasant emotions, productivity, health, and well-being.

KEYWORDS:

URBAN DWELLING, WINDOW VIEWS, URBANIZATION, VISUAL COMFORT, WELL-BEING AND BUILDING ORIENTATION.

ID 125: Quantification of the Non-Biodegradable Waste Through Empirical Model

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ABSTRACT

The Forecasting of the quantity of non-biodegradable waste is foremost for the actual management of solid waste. The modelling is practical for the prediction of Municipal solid waste. In this study, a developed model formed the relationship between household waste generation rate and socioeconomic factors such as income, family members, kids, restaurant visits per month and gardens. Multiple linear regression is practicable in this study for the prediction of non-biodegradable waste. The result of the model showed that the coefficient of determination (R2) is 0.743 and the accuracy of the model showed that predicated value is very close to the observed values.

KEYWORDS: NON-BIODEGRADABLE, SOCIO-ECONOMIC FACTORS, MULTIPLE LINEAR REGRESSION, COEFFICIENT OF DETERMINATION

ID 126: Development of the Model to Estimate the Biodegradable Solid Waste Generation Rate

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ABSTRACT

As we know the population increases day by day, so the generation of the solid waste is also increases. It deteriorates the media of the environment such as land, air and water so in order to reduce the effects of solid waste. The efficient way of municipal solid waste is a difficult process. For the proper handling of solid waste, it depends on the accurate estimation of the generation rate of municipal solid waste. The prediction of generation rate of solid waste effective management is needed. Due to insufficient of data different models are used for prediction the generation rate of solid waste different independent variables selected in the prediction models such as: occupation, income of family members, household size and education Previously many researchers using different modeling methods for identify the generation rate of solid waste. In the prediction of model's regression analysis were used for due to its well-developed theory and simple algorithm. The prediction of municipal solid waste management depends on many factors. The results showed that the total generation of municipal solid waste depends on total population while the chemical and physical components of Municipal solid waste depend upon a various factor such as living standards, commercial activities, food, seasonal variations, habits.

KEYWORDS: BIODEGRADABLE SOLID WASTE, MUNICIPAL SOLID WASTE, INDEPENDENT VARIABLES

ID 127: Barriers towards the Adoption of E-Procurement in Construction Industry of Sindh Pakistan

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ABSTRACT

The E-Procurement or Electronic Procurement is a method by which goods and services can be ordered and delivered with the help of internet by using different electronic means. As with any other technology, there are many techniques and strategies that are used to realize a smooth and efficient use of E-Procurement. As process gets more complex and enters in national and international stage, it manifests different barriers towards its adoption. The study is carried out to determine E-Procurement Barriers in Public Sector Construction Organizations throughout Sindh Pakistan. The Study shows that barriers that hinder adoption of E-Procurement of Public sector Construction Industry of Sindh Pakistan differs from barriers faced by developed and technologically adapt countries around the world.

KEYWORDS:

E-PROCUREMENT, ENTERPRISE RESOURCE PLANNING SYSTEM (ERP), SMALL AND MEDIUM ENTERPRISES (SEMS)

ID 17: Sustainable Solution for Uplifting of Local Markets of Hyderabad

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ABSTRACT

Sewerage systems in urban area is an important priority because of rapid urbanization, industrialization, and population growth. Since, along with increase in population, underdeveloped countries face the problem regarding sewerage, solid waste management and food waste management consequently. The study focuses the area of Latifabad unit # 12, Hyderabad, which faces said three problems due to its commercial and residential capabilities, encroachments, illegal infrastructures, poor planning of illegal market are other issues. In this regard, the presence of efficient drainage and sewerage system, anti-encroachments and legal development is major factor in shaping the socio-economic structure of any city. The research aims to list down the problems along with the applicable solutions that will not only solve the respective issues but also uplift the socio-economic condition of residents. The qualitative data is analyzed by using, NVIVO, while SPSS is used for quantitative data analysis. The results suggests that the local markets of Hyderabad must be converted into self-sufficient in term of generating their power and some financial aspects, through waste management plan, solar panels, proper planned markets, reshaping them through scrap.

KEYWORDS:

WASTE MANAGEMENT, FOOD WASTE, DRAINAGE, SEWERAGE

ID 85: Structural Design of RCC Building Using Integrated BIM-Based Design Workflow and Analysis Result Comparison Between ETABS and RSAP

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ABSTRACT

Rapid computerization in the construction industry stressed the need for a new design methodology that was only possible through BIM. This study aims to develop an integrated design flow using the Autodesk system followed by structural design through the developed flow. Further, the study also aims at identifying and resolving clashes between architectural and structural models and incorporating analysis results comparison of Robot Structural Analysis Professional (BIM integrated software) and ETABS (conventional process software). The design was carried for gravity loads with 1.2DL+1.6LL combination. The architectural and primary structural models were created in Autodesk Revit, and the structural model created in Revit was then exported to Robot Structural Analysis Professional (RSAP) for structural design, which was then updated back in Revit. Finally, both architectural and structural models were exported to Navisworks for clash detections between the two. The results of the study revealed that BIM design flow provided better coordination between involved stakeholders, speedy clash detection, and resolved bi-directional interoperability issues using an extension (structural analysis toolkit). Additionally, design through BIM provided better visualization i.e., both 2D and 3D and final documentation in the shape of structural detailing of designed elements. Furthermore, Navisworks successfully identified coordinates and element clashes between architectural and structural models and provided a virtual 3D representation of the facility before the construction phase. The analysis results of RSAP and ETABS revealed that RSAP gives higher analysis results than ETABS due to the different analysis procedures of the two software packages.

KEYWORDS:

BUILDING INFORMATION MODELLING (BIM), ROBOT STRUCTURAL ANALYSIS PROFESSIONAL (RSAP), CLASH DETECTION, INTEROPERABILITY ISSUES, PARAMETRIC MODEL.

ID 128: An Empirical Study on the Cost of Collection of The MSW - A Case Study of Hyderabad

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ABSTRACT

Municipal solid waste (MSW) collection and transport are important operations in the MSW management system. Up to 70% of the MSW system costs are of these operations. This paper estimates the cost of collection of municipal solid waste in seven residential colonies of Hyderabad. The empirical analysis is based on the input data conducted through a survey, which are independent variables that affect the cost of collection. The cost of collection is separated into two costs i.e. the initial cost of collection and the operating cost of collection. Which gives two dependent variables i.e. Y1 and Y2, variables affecting the initial cost of collection of MSW are analyzed, such as the number of vehicles, hand trolleys, bins, houses, and collection points and operating costs of the collection of MSW are analyzed, such as waste generation rate, whole trip distance, frequency of collection, No: of workers, fuel and maintenance cost, and collection service charges. Through regression analysis, the coefficient of determination R^2 is estimated using excel, the R^2 for the initial cost of collection (ICOC) i.e. Y1 is $R^2 = 0.96$, and the operating cost of collection (OCOC) i.e. Y2 is $R^2 = 0.99$.

KEYWORDS:

MUNICIPAL SOLID WASTE MANAGEMENT, COST OF COLLECTION, HYDERABAD CITY, INITIAL COST OF COLLECTION, AND OPERATIONAL COST OF COLLECTION

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