11TH International Conference on Development and Investment in Infrastructure (DII 2025)

BOOK OF ABSTRACTS

BUILDING INFRASTRUCTURE BETTER: DIGITALISATION, DECARBONISATION AND DECENTRALISATION

6th-8th August 2025 - Johari Rotana Hotel, Dar es Salaam, Tanzania

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FOREWORD

On behalf of the Organising Committee, I warmly welcome you to the 11th International Conference on Development and Investment in Infrastructure (DII-2025), held from 6th to 8th August 2025 at the Johari Rotana Hotel in Dar es Salaam, Tanzania. This year's conference continues the tradition of the DII Conference series in providing a critical international platform for academics, industry leaders, policymakers, and practitioners to deliberate on the most pressing issues shaping infrastructure delivery in developing economies.

The 2025 theme, "Building Infrastructure Better: Digitalisation, Decarbonisation and Decentralisation", underscores the urgent need to reimagine how infrastructure is conceived, financed, delivered, and sustained in the face of climate imperatives, technological disruption, and increasing demands for equitable access. These three pillars, digitalisation, decarbonisation, and decentralisation, are not only critical levers for transforming infrastructure systems but also essential drivers for achieving sustainable, resilient, and inclusive development.

The conference brings together a diverse set of papers and discussions addressing key areas, including:

- Digitalisation, Smart Technologies and Sustainable Infrastructure
- Circular Economy and Waste Management
- Quality, Resilient and Inclusive Urban Systems
- Gender Equity, Social Justice, and Governance in Construction
- Renewable Energy and Decarbonisation Strategies
- Building Information Modelling (BIM), Digital Twins, and Mixed Reality Applications
- Climate Change, Shock Events and Infrastructure Adaptation

Our sincere appreciation goes to all authors whose contributions have enriched this conference. Each paper has undergone a rigorous two-tier peer-review process, and we acknowledge the invaluable voluntary service of the Scientific and Technical Review Committees in maintaining the highest academic and professional standards.

We also extend our gratitude to our keynote speakers, session chairs, local organising committee and delegates joining us from across continents. Your participation ensures that DII-2025 remains a dynamic forum for advancing knowledge, fostering collaboration, and influencing policy and practice in infrastructure development. As we engage in dialogue over the next three days, may this conference not only stimulate robust academic exchange but also catalyse actionable strategies for building infrastructure better for future generations.

Prof. Innocent Musonda
For/DII-2025

ACKNOWLEDGEMENT

The Organising Committee of DII-2025 extends its deepest gratitude to Ardhi University (ARU), Dar es Salaam, Tanzania, for graciously hosting this year's conference and for the exceptional support provided through the Local Organising Committee, chaired by Dr. Rehema Monko, in ensuring a successful event. We sincerely appreciate the University of Johannesburg, South Africa, and our partner institutions under the EU-funded ASIM programme including Malawi University of Business and Applied Sciences (MUBAS), Malawi, Covenant University (CU), Nigeria, as well as other South African, African, and international universities and institutions for their valued contributions and continued support of the DII Conference series.

Special thanks go to the International Advisory and Scientific Committees, whose dedicated efforts in reviewing, refereeing, and editing papers have ensured the quality of these proceedings and enabled compliance with the requirements for subsidy by the South African Department of Higher Education and Training (DHET). We are equally grateful to all our keynote speakers, industry facilitators, authors, poster presenters, reviewers, session chairs, and members of the Organising and Scientific Committees. Your invaluable contributions have enriched the quality of discussions, knowledge exchange, and overall success of DII-2025.

DISCLAIMER

Every effort has been made to ensure the accuracy of the information contained in these proceedings. However, the publishers and editors make no representation, either express or implied, regarding the completeness or reliability of the content and accept no legal responsibility or liability for any errors or omissions that may appear in individual articles or contributions.

DECLARATION

All the papers in these conference proceedings were double-blind peer-reviewed at the abstract and full paper stage by the members of the International Review Committee. The process entailed a detailed review of the abstracts and full papers, reporting comments to authors, modification of articles by authors whose papers were not rejected, and re-evaluation of the revised articles to ensure the quality of content.

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SCIENTIFIC AND TECHNICAL REVIEW COMMITTEE

This committee ensured that the final papers incorporated the reviewers' comments, were correctly allocated to the appropriate theme and met the requirements set by the organisers in line with international standards for inclusion in the proceedings. They also arranged the papers into their final sequence, as the table of contents captured. The committee ensured that the papers were of the highest standard regarding the originality of material, academic rigour, contribution to knowledge, critical current literature review, research methodology and robustness of findings, empirical research findings and overall quality and suitability for inclusion in the conference proceedings.

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THE PANEL OF SCIENTIFIC REVIEWERS

The panel of scientific reviewers comprised experts from the built environment who ensured the originality of material, academic rigour, contribution to knowledge, critical current literature review, research methodology and robustness of findings, empirical research findings, and overall quality and suitability for inclusion in the conference proceedings.

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THE PEER-REVIEW PROCESS

The need for high-quality conference proceedings, evident in the accepted and published papers, entailed a rigorous two-stage blind peer review process by no less than two acknowledged experts in the subject area. Experts, including industry professionals and academics, were assigned to ensure that high standards of scientific papers were produced and included in the proceedings.

The first stage of the review
Submitted abstracts were twice blind reviewed. Each abstract was examined to ensure relevance to the conference theme and objectives, academic rigour, contribution to knowledge, originality of material and research methodology. Authors whose abstracts were accepted were provided with anonymous reviewers' comments and requested to develop and submit their full papers, considering the abstract review comments.

The second stage of the review
Reviewers were assigned the submitted full papers according to their expertise. The full papers were reviewed to ensure relevance to the conference theme and objectives, originality of material, academic rigour, contribution to knowledge, critical literature review, research methodology, robustness of analysis of findings, empirical research findings, overall quality and suitability for inclusion in the conference proceedings.

Third stage review
Authors whose papers were accepted after the second review were provided with additional anonymous reviewers' comments on evaluation forms and requested to submit their revised full papers. Evidence was required relative to specific actions taken by the authors regarding the referees' suggestions. After satisfactory evidence was provided, final papers were only accepted and included in the proceedings.
To be eligible for inclusion, these papers were required to receive a unanimous endorsement by all the reviewers that the paper had met all the conditions for publication. Of 114submissions, 71 papers were finally accepted and included in the DII-2025 conference proceedings. The review process was managed on the Oxford abstract system.

At no stage was any member of the Scientific Review Panel, the Organising Committee, or the editors of the proceedings involved in the review process related to their own authored or co-authored papers. The role of the editors and the scientific committee was to ensure that the final papers incorporated the reviewers' comments and to arrange the papers into the final sequence as captured in the Proceedings.

Regards
Prof. Innocent Musonda
Chair: Scientific Programme

PEER REVIEW PROCESS (PRP) CONFIRMATION

On behalf of the DII-2025 International Conference on Infrastructure Development and Investment Strategies for Africa, I confirm that the manuscripts accepted for oral presentation and publication in the Conference proceedings were blind peer-reviewed by two (2) or more technical specialists.

The reviewers were selected from the experts in the Scientific and Technical Review Committee. To be eligible for inclusion, the papers, reviewed through a three-stage review process (abstract, full paper and final paper), received unanimous endorsement by all the reviewers that they had met all the conditions for publication. All accepted manuscripts will be published via the conference proceedings.

Regards,

Rev. Dr. Nana-Addy, Edward
Building Technology Department
Sunyani Technical University

This is to certify that all manuscripts accepted for oral presentation and inclusion in the DII-2024 International Conference on Infrastructure Development and Investment Strategies for Africa Proceedings underwent a rigorous blind peer-review process conducted by no fewer than two (2) independent technical specialists. The reviewers were appointed from the Scientific and Technical Review Committee, comprising experts in the relevant subject areas. Each submission was evaluated through a three-phase review process, which included assessment of the abstract, full draft, and final manuscript. Only those papers that received unanimous approval from all reviewers, confirming that they met the required academic and technical standards, were approved for presentation and publication.

All accepted manuscripts will be published in the official Conference Proceedings.

Regards,

Dr Nana Zenkosi Dumile Mhlongo

University of Johannesburg

KEYNOTE ADDRESSES ABSTRACTS

Eng. Bernard Kavishe- *Green Infrastructure: Designing Resilient Cities for a Sustainable Future*

This keynote addresses the urgent imperative for transformative urban strategies, arguing that the escalating climate crisis, particularly its manifestations in urban centres, is a direct consequence of human design and development choices, and thus, profoundly avoidable. It advocates for a fundamental shift in our strategic approach to urban planning and infrastructure. The presentation highlights two critical and escalating urban challenges: urban heating, driven by the Urban Heat Island (UHI) effect, which makes cities significantly hotter and impacts health and energy systems; and pervasive urban flooding, resulting from traditional drainage systems' failure to cope with intense rainfall. The core solution lies in embracing Green Infrastructure, a critical system for urban resilience, regeneration, and equity by integrating natural processes into the built environment. This paradigm champions Urban Cooling through strategies like extensive urban tree planting and greening programs that provide shade and cool air via evapotranspiration, alongside the implementation of green roofs for insulation and stormwater management, and cool surfaces (roofs and pavements) to minimise heat absorption. It also emphasises Sustainable Drainage Systems (SuDS), which manage stormwater by mimicking natural hydrological processes through permeable pavements, swales, rain gardens, and rainwater harvesting, thereby mitigating flood impacts. Ultimately, the speech underscores that these green infrastructure solutions must be integrated across all urban planning sectors, fostering cross-institutional collaboration and robust citizen involvement, as investments in nature-based solutions yield significant economic and environmental returns. The keynote concludes with a powerful call to action for cities, particularly rapidly developing ones, to embed nature as essential infrastructure, ensuring a resilient, livable, and sustainable future for all their citizens.

QS. Samuel N. Marwa- *Unlocking Africa's Infrastructure Potential: A Contractor's Perspective on Enabling Growth, Investment, and Local Empowerment*

Africa stands at a defining juncture in its development trajectory, with infrastructure development playing a critical role in unlocking economic growth and regional integration. This keynote address reflects on the current state of infrastructure across the continent from a contractor's perspective, highlighting investment gaps, challenges, and actionable strategies to fast-track development.

The presentation will explore the urgent need for innovative technologies—such as Building Information Modelling (BIM)—which offer cost savings and efficiency, as well as the necessity for curriculum reforms in education to align with modern industry demands. Drawing inspiration from countries like the UK, Malaysia, and South Korea, the address will call for the adoption of enabling legal frameworks such as payment legislation and digital procurement systems to enhance industry reliability and reduce risks.

Special focus will be placed on Tanzania's evolving procurement environment, including progress made through digital platforms like NeST, and the persistent challenges local contractors face in accessing high-value projects. With 98% of contractors locally registered but executing less than 40% of the total project value, the speech will advocate for policy reforms, local contractor development funds, and fairer procurement conditions to ensure equitable participation.

This address aims to provoke thought, encourage strategic partnerships, and inspire renewed commitment among stakeholders—governments, financiers, professionals, and contractors—to invest not just in infrastructure, but in the people and systems that deliver it.

Prof. Geraldine J. Kikwasi- *Construction Cost Management: The Tale of Triple Constraints*

Construction cost is the forethought of any individual who invests in a constructed facility, be it a building, bridge, road or an airport. Once the cost is estimated and the budget is established, the cost management function starts. This paper provides a review of construction cost management, exploring the entire process from cost planning and setting cost targets to cost control, while also emphasising the integration of time

and quality management. It examines common challenges such as inaccurate initial cost estimate, scope creep, inflation and fluctuation in material prices, lack of technological integration and poor risk management. The paper also highlights current industry trends, including the use of Building Information Modelling (BIM), AI-driven analytics, modular construction, and life-cycle costing. Based on the review, some actionable recommendations are advocated for realisation of successful cost management mainly: implement parametric and data-driven estimating tools, invest in historical cost databases, define a clear project scope and freeze design at an appropriate stage before tendering, incorporate price adjustment clauses in contracts for long-duration projects, embrace digital transformation and conduct comprehensive risk assessments.

ABSTRACTS

THEME 1: SMART INFRASTRUCTURE AND CITIES

DII-2025-214

Bridging Urban Inequality Through Resilient Infrastructure Development: The Role of Digitalisation in Tembisa's Water Systems

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Abstract

Most cities in the Global South faced segregative developments during separatist and colonial periods, making it difficult for democratic governments to bridge disparities. This is evident in South African townships like Tembisa, where longstanding socioeconomic inequalities are worsened by inadequate infrastructure. Water infrastructure requires modernisation to ensure fair access and sustainable service provision. Despite efforts to improve water supply since democratisation, minimal research has assessed the impact of these interventions. This paper examines the role of digitalisation in strengthening Tembisa's water infrastructure resilience. Using a qualitative case study approach, it explores digital tools like smart metering and real-time monitoring to address water management challenges. In-depth interviews with municipal officials and community representatives reveal that while digital solutions improve efficiency and accountability, challenges like affordability, digital literacy, and governance persist. The study concludes by recommending upgrades to ageing water systems, including pipelines and treatment facilities, to improve efficiency.

Keywords: Digitalisation, Water systems, Inequality, Resilience, Decentralised Water Management

DII-2025-221

Digitalisation in Quantity Surveying: Insights and Barriers from Namibian QS Consultants

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[4]University of Johannesburg, Johannesburg, South Africa.

Abstract

With the proliferation of digitalisation worldwide, which is increasingly making traditional approaches redundant, the study explored the adoption level and barriers to digitalisation among Namibian quantity surveyors (QS). Using a cross-sectional survey design and census sampling technique, data was collected from thirty-three (33) registered QS firms in Windhoek. Self-administered structured survey questionnaires were delivered to the respondents physically and via email. Through frequency measure and mean score computations, the results revealed that digital tools like WinQS, DimX, Microsoft Project and Microsoft Excel are highly adopted by Namibian QSs. However, emerging technologies like BIM, Candy, PlanSwift and Kreo are moderately to rarely adopted. Major barriers to digitalisation among QSs include financial-related constraints, technological ineptness and organisational resistance. Therefore, the study recommends that QSs and relevant stakeholders invest in existing and emerging digital tools and technological training to meet the ever-changing clients' demands in the current digital era.

Keywords: Digitalisation, Technology adoption, Digital tools, Barriers, Quantity Surveying Services

DII-2025-269

Barriers to the Adoption of Health and Safety Smart Technologies in Construction Projects in Tanzania

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Abstract

Smart technologies, including IoT sensors, wearable safety devices, drones, and AI-driven monitoring, ensure real-time hazard detection, faster responses, and predictive risk management in construction projects. However, in Tanzania, local contractors struggle to adopt them because of Tanzania's works procurement environment and related costs. This study aims to assess the barriers to adopting health and safety (H&S) smart technologies in construction projects. Complementing similar works from Kenya and South Africa, this paper focuses on the local context involving large contractors not previously been explored. Through a survey, 52 responses were obtained from Class 1 and Class 2 contractors. Descriptive statistics and the Analytic Hierarchy Process were used to analyse collected data. The top four barriers that emerged are: high cost of installation, operational complexity, workforce resistance, and maintenance costs. The paper provides actionable recommendations to address these barriers through pilot programs with supplier training for contractors, tax credits for policymakers, and tiered maintenance and local support from technology providers.

Keywords: Analytic Hierarchy Process (AHP), Barriers to innovation, Construction Health and Safety, Technology adoption, Tanzania

THEME 2: INFRASTRUCTURE INVESTMENT – TRENDS AND FORECASTS

DII-2025-236

Cost-effective Solutions for Large Web Openings in Cold-formed Steel Joists

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Abstract

Floor joists of cold-formed steel (CFS) structures utilise large web openings to keep the floor height to a minimum. A cost-effective solution to restore capacity is to affix reinforcements around the openings. Twenty-three laterally braced simply supported CFS joists were subjected to uniformly distributed loads until failure. Program considered solid sections, circular and square web openings (65% of web depth) and sections with reinforced web openings. The reduction in the flexural capacity is < 15%. Twenty-seven joist sections were subjected to shear tests to establish the shear capacities of sections having a large opening and reinforced opening. The reduction in the shear capacity was as high as 60%. Vierendeel-type reinforcement system restores the original shear capacity. Recommended prescriptive solutions are, provide flexural reinforcements for openings in the mid 40% region of a joist and provide shear reinforcements for openings in regions outside the mid 40% region (defined as "Shear Zone").

Keywords: Cold-formed Steel Joists, Large Web Openings, Reinforcements, Experimental, Construction Guidelines

DII-2025-243

Examining Stakeholders' Perspectives on Construction Project Auditing in Ghana

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Abstract

This study examines stakeholders' perceptions of construction project auditing in Ghana, focusing on its role in promoting accountability, transparency, and value for money in infrastructure delivery. The purpose is to explore how stakeholders, contractors, consultants, auditors, and government officials view the effectiveness and implementation of project audits. A mixed-methods research approach, combining surveys and semi-structured interviews, was employed to gather data from industry actors across in Greater Accra Region. The findings reveal a general appreciation for the audit process, although concerns persist regarding audit independence, delayed interventions, and limited enforcement of recommendations. The study concludes that while stakeholders recognise the importance of project auditing, systemic challenges hinder its full potential. Recommendations include capacity-building for audit teams, integrating digital monitoring tools, and implementing policy reforms to enforce audit outcomes. The originality of this research lies in its stakeholder-centred approach, which provides a nuanced understanding of construction project auditing within the Ghanaian context.

Keywords: Examine, Stakeholders, Perspective, Construction Projects Auditing, Ghana

DII-2025-251

An Assessment of Finance Models for Sustainable Construction Projects in Tanzania: A Review of Literature

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Abstract

This study explores financial models for sustainable construction in Tanzania by examining relevant literature and insights from South Africa, Kenya, Rwanda, Morocco, and Egypt. Tanzania faces challenges in mobilising green finance due to institutional gaps, limited private sector involvement, and regulatory inefficiencies. Through a review of 45 scholarly and policy sources, key financing mechanisms are identified, including public funding, private investment, public-private partnerships, donor funding, and community-based finance. Successful models from other countries include South Africa's green bonds, Kenya's blended finance, Rwanda's centralised Green Fund, Morocco's climate-aligned construction, and Egypt's policy reforms with sovereign green bonds. The study recommends that Tanzania implement a hybrid finance model supported by a centralised green finance facility to improve coordination, attract private capital, mitigate risks, and enhance inclusivity, ultimately fostering sustainable construction and long-term environmental and economic benefits.

Keywords: Finance Models, Sustainable Construction, Sustainable Finance, Tanzania, Public-Private Partnerships

DII-2025-260

Building Cemetery Infrastructure Better through Digitalisation and Decentralisation

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Abstract

South Africa faces a critical shortage of burial space due to rapid urbanisation and cultural resistance to alternative burial practices. This paper explores how digitalisation and decentralisation can improve cemetery management to promote resilience and sustainability. A narrative literature review examines the historical development of cemeteries, societal values, land use conflicts, and record-keeping challenges. The review synthesises academic literature and regional case studies, highlighting the potential of Geographic Information Systems (GIS) and geo-tagging to enhance planning efficiency. Decentralisation is proposed to improve community access and cultural sensitivity. Findings suggest integrating digital tools with stakeholder engagement can address burial space shortages while respecting African traditions. Practical recommendations include policy frameworks and capacity building for municipalities. The paper contributes to urban planning by offering context-specific solutions for sustainable cemetery infrastructure in the Global South.

Keywords: Cemeteries, Urban planning, GIS, Sustainable burial practices, Infrastructure development

DII-2025-262

Barriers to Green Building Costing Competence Adoption in Cost Management Practices by Quantity Surveyors in Zimbabwe

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[3]University of Johannesburg, South Africa

Abstract

Green building adoption in Zimbabwe remains low despite its prominence globally. The study sought to determine the factors that impede the adoption of green building costing competence in cost management practices by quantity surveyors (QSs) in Zimbabwe. Through a cross-sectional survey research design, data was collected from 132 randomly selected QSs working for contracting and consulting firms in Zimbabwe using a structured questionnaire. A response rate of 53% was achieved for the study. Based on one sample test and Cramer's Value calculations, the results revealed the inadequate cost database, limited exposure to green costing practice and lack of proficiency in advanced information and technology related to green building costing as the major impediments to green building costing competence adoption among QSs in Zimbabwe. The study therefore recommends that quantity surveyors undertake training courses on green costing to enhance sustainable building projects in Zimbabwe and similar contexts.

Keywords: Barriers, Green building, Costing competence, Sustainable buildings, Quantity surveyors

DII-2025-263

Integrating Smart Water Management Technologies in Urban Infrastructure: Addressing the Water Crisis in Zimbabwean Cities. A Case of Bulawayo

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Abstract

Water supply crisis and inefficient water management are persistent challenges in most developing countries. This study examines the feasibility of integrating smart water management technologies into Bulawayo's urban infrastructure to enhance efficiency, resilience, and sustainability. Employing a mixed-method approach, data was collected through surveys and interviews with 35 officials from the Department of Water Engineering, the Zimbabwe National Water Authority (ZINWA), and other key stakeholders. Mean score analysis provided insights into stakeholder perceptions, while thematic analysis identified key trends and challenges. The findings reveal that, beyond the El Nino-induced drought, the city's water crisis is exacerbated by ageing infrastructure, illegal gold mining, and inefficient management practices. The study recommends the adoption of smart water management practices and technologies such as IoT-enabled sensors, automated systems, and data analytics. These innovations facilitate real-time monitoring, leak detection, optimised water usage, and effective resource allocation, ultimately enhancing water distribution and minimising wastage.

Keywords: Smart water management, Urban Infrastructure, Sustainability, Stakeholder Perceptions, Digital Technologies

DII-2025-265

The Impact of Industrial 4.0 Technologies on Construction Project Cost Management in Zimbabwe

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Abstract

Although technology has transformed the construction industry worldwide, its impact in the Zimbabwean context remains unknown. The study explored the impact of Industry 4.0 technologies on cost management in Zimbabwe's construction sector. Using a quantitative approach, questionnaires were administered to 244 contracting firms. Data was analysed using mean score computations. The findings indicate a moderate level of adoption of Industry 4.0 technologies in Zimbabwe, as shown by the indicators compiled from literature that measure adoption, reflecting growing awareness but limited implementation. Results also show that I4.0 technologies have the potential to improve cost estimation, risk management, and decision-making processes. The study recommends the need for the government to strengthen infrastructure to increase the uptake of I4.0 technologies. Study is instrumental to governments, contractors and clients to knowingly engage in ways that promote I4.0 technologies. Study findings may not apply to all contexts without careful consideration.

Keywords: Industry 4.0, Technologies, Construction Project, Cost Management, Zimbabwe

DII-2025-276

Indigenous Investment Practices and Community-based Models in the Minibus Industry Sector

R. C. Kalaoane & T. Gumbo
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Abstract

Minibus taxis are vital transportation options in African cities, despite their often unregulated and chaotic operational systems. Interestingly, the very communities that mainstream financial institutions aim to support remain marginalised across Africa, even after decades of transport infrastructure investments. This paper explores the shortcomings of current financial models in reaching these marginalised groups and examines the effects of disrupting informal structures and indigenous knowledge systems that have long sustained livelihoods for many Africans. Data were collected from taxi association organisations, complemented by policy document review, case studies, and direct observations, and analysed through thematic methods. The results show that formalisation can disempower minibus operators by enforcing strict regulations, interfering with traditional investment practices, and escalating violence and corruption. The study underscores the tension between government-led modernisation claims and grassroots transport needs, noting that traditional systems have demonstrated greater innovation and flexibility in adapting to the changing landscape of transportation investments.

Keywords: Indigenous Knowledge Systems, Formalisation, Policy, Minibus Taxi, Investment

DII-2025-278

Influencing Travel Behaviour through Educational Interventions for Sustainable Urban Mobility

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Abstract

Educational campaigns aimed at influencing travel behaviour are essential for raising awareness of sustainable mobility options and, ultimately, decreasing dependence on private motor vehicles. This is especially true in many African cities where, despite the negative impacts, car ownership is more widely used and socially acceptable than public transportation. In order to encourage sustainable mobility, this study investigates low-cost behavioural interventions drawing on documented best practices from Tanzania, Colombia & Charlotte as case studies. The results demonstrate how targeted educational activities can catalyse behavioural change, supporting a broader move towards sustainable transport systems. Based on the findings, there is a need for a novel nudge-based paradigm for mobility education in African contexts. By illustrating how behavioural techniques enhance structural investments in transport planning, the research advances the field of infrastructure sustainability, providing an empirically grounded alternative to dominant policy paradigms.

Keywords: Travel behaviour, Education Campaigns, Perceptions, Sustainable Transport, Nudge Theory

THEME 3: SUSTAINABILITY IN INFRASTRUCTURE DEVELOPMENT

DII-2025-232

Stakeholder Synergies for Environmental Sustainability in Ghana's Real Estate Sector: A Qualitative Perspective

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Abstract

This study investigates how stakeholder collaboration fosters environmental sustainability within Ghana's real estate sector. It explores the roles and interactions of property managers, financial institutions, legal agents, district assemblies, and land stakeholders through ten in-depth interviews. Findings show that sustainability outcomes are strengthened by synergistic stakeholder interactions—e.g., financing aligned with enforceable contracts and operational tenant engagement. However, institutional tensions, capacity gaps, and misaligned incentives hinder progress. The study introduces a stakeholder synergy model grounded in stakeholder theory, socio-technical transitions, and environmental governance. A stakeholder-outcome matrix links actor roles to measurable environmental metrics. This integrated framework addresses a key gap in the literature on multi-actor governance in developing contexts and offers practical planning tools to support sustainable real estate policy and practice. The study advances theoretical understanding by emphasising power asymmetries and institutional interdependencies as central to sustainability delivery in emerging economies.

Keywords: Environmental Sustainability, Ghana, Real Estate Sector, Stakeholder Synergies, Qualitative Research

DII-2025-233

Challenges of Integrating Climate-Resilient Buildings into the existing Spatial Planning in Blantyre City, Malawi

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Abstract

The study explores the challenges of incorporating climate-resilient buildings in urban settings to mitigate the effects of natural disasters like cyclones. The study adopted qualitative methods, using face-to-face interviews to solicit information from 8 key stakeholders, who are government officials involved in managing Blantyre City. Data from the interviews were analysed using thematic content analysis to identify themes from the participants' narrations. The results indicate that issues such as lack of funding and resources, inadequate technical expertise, poor agencies' coordination, lack of effective land use management, weak enforcement of building regulations, and insufficient drainage systems further inhibit the Blantyre City managers' ability to make the existing infrastructure resilient to withstand natural disasters. The study gives insight into the factors inhibiting Blantyre City's ability to make its building infrastructure resilient to climate-related effects. This study is also the maiden post-Cyclone Freddy that caused devastation in Malawi, guiding future studies on this subject.

Keywords: Blantyre City, Climate-resilient Buildings, Cyclone Freddy, Infrastructure Challenges, Spatial Planning

DII-2025-244

BIM-Enabled Sustainability Analysis of Kinetic Façade Systems: A Case Study of Lusail Plaza Tower

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Abstract

Façade systems play a critical role in the thermal performance as well as energy use in buildings. This study investigates BIM-integrated kinetic façade systems for hot climates through a comprehensive case study of Lusail Plaza Tower, Qatar. Using Autodesk Revit, Dynamo visual programming, Insight 360, and Green Building Studio, three façade configurations were modeled and analyzed: conventional baseline (without shading), enhanced (with static shading), and kinetic (with adaptive shading) systems. The kinetic façade-based building model performed remarkably close to the ASHRAE-defined target for energy use intensity (EUI) with a value of 203 Kwh/m²/yr. The use of kinetic façade for photovoltaic-based energy generation is also assessed, indicating the potential of 6.8 million kWh/year with a payback period of about 22 years. The study helps validate the usefulness of BIM-based methodology for early-stage sustainable façade design decisions, particularly for hot climates, contributing to the quantitative evidence for environmentally responsive façade design.

Keywords: Kinetic Façades, Sustainable Design, Energy Efficiency, BIM, Dynamo Programming

DII-2025-249

Rethinking Sustainable Infrastructure: Trade-offs in Dar es Salaam's BRT System

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Abstract

The Dar es Salaam Bus Rapid Transit (BRT) system, introduced to alleviate congestion and improve urban mobility, has been internationally recognised for its accessibility, earning the 2018 Sustainable Transport Award. However, its implementation has triggered significant environmental and socio-economic trade-offs, including the clearance of green spaces and the displacement of informal communities. This study employs a three-dimensional sustainability framework and employs document analysis to interrogate the BRT's alignment with global paradigms of digitalisation, decarbonisation and decentralisation. Findings highlight partial decarbonisation gains but limited digital integration and centralised planning processes that have marginalised informal communities and displaced livelihoods, raising concerns about the project's sustainability claims. The paper argues for a more inclusive and context-sensitive interpretation of sustainability that foregrounds equity, ecological resilience and governance reform in African urban transport infrastructure planning. It concludes by proposing the participation of informal sectors in planning and decision-making to enhance performance, service quality and user satisfaction.

Keywords: 3Ds, BRT System, Environmental Integrity, Sustainable Infrastructure, Trade-offs

DII-2025-254

Translating Policy into Practice: A Critical Appraisal of Sustainability Outcomes in South Africa's Riverside View Mega Human Settlement

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Abstract

South Africa's new state-led mega housing programme aims to address chronic housing backlogs through large-scale, integrated developments. However, the long-term sustainability of these new projects remains underexplored. This study presents an interpretive case study of Riverside View, the most advanced of Gauteng's mega human settlements, to assess whether policy ambitions have translated into lived sustainability outcomes. Drawing on three focus group discussions with 47 residents and six semi-structured interviews with project implementers, the research explores social, economic, and environmental dimensions of sustainability. Thematic analysis is guided by the Sustainable Livelihoods Framework, Urban Resilience Theory, and the Triple Bottom Line. While the project has delivered significant housing stock, the findings reveal challenges related to adaptability, service access, and local economic integration. This paper highlights the gap between planning rhetoric and lived experience, contributing new insights into the complexities of implementing inclusive urban policy in South Africa's evolving human settlements landscape.

Keywords: Mega Human Settlements, Sustainability, Riverside View, Urban planning

DII-2025-242

Factors Hindering Quantity Surveyors from Playing the Advisory Role of Green Building Uptake

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Abstract

This study is anchored on the debate that Quantity Surveyors (QSs) have shown limited interest in promoting the uptake of green buildings. Meanwhile, the underlying factors limiting them from being at the forefront in advocating for and ensuring that green building technology is embraced and fully adopted are scarcely understood. This disappointing scenario is especially notable in developing countries, where green buildings are still in their infancy. It is against this backdrop that this study was conducted to explore the factors linked to Quantity Surveyors' indifferent attitudes to green building uptake. Purposive and snowball sampling were applied in selecting key respondents. Semi-structured interviews were utilised to collect data, while content analysis was employed for analysis. The study identified sixteen factors limiting QS to be proactive in green building advocacy and implementation, which were again grouped into four categories. The factors are client-related, regulatory, market, and finally, self-induced.

Keywords: Sustainability, Green buildings, Barriers, Adoption, Quantity Surveyors, Advisory Role

DII-2025-225

Innovative Technologies for Sustainable Construction in Developing Countries: A Systematic Literature Review

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Abstract

Developing countries face significant challenges in achieving sustainable construction objectives due to inefficient traditional practices. Despite the transition towards innovative technologies, there is scant literature on achieving sustainable construction outcomes in developing countries. Therefore, this paper reviewed how sustainable construction objectives are achievable through the application of innovative technologies in developing countries. PRISMA guideline protocols were followed. Scopus and Web of Science were used for a preliminary search using specific keywords, yielding 143 papers. Further screening yielded 23 publications and 5 from a backwards search, amounting to 28. Five themes regarding sustainable construction objectives and innovative technologies emerged from thematic analysis: time saving, energy efficiency and environmental friendliness, cost saving, health and safety, and social outcomes. The revealed applied innovative technologies include BIM, AI, Virtual Reality, and IoT. Potential policy enhancements and implementation strategies that leverage innovative technologies for achieving sustainable construction objectives in developing countries are proffered.

Keywords: Sustainable Construction, Technological Innovations, Construction Industry, Developing Countries, Systematic Literature Review

DII-2025-271

Sustainable Impact of Post-Occupancy Evaluation: A Case of the Lands Building at Ardhi University

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Abstract

Post Occupancy Evaluation (POE) plays a critical role in ensuring the functionality and long-term success of built environments. However, in Tanzania, the absence of a standardised POE methodology has led to inconsistencies in data collection, analysis and reporting. This study evaluates the performance of the Lands Building at Ardhi University, focusing on the key functional parameters such as space utilisation, security, accessibility, cleanliness, air quality, temperature, noise levels, lighting, and energy use. Data was gathered through occupant questionnaires and on-site walkthrough observations. Findings reveal that, despite a generally high level of satisfaction, variation exists across different building units. The study highlights the need for structured POE integration in project planning and advocates for incorporating occupant feedback to improve the performance and quality of future infrastructure developments.

Keywords: Post-Occupancy Evaluation, Building Performance, Building Projects

DII-2025-286

From Housing to Sustainable Human Settlements: A Bibliometric Analysis of Spatial Integration in Reshaping South Africa's Urban Landscapes

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Abstract

South Africa's transition from a housing-centric approach to sustainable human settlements is crucial in addressing its fragmented urban landscapes. Despite policy shifts, spatial integration remains a challenge, with marginalised communities still relegated to peripheral areas, limiting access to economic and social opportunities. This study examines the gap between policy intentions and on-the-ground realities in achieving spatial integration. Using bibliometric analysis, it assesses the evolution of knowledge in this field, identifying key narratives and emerging trends. Findings highlight inconsistencies in policy implementation, where frameworks include Breaking New Ground (BNG) and the National Development Plan stress integration, yet housing projects often reinforce peripheral development due to poor location choices, inadequate infrastructure, and weak stakeholder coordination. However, successful case studies showcase mixed-use developments, inclusionary housing, and transport integration. The study proposes a Spatial Integration Framework (SIF) advocating policy alignment, location-centred planning, and participatory approaches to enhance spatial integration in South Africa.

Keywords: Spatial Integration, Sustainable Human Settlements, Housing Policy, Urban Development, Bibliometric Analysis

DII-2025-287

Trapped in Transition: A Governance-Responsive Framework for the Delivery of Temporary Residential Units in South Africa

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Abstract

The persistence of Temporary Residential Units (TRUs) in South Africa challenges the state's commitment to spatial justice and the constitutional right to adequate housing. While TRUs are intended as short-term emergency shelters, they often become permanent settlements marked by poor living conditions. This research argues that the failure to transition communities out of TRUs reveals deeper governance dysfunctions across all spheres of government. The study critically assesses these governance failures. A systematic review of content analysis, including legislation, court cases, policy documents, and case studies, forms the basis of the analysis. Findings reveal weak planning integration, limited municipal capacity, non-compliance with legal mandates, and poor accountability. The study proposes a Governance-Responsive Framework centred on integrative planning, capacity building, and monitoring and accountability mechanisms. The framework offers a practical roadmap to resolve TRU entrenchment and realise housing rights in post-apartheid South Africa.

Keywords: Temporary Residential Units, Governance, Housing Policy, Emergency Housing, Human Rights

DII-2025-298

Access barriers to GF and Strategies for Retail Consumer Uptake in South Africa

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Abstract

Despite the positive contribution of green finance (GF) to sustainability, challenges related to information, assurance, and access persist. To bridge this gap, international institutions have committed to developing GF products as a sustainability strategy. While some institutions have held up their end and issued GF products, many have not. Using semi-structured interviews with GF employees, this study investigated and categorised GF access barriers and formulated strategies to improve consumers' access. Findings from thematic analysis revealed that knowledge and information availability, apparent nature of GF, and retail consumers' profile influence access to GF products. Further findings showed that addressing existing GF barriers, improving education and skills, and stakeholder collaboration are imperative strategies to improve access. The study is beneficial to GF stakeholders, highlighting access barriers and formulating strategies to overcome these barriers. The findings of this study can be used to increase investment in GF products and related assets.

Keywords: Green Finance, Retail Consumer, Access, Barriers, South Africa

DII-2025-309

South African Perspective on the Impact of COVID-19 on REITS's

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Abstract

The COVID-19 pandemic had a significant and disruptive impact on the South African economy, with the listed sector and particularly Real Estate Investment Trusts (REITs) being no exception. This research examines how the pandemic influenced the performance, adaptability, and strategic actions of South African REITs in various ways. The study employs a quantitative method to assess financial metrics, including rental revenue, debt ratios, dividend payouts, and changes in market share, across retail, office, logistics, and residential REIT sectors. Findings reveal a sharp decline in revenues, high vacancy rates, and increased financial leverage among retail and office REITs, while logistics-focused REITs demonstrated relative resilience. The paper offers recommendations centred on financial resilience, asset diversification, adaptive leasing structures, and sustainable investment practices. Through empirical data and theoretical analysis, this study adds to discussions on real estate financialisation and post-crisis market recovery, delivering insights for policymakers, investors, and REIT managers facing economic uncertainty.

Keywords: REITs, KPI's, Covid-19, Impact, South Africa

THEME 4: QUALITY AND RESILIENT INFRASTRUCTURE

DII-2025-219

A Consumer-Centric Approach for Integrating Indoor Environmental Quality Metrics into Building Performance Optimisation in Shopping Malls

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Abstract
This research examines the interplay between indoor environmental quality (IEQ), energy efficiency, and consumer behaviour within Ghana's Accra and Kumasi Malls. Combining IoT-based monitoring tools, building system data, and spatial behaviour tracking, the study assesses how temperature, CO_2 levels, lighting, and ventilation influence the duration of visitor stays. The analysis reveals that elevated temperatures and poor air quality decrease occupancy time, whereas good lighting and adequate ventilation promote more extended visits. The performance index indicates that Accra Mall attracts more visitors, but Kumasi Mall leads in environmental regulation and energy use. These findings underscore the importance of evaluating commercial spaces through both human-centred and technical dimensions. This study suggests that combining smart environmental controls with tailored design and policy can enhance occupant experience and operational outcomes in shopping malls. This promotes a shift toward more sustainable and responsive building management practices.

Keywords: Energy Efficiency, Environmental Quality, Indoor Conditions, Shopping Mall, Smart Buildings

DII-2025-228

Unpacking Barriers and Incentives to Sustainable Drainage Systems (SuDS) in Sub-Saharan Africa: Toward Climate-Resilient Urban Infrastructure

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Abstract

Urban flooding is a major concern in Sub-Saharan Africa (SSA), due to urbanisation, inadequate infrastructure, and climate change. Many cities lack effective drainage systems, leading to frequent flooding. Sustainable Drainage Systems (SuDS) offer an ecologically sound alternative to traditional drainage methods by integrating natural processes into stormwater management. This study uses a thematic analysis of peer-reviewed sources to examine the behavioural, institutional, economic, and technological barriers to SuDS adoption in SSA. Findings reveal deep-rooted constraints, including low public awareness, governance fragmentation, limited financing, and technical capacity gaps. Despite these challenges, opportunities exist in the form of community engagement, policy reform, innovative financing, and technological advancements. Case studies from within SSA demonstrate promising outcomes. The study concludes that overcoming these barriers requires locally adapted, multi-sectoral approaches. The findings offer practical insights for urban planners, policymakers, and infrastructure stakeholders aiming to enhance flood resilience and promote sustainable urban development across SSA.

Keywords: Sustainable Drainage Systems (SuDS), Urban Flooding, Sub-Saharan Africa, Stormwater Management, Thematic Analysis

DII-2025-246

Integrated Cost Control in Construction Megaprojects: A Systematic Review of Lean and Technology-Driven Approaches

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Abstract
Poor cost control management is a major issue that requires a comprehensive plan. A novel project management strategy for megaprojects is Learn Construction Management (LCM) theory, according to academics. This study investigates a Technology-Driven (TD) cost control approach to reduce megaproject cost overruns in South Africa. PRISMA comprehensive literature reviews of prior publications were conducted for suitable scholarly materials. After reviewing 87 items, we removed 26. The research examined whether LCM theory and Technology Driven (TD) theories, such as IoT, AI, and big data theory, could increase cost and schedule performance. Each theory/approach was thoroughly explained, technical differentiation concepts were explained, and pros and cons were weighed. Two proactive-corrective theories were discussed and applied to support megaprojects. The results demonstrated that LC and TD theory frameworks increased productivity, teamwork, and cost savings. The framework's theoretical and practical implications can inform construction management and project finance researchers' study and development.
Keywords: Megaprojects, Lean Construction Management Theory, Cost Control, Internet of Things & Technology-Driven Theories

DII-2025-257

Critical success factors of quality enhancement in low-cost housing: Insights from Harare and Bulawayo, Zimbabwe

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Abstract
Most developing countries confront serious housing shortages among low-income earners. Thus, this study investigated the critical success factors of quality in low-cost housing in Zimbabwe. Through a survey design, 150 questionnaires were distributed to building inspectors, property developers and low-cost housing residents to probe data on what respondents perceived as the critical success factors of quality. Through statistical analysis, the findings revealed varied critical success factors of quality between construction players and housing end-users. The finding also revealed gaps in the robustness of quality regulatory policies in addressing resident needs, poor understanding of quality expectations between stakeholders and home end users in the delivery of quality low-cost housing in Zimbabwe. The study recommends cooperation between relevant stakeholders, including the end users. In addition, stakeholders should adopt the identified critical success factors to enhance the provision of quality affordable housing stock for the low-income earners in Zimbabwe.
Keywords: Critical Successful Factors, Low-cost Housing, Low-income Earners, Quality, Zimbabwe

DII-2025-259

Quality Management System (QMS) Implementation in Construction: A Critical Review

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Abstract

This study conducted an in-depth literature review on the implementation of Quality Management Systems (QMS) in construction projects to identify barriers and develop a conceptual framework for optimising QMS in the construction industry. The research adopted the PRISMA guidelines to systematically retrieve and screen articles for review, covering the timeframe from 2014 to 2024. Articles were reviewed, revealing six categories of barriers to QMS implementation. The identified categories are multifaceted and include Organisational Barriers, Resource Barriers, Technical Barriers, Cultural Barriers, Communication Barriers, and External Barriers. The research concludes that construction organisations can overcome these barriers by committing to absolute leadership, supported by the necessary resources, and ensuring that continuous improvement strategies are sustained over time. This is envisaged to potentially contribute to creating quality and resilient infrastructure in developing countries.

Keywords: Quality Management Systems (QMS) Barriers, Construction Quality Management, Implementation Challenges, Literature Review, Developing Countries

DII-2025-273

Integrated Infrastructure Construction: The Answer to Sustainable Resource Use in South Africa

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Abstract

Africa is experiencing a growing infrastructure deficit due to dwindling resources and increasing population & urbanisation. Managing this trend requires replacing the single-use ideology of social service infrastructural construction with an integrated infrastructure planning approach, where multiple social service infrastructure is integrated rather than built as individual service points, thereby minimising excessive land and resource use. Despite its potential, empirical research on the implementation of this in South Africa remains scarce. This study investigates the feasibility of integrated social infrastructure in South Africa by analysing existing policy documents and drawing insights from 30 certified town planners. Findings reveal micro-practices aligned with this approach, with a solid policy framework lacking. Interview responses identified key benefits, including enhanced community cohesion, reduced cost and land use, but underscored poor maintenance culture as a critical barrier to implementation. This research contributes to actionable strategies for sustainable infrastructure development in resource-constrained settings.

Keywords: Integrated Infrastructure, Sustainable Resource Use, Facility Clustering, Infrastructure Development, Construction Sector

DII-2025-275

Passenger Service Qualities of Bus Terminal Infrastructure for Intercity Transportation in Nigeria

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Abstract

Bus terminal infrastructure significantly facilitates passengers' experience and satisfaction with the intercity transportation process. The dimensions of service quality at intercity bus terminals are investigated in this study. The goal is to identify the indicators of service quality dimensions that are important for the provision of bus terminal infrastructure. A well-structured questionnaire was developed to collect data from 300 randomly selected respondents. The data were analysed using exploratory factor analysis. The study found that the service quality dimensions of responsiveness (prompt complaint handling), assurance (service trustworthiness), and reliability (adherence to schedule) significantly influence passenger perception of bus terminal infrastructure provision. The finding provides insight into improving bus terminal infrastructure to enhance passenger patronage and satisfaction with intercity travel. The finding implies the need to promote intelligent transport infrastructure provision with technological integration for digital operations that will enhance prompt complaint handling, service reliability, and adherence to schedule.

Keywords: Bus Terminal, Terminal Infrastructure, Service Qualities Dimensions, Intercity Travels, Passenger Transportation

DII-2025-279

The Energy-Gender-Water Infrastructure Nexus: Gendered Roles in Accessing Basic Services in Emalahleni, Mpumalanga, South Africa

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Abstract

This paper explores the energy-gender-water nexus in Emalahleni, Mpumalanga, South Africa, examining how socially constructed gender roles shape access to water and energy services in a coal-mining community. Using secondary data from a desk review, the study analyses how women and men are assigned distinct responsibilities in access to energy and water infrastructure, reinforcing inequalities. Drawing on feminist political ecology and intersectionality, the research investigates gendered divisions of labour, health impacts, and community resistance. For data analysis, the study used textual analysis. Findings reveal that women bear disproportionate burdens in securing water and energy, facing time poverty and health risks, while men's roles are tied to paid labour in mining. The study contributes to understanding how gendered norms intersect with resource access and advocates for gender-sensitive policies in mining communities.

Keywords: Water-energy Nexus, Energy Access, Gender Roles, Emalahleni, Basic Services

DII-2025-227

Preventive strategies for building projects' abandonment in Nigeria

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Abstract

This study examines the strategies for preventing abandonment of projects in Lagos State, Nigeria, to minimise their occurrences. A qualitative research approach was employed with the use of a well-structured questionnaire to collect data from 86 respondents, made up of construction professionals. The findings reveal that the most frequently adopted strategies for the prevention of building project abandonment are effective and adequate planning, while the least are change orders and variation orders. It also sheds light that economic downturns and land use disputes are among the difficult problems of project abandonment. The study concludes that although several problems hinder the prevention of project abandonment, however, the most difficult among them is economic downturns. It is recommended that stakeholders should regularly employ various strategies, such as adequate funding with effective planning and design, to prevent project abandonment, with particular consideration for effective and adequate planning.

Keywords: Abandonment, Building, Projects, Prevention, Strategies

THEME 5: GENDER EQUITY, EMPOWERMENT & SOCIAL JUSTICE

DII-2025-247

Benefits of Strategic Spatial Planning for Equitable Urban Renewal: Advancing Housing Justice in Post-Apartheid Soweto

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Abstract

The South African post-apartheid government is highly embarking on addressing the past injustice in housing through exciting projects of urban renewal. These projects aimed to eradicate poverty and house thousands of hostel dwellers within townships. This paper provides a map layout to show the importance of planning for increasing the delivery of houses by using strategic spatial planning approaches. The research methodology was based on non-human contact, which used photographic evidence and map layout to display the difference in space used by the old and new Jabulani hostel housing, as well as present infrastructure that supports service availability. It also included the use of Case Study Design and documentation from the Community Residential Units, Housing Development Agency, and Spatial Planning in the City of Johannesburg. The results show how strategic spatial planning increases housing delivery, services and supports social development as well as improves resilience toward climate change.

Keywords: Strategic, Renewal, Housing, Justice, Jabulani

DII-2025-267

Exploring Barriers to Women's Leadership in the Quantity Surveying Profession in Zimbabwe

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Abstract

This study explores the barriers to women's leadership roles in the Quantity Surveying (QS) profession in Zimbabwe. Using a mixed-methods approach, 50 questionnaires and follow-up interviews were administered to consultants and public sector professionals. Data was analysed using the mean score computations and interpretation. Findings showed that the main barriers to women's representation in the QS profession are gender bias, unequal pay and lack of representation. Most of the barriers cited in the study are based on gender bias, and as such, the study recommends that responsible authorities mount targeted campaigns on demystifying these patriarchal structures hindering the progression of women in the QS profession. Despite the small sample that was used in the study, the data are useful in providing insights that will inform policymakers and educational institutions. Data generated in this study may be useful to other countries in the Global South if used with great contextual flexibility.

Keywords: Barriers, Women's Leadership, Quantity Surveying Profession, Construction industry, Zimbabwe

DII-2025-282

Equity Transitions in Engineering: Trends, Challenges and Strategies for Inclusivity

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Abstract

Equity in engineering refers to how well it accommodates the diverse needs of different social groups. While literature has explored strategies for transforming engineering education, much of this work remains narrowly focused, often neglecting broader, systemic measures for inclusivity. Despite significant policy efforts aimed at transformation, a substantial body of academic research highlights the persistent gender gap in engineering, particularly at the postgraduate level. This study aims to systematically identify the extent and drivers of the gender gap within selected engineering programs. Employing a mixed-methods approach, the study follows a four-step research design combining comparative analysis, qualitative inquiry, and stakeholder engagement. The findings reveal a consistent male bias in postgraduate enrollment, with psychological and emotional challenges emerging as key factors contributing to the persistence of gender imbalances. The study recommends emerging technologies such as artificial intelligence and virtual reality for deployment as part of strategies to address the gender gap.

Keywords: Equity, Engineering, Artificial Intelligence, Virtual Reality, Postgraduate

DII-2025-285

Pioneering Social Justice: A Critical Review of Women's Leadership in South Africa's Construction Industry

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Abstract

South Africa's construction industry remains structurally unequal, with women facing entrenched barriers to participation and leadership. This qualitative study critically reviews women's leadership in the sector through a feminist and social justice lens, using content analysis of policy documents, industry reports, and scholarly literature. Despite policy instruments such as the Employment Equity Act, B-BBEE, and CIDB charters, the findings reveal ongoing challenges, including patriarchal norms, symbolic compliance, and limited access to mentorship and skills development. The study proposes a Gender Transformation Action Framework aligned with SDGs 5, 8, and 10, offering strategic interventions such as cultural transformation, leadership inclusion, and enforceable accountability mechanisms. Women's leadership is shown to be a driver of innovation, equity, and long-term sustainability in the built environment. This research contributes by positioning gender equity not only as a justice issue but as a catalyst for inclusive growth and systemic transformation in infrastructure development.

Keywords: Women in Construction, Gender Equality, Social Justice, South Africa, Leadership

DII-2025-252

Managing Psychosocial Risks in Construction: A Systematic Review of Underlying Causes and Impacts on Construction Workers

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Abstract

Psychosocial hazards in the construction industry have gained increasing attention due to their significant impact on worker health, safety, and productivity. Despite this, these risks remain under-addressed in comparison to physical hazards. The purpose is to identify the underlying causes of psychosocial hazards and risk impact among construction workers. A systematic literature review was conducted using the PRISMA framework, reviewing peer-reviewed literature published between 2015 and 2025 from academic databases such as Scopus, Web of Science, and ScienceDirect. Findings reveal that excessive workloads, job insecurity, poor leadership, and fragmented work environments are key contributors to psychosocial stress. Identified control measures include mental health awareness training, supportive leadership, worker participation, and employee assistance programmes. However, applications remain inconsistent across regions and organisations. The study highlights the urgent need for integrated, context-specific psychosocial risk management strategies to improve occupational health and safety outcomes in construction settings.

Keywords: Construction Industry, Health and Safety, Impact, Organisation, Psychosocial risks

THEME 6: MEGAPROJECTS/ CLIMATE CHANGE AND SHOCK EVENTS

DII-2025-238

Exploring the Role of Green Building Technologies in Zimbabwe's Climate Resilience Strategy

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Abstract

This study sought to explore the role of green building technologies in Zimbabwe's climate resilience strategy. The study utilised online-based questionnaires to gather data from contractors, consultants and relevant government ministries. Based on descriptive statistics and factor analysis, the study revealed that passive design strategies, renewable energy integration, water efficient building designs, smart solutions and waste management techniques are significant GB technologies in addressing climate resilience strategy in Zimbabwe. The study concludes that GB technologies play a crucial role in addressing climate resilience strategy by enhancing occupant comfort and operational efficiency, promoting resource efficiency and environmental sustainability. It is therefore recommended that the government develop and enforce policies that ensure that buildings meet minimum GB standards and undertake stakeholder education and training on green practices. Higher education and training institutions within the built environment must play a pivotal role through education and training, research and development.

Keywords: Green buildings, Green building Technologies, Climate Resilience Strategy, Zimbabwean Built Environment

DII-2025-277

Unveiling the Multidimensional Effects of Large-Scale Projects: The Case of Lesotho Highlands Water Projects

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Abstract

Lesotho Highland Water Projects (LHWP) remains a cornerstone for generating hydroelectric power for Lesotho and supplying water to South Africa. The project is regarded as a key driver that promotes economic growth and enhances the quality of life, especially for both nations. However, despite the intended benefits, the project is often faced with numerous challenges, particularly community displacement, increased inequalities affecting overall well-being. This study uses a qualitative approach based on participant observation, community meetings, and secondary data analysis to examine the socioeconomic and cultural effects of LHWP. Over three months, 120 to 250 people attended community meetings, and the dataset was further enhanced by informal interviews. The study adopted the IRR model to pinpoint the key themes. The results imply that displacement causes systemic sociocultural breakdowns, causing severe impacts on society. Ultimately, the study recommends creating community-led governance structures that incorporate livelihood restoration beyond financial payouts.

Keywords: Displacement, Cernea's IRR Model, Cultural Dynamics, Land Disputes, Underemployment

DII-2025-280

Water Resource Vulnerability in the Face of Climate-Induced Shock Events: A Bibliometric Analysis

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Abstract

Water resources face increasing vulnerability to climate-induced shock events, such as droughts, floods, and heat waves. This study conducted a bibliometric analysis of 213 Scopus-indexed publications from 2010 to 2025 for the purpose of mapping research trends, key contributors, and thematic evolution. Using VOSviewer, prominent keywords, co-authorship networks, and citation patterns revealed emerging clusters and persistent knowledge gaps. Findings indicated that a significant increase in scholarly attention occurred post-2015, with 68% of publications on drought resilience, integrated water management, and climate adaptation. While the Global North leads, input from African and Asian institutions is growing. This analysis provided actionable insights into resilient water governance, informing policy and identifying future research directions for climate-resilient water management.

Keywords: Water Security, Climate Change, Bibliometric Analysis, Vulnerability, Resilience

DII-2025-291

Reframing Life Cycle Assessment for Low-Income Housing in South Africa: Towards Social, Dynamic and GIS-Integrated Models

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Abstract

Life Cycle Assessment is widely used to evaluate the environmental impacts of construction systems, yet affordability constraints, unreliable data, and the exclusion of socio-economic factors limit its relevance to low-income housing in South Africa. Drawing on empirical data from Gauteng province and consultations with key stakeholders, this study identifies three core limitations: insufficient subsidy support, weak material and energy datasets, and the lack of integration of social dimensions. To enhance the tool's applicability, the study proposes three adaptations: Social Life Cycle Assessment (S-LCA) to incorporate affordability and well-being; Dynamic LCA to reflect the incremental nature of low-income housing; and Geographic Information Systems (GIS)-Based LCA for location-specific sustainability analysis. These models offer a more holistic, flexible, and inclusive framework for assessing housing impacts in resource-constrained environments. The study provides actionable insights for developing nations, advocating for hybrid LCA approaches that align environmental, economic, and social sustainability goals in housing delivery.

Keywords: Life Cycle Assessment (LCA), Low-Income Housing, Social LCA, South Africa, Sustainable Development

THEME 7: GREEN/SUSTAINABLE BUILDING

DII-2025-224

Green Skills and Training Models for Construction Operatives: A PRISMA-guided Systematic Literature Review

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Abstract

The demand for infrastructure is rising, and green construction is gaining prominence, thereby increasing the need for green skills among construction operatives. However, a lack of focus on specific green skills has created barriers to designing effective training methods and certification standards for operatives. Therefore, green skills and training methods were reviewed using the PRISMA framework. A total of 69 articles from 2000 to 2024 were obtained after screening on the Web of Science and Scopus databases. These were further screened to eliminate duplicates and articles that were irrelevant or ineligible. Eight articles were selected and analysed. Specific themes on green skills and training methods were analysed using NVivo. The SLR highlights specific sustainability-related green skills themes and organisational and systems thinking-related green skills. On-the-job and off-the-job training methods were revealed. Recommendations include contextualising training. Future studies should develop a framework for enhancing green skills training and certification among operatives.

Keywords: Green Skills, Sustainable Training Methods, Construction Operatives, Construction, Systematic Literature Review

DII-2025-226

Barriers to Sustainable Construction Labour Management in Developing Countries: A Systematic Literature Review

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Abstract

Despite the existence of sustainable management frameworks, developing countries are grappling to overcome sustainable construction labour management barriers. This is potentially due to a dearth of literature related to contextual barriers that can promote the development of appropriate interventions. Therefore, this study sought to review literature on barriers to sustainable construction labour management in developing countries to close this gap. The Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA 2020) methodology was applied for data comprehensiveness. A total of 109 documents were extracted from Scopus and Web of Science, using specific keywords. From the 18 delineated and relevant articles, five main barrier themes emerged from the thematic analysis: awareness deficiency, stakeholder fragmentation, lack of cultural integration, financial limitations and regulatory compliance issues. Bridging this research gap will provide for sustainable construction labour policy enhancements and fulfil the targets of the decent work agenda in the construction sector.

Keywords: Sustainable Labour Management, Sustainable Construction, Developing Countries, Systematic Literature Review, Decent Work

DII-2025-240

The Spatial Integration of Bus Rapid Transit System and Non-motorised Transport in Johannesburg, South Africa

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Abstract

In recent decades, South Africa has prioritised a long-term focus towards innovative public transport infrastructure and non-motorised transport. Several metropolitan cities paved the way for creating innovative public transportation systems and non-motorised infrastructure that are safe, integrated, clean, accessible, and beautifully constructed. However, in major centres, integration of public transportation and infrastructure for non-motorised transportation, such as designated lanes for walking, cycling, and motorcyclists, has been ignored over the years. These setbacks exacerbated geographical disintegration on the way to achieving a well-integrated, cost-effective, and dependable contemporary public transportation system in Johannesburg. The study adopts mixed methods research grounded on the descriptive phenomenological approach. Research findings reveal that integration of Rea Vaya BRT with NMT system stimulates strong local real estate markets, reduces costs of public transport, addresses the issue of job-housing mismatch and enhances new strips of development along the mobility spines.

Keywords: Spatial, Bus Rapid Transit, Non-motorised Transport, Modal Integration, Mobility

DII-2025-241

Barriers to Green Retrofitting Practices' Adoption in Zimbabwean Commercial Buildings in Harare

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Abstract

Economic growth of most cities in developing countries is hampered by unsustainable commercial buildings. Hence, this study investigated challenges hindering green retrofitting adoption in Harare's commercial buildings. Using a cross-sectional survey design, data was collected from 40 purposively selected building owners, designers and property managers of commercial buildings via web-based questionnaires. Data collected was analysed using mean score computations and their ratings. The findings revealed financial constraints (upfront costs, ROI uncertainty), limited local green materials/technologies, stakeholder resistance, and ambiguous regulations as key barriers. A framework integrating the Technology Acceptance Model (TAM) and Diffusion of Innovation Theory is proposed to address stakeholder resistance. The study recommends tailored financing mechanisms, capacity-building programs, and policy reforms to promote sustainable retrofitting. Further, the results could be utilised to develop a green retrofitting framework to promote the implementation of green retrofitting on commercial buildings for sustainable economic development in developing economies, including Zimbabwe.

Keywords: Green Retrofitting, Commercial Buildings, Sustainable Construction, Barriers, Zimbabwe

DII-2025-258

Unlocking Sustainable Infrastructure Delivery in Emerging Economies: A Systematic Review of Success Factors and Barriers

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Abstract
This study explores sustainability and continuous improvement in infrastructure delivery within emerging economies. While sustainable construction is widely accepted, its practice is often hindered by unclear regulations, institutional challenges, and local barriers. A systematic literature review (SLR) of 51 peer-reviewed studies was conducted using the PRISMA 2020 protocol, applying Braun and Clarke's thematic analysis to identify key patterns. The findings highlight critical success factors such as leadership commitment, clear policy regulations, and stakeholder engagement, alongside constraints like weak regulatory systems and limited technical capacity. The study introduces a conceptual framework illustrating how these factors interact across different levels and introduces a stakeholder-action matrix linking actors to targeted strategies. These tools offer both theoretical insights and practical guidance for advancing sustainable infrastructure delivery.
Keywords: Social Infrastructure Delivery, Sustainability, Critical Success Factors, Emerging Economies, PRISMA

DII-2025-290

Urban Renewal for Sustainable Development in Johannesburg CBD: A Critical Assessment of Challenges and Strategic Opportunities

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Abstract

The economic hub of South Africa, Johannesburg, faces issues such as ageing infrastructure and environmental degradation. With this mentioned, urban renewal initiatives offer opportunities to modernise the built environment and enhance resilience. This study explores the barriers to sustainable urban infrastructure in Johannesburg's CBD and identifies strategic opportunities to integrate sustainability into urban renewal efforts. Using a qualitative case study approach, the research examines urban renewal challenges and opportunities towards sustainable urban infrastructure and development in Johannesburg. Findings indicate that key challenges include gentrification, ownership, financial capital outlay, stakeholders' coordination and management, community engagement, governance and corruption. Despite these obstacles, opportunities exist presenting the general outlook of a city, creating new spaces, revenue regeneration, international appeal, public-private partnership, social justice and communities. The study concludes by indicating challenges affecting sustainable urban renewal development and presents opportunities to develop a recommended framework.

Keywords: Urban Regeneration, Public-Private Partnerships, Urban Renewal, CBD Sustainable Infrastructure, Johannesburg

THEME 8: RENEWABLE ENERGY/CIRCULAR ECONOMY

DII-2025-220

Exploring the Potential of Piezoelectric Floor Tiles to Harness Kinetic Energy Harvesting in Shopping Malls in Ghana

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Abstract
This research investigates the potential of piezoelectric floor tiles to harness kinetic energy in shopping malls across Ghana. Focusing on installations in high-traffic areas at Accra Mall and West Hills Mall, simulations and small-scale pilots were used to evaluate performance and financial viability—a 10 m² array produced between 1.15 and 3.46 kWh daily, with observed data closely mirroring projections. Notably, energy output peaked in zones with constant foot traffic. Thus, entrances and food courts proved especially productive. Financially, the setup showed a payback range of 6 to 8 years, translating to annual savings of GHS 584 to GHS 1,582 per year. While the generated energy is insufficient to run entire facilities, it presents a practical solution for powering LED signs. The study suggests that, beyond function, such systems could serve as visible symbols of sustainable innovation in developing urban centres. For commercial property managers, this study provides a strong case for focused deployment in commercial areas to maximise return on investment.

Keywords: Energy Harvesting, Ghana, Human Movement, Kinetic Energy, Shopping Malls

DII-2025-237

Circular Economy in Construction: Risk Landscape and Mitigation Pathways in Zimbabwe

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Abstract

Circular Economy (CE) has emerged as one of the most crucial and contemporary paradigms to address project sustainability in the construction industry. It is, however, associated with several risks, causing project failure in the Zimbabwean construction industry. This study sought to assess risks associated with CE and mitigation strategies to manage them. The study adopted a cross-sectional survey research design, making use of online questionnaires to gather data from architects, quantity surveyors, engineers, and contractors, and analysed through frequencies, percentages and mean ranking using SPSS. The results revealed the main risks, which included high upfront costs, lack of skilled personnel, cost overruns, and unavailability of quality recycled materials. Key strategies included investment in technology, education and training, collaboration with experts, and policy advocacy and compliance. The study recommends that policymakers, including the government and regulating bodies to consider formulating policies that mandate the implementation of CE practices in the industry.

Keywords: Circular Economy, Risks, Risk Mitigation, Circular Construction, Zimbabwean Construction Industry

DII-2025-272

Circular Economy Implementation in South Africa's Construction Industry

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Abstract

This study examines the implementation of Circular Economy (CE) principles in South Africa's construction sector through qualitative interviews with 30 key stakeholders selected across provinces in South Africa. Findings reveal limited understanding and inconsistent application of reduce-reuse-recycle practices, primarily driven by cost-saving rather than sustainability goals. Implementation opportunities include environmental benefits (waste reduction, resource conservation), economic advantages (cost efficiency, job creation), social gains, and alignment with SDG 11. Significant barriers identified include resistance to change, high initial investment costs, inadequate regulatory frameworks, insufficient recycling infrastructure, and underdeveloped markets for recycled materials. The research proposes implementation strategies centred on policy development, capacity building, infrastructure investment, stakeholder collaboration, and pilot projects. These findings benefit government officials, construction stakeholders, innovators, investors, and material manufacturers seeking sustainable construction practices in South Africa.

Keywords: Circular economy, 3Rs, Construction Industry, Opportunities, Barriers, South Africa

DII-2025-261

Leveraging Artificial Intelligence for Sustainable Energy Solutions: Enhancing Energy Efficiency and Grid Reliability in Zimbabwe's Construction Industry

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Abstract

Zimbabwe faces a persistent energy crisis, marked by frequent power outages, unreliable grid supply, and limited renewable energy adoption. The construction industry suffers from project delays, increased costs, and inefficiencies due to power shortages. Thus, the study explored the role of Artificial Intelligence (AI) in mitigating energy challenges by enhancing efficiency, optimising power distribution, and integrating renewable energy into the construction sector. A quantitative approach was employed, comprising surveys with 50 industry experts. Regression analysis examined the relationship between AI adoption and energy efficiency. The key findings suggest that AI can reduce project delays, improve grid reliability, and enhance sustainability. However, challenges such as high costs, lack of expertise, and policy inconsistencies hinder its adoption. This study proposes an AI-driven energy management framework to support construction and energy stakeholders in fostering energy resilience in Zimbabwe and similar settings, particularly in the Global South.

Keywords: Artificial Intelligence (AI), Renewable Energy Integration, Energy Efficiency, Sustainability, Construction Industry

DII-2025-216

Affordable Housing Presales: A Case Study of Approval Determinants and Patterns in Johannesburg, South Africa

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Abstract

Affordable housing remains a concern in South Africa, and developers require information about the target market to increase the supply of housing. Although pre-sales, a strategy where houses are sold before construction, are increasingly used by private developers to finance affordable housing projects, not much is known about these kinds of datasets. This study investigates the structural patterns influencing access to affordable housing presales in South Africa. Using a mixed-methods approach, drawing from secondary data owned by SSI Group, a credible private developer in Gauteng, complemented by interviews with sales agents. Findings indicate presales seem to get the market right in building affordable houses for buyers through presales. The study concludes that presales accessibility is strongly shaped by demographic, socio-economic factors and financial requirements. The study recommends that developers and policymakers adopt inclusive flexible financing models and target correct market to expand access and support equitable housing delivery in South Africa.

Keywords: Affordable Housing, Demographic Factors, Developers, Inclusive Flexible Financing Models, Presales

DII-2025-310

A Review of Circular Economy Integration into Disaster-Related Demolition Waste Management: Trends and Future Direction

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Abstract

Disaster-related demolition waste (DDW) is rising worldwide. DDW generation poses significant challenges to the construction industry due to its impact on the environment and the depletion of natural resources during reconstruction activities. As a result, several empirical studies and comprehensive reviews by the scholarly community have been produced. Circular economy (CE) applications are a crucial way to mitigate these consequences. Nevertheless, these past studies have paid little attention to CE integration into DDW management. This study used a scientometric review to analyse 32 articles from Scopus and Web of Science databases to understand research trends and future directions. The findings emphasise the need for a balanced strategy that balances financing goals with sustainable DDW reuse and recycling alternatives. Furthermore, there is a need for comprehensive studies on DDW management, indicating that existing literature is insufficient. Policymakers and stakeholders could utilise mathematical models to support decision-making in solving DDW problems.

Keywords: Circular Economy, Disaster, Demolition Waste, Construction Industry, Scientometric Review

THEME 9: BIM, DIGITAL TWINS, MIXED REALITY, 3D PRINTING AND CONSTRUCTION INNOVATION

DII-2025-230

Accelerating BIM Adoption in Tanzania: Lessons from Global Public Sector Interventions

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Abstract
Despite the growing pace of implementing huge projects in the country, local contracting parties perform inadequately. They have inadequate planning and fragmented processes. While these problems may be solved through BIM's adoption well well-deployed globally, in Tanzania, its deployment lacks a government-driven strategy. To expand the BIM adoption rate, two methods were adopted; firstly, focused group discussions were conducted in Dar es Salaam in 2023 to understand the true weaknesses of local firms, and a comparative literature review in Tanzania and developed countries. In the results, evidence on the viability of huge projects was noticed through the engagement of the government. Capitalising on this, reviewed works helped to establish an eight-element strategic framework for deploying BIM: government advocating the increase in BIM use among stakeholders; establishing working groups/committees; making BIM a mandatory requirement; demonstrating BIM benefits; establishing collaboration networks; establishing BIM funding supports; giving technical support guidance to practitioners and publishing standards & guidelines.

Keywords: Tanzania Construction Industry, BIM Deployment Strategy, Global Best Practices, Digital Construction, Government BIM-led strategies

DII-2025-231

Building Information Modeling (BIM) Adoption in Zimbabwe's construction sector

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Abstract

Despite its proven advantages, BIM adoption in Zimbabwe's construction industry remains significantly low. This study evaluates the barriers and enablers of Building Information Modelling (BIM) adoption in Zimbabwe's construction sector in a bid to enhance efficiency and productivity in the industry. Through a quantitative approach, data was collected from 217 randomly selected quantity surveyors in Zimbabwe using a structured survey questionnaire. From descriptive analysis, Pearson's correlation, factor analysis, and multiple regression modelling conducted, the findings identified organisational culture ($M = 9.5$, $SD = 1.15$) and knowledge gaps ($M = 8.8$, $SD = 1.10$) as the most significant barriers to BIM adoption. Regression analysis revealed that organisational culture ($\beta = 0.432$, $p < 0.001$) and technical issues ($\beta = 0.199$, $p < 0.001$) strongly influence BIM adoption. The study recommends that construction players, government and policymakers develop BIM adoption strategies, including a national BIM framework to improve operational efficiency and productivity.

Keywords: BIM, Barriers, Enablers, Adoption, Construction industry

DII-2025-235

Virtual and Augmented Reality for Safer Construction Sites: Barriers and Adoption Realities in Zimbabwe

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Abstract

This study examines the adoption of Virtual and Augmented Reality (VAR) towards Occupational Health and Safety (OHS) management in Zimbabwe's construction industry, where a high rate of accidents and fatalities has been reported. Data was collected from 50 randomly selected industry experts through a structured questionnaire survey. Based on mean score calculations and their interpretation range, where: MSs>1.00 ≤ 1.79 (Very low extent), MSs>2.60≤ 3.39 (Moderate) and MSs>4.20≤ 5.00 (Very high extent), the findings revealed that VAR has been adopted to a lesser extent in managing OHS in the construction industry. Based on the findings, the study concludes that VAR is lowly adopted on Zimbabwean construction projects. It is therefore recommended that stakeholders upscale the adoption of VAR in the management of OHS to mitigate fatalities in the construction industry. The findings are crucial in guiding regulatory changes and policies which enhance OHS management on construction projects for accident reduction.

Keywords: Virtual and Augmented Reality, Adoption, Occupational Health and Safety, Accidents, Construction Industry

DII-2025-250

An Overview of Building Information Modelling Strategies in the Malawian Construction Industry

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Abstract

The Malawian construction industry faces persistent challenges such as high costs, delays, poor quality, lack of expertise, weak institutional collaboration, and corruption. Building Information Modelling (BIM) offers a potential solution, yet its adoption in Malawi remains limited and under-researched. This study aimed to highlight the benefits of BIM and explore effective implementation strategies. A scoping literature review identified 12 strategies, followed by a survey of 189 construction professionals, including engineers, architects, and project managers. Data were analysed using descriptive statistics, the relative importance index, and a one-sample t-test. Findings revealed that most strategies were critical, particularly introducing BIM in academic institutions, engaging key stakeholders, learning from global practices, piloting projects, and government subsidies. Enhancing BIM use through legislation/laws was the only strategy deemed less important. The study offers insights into improving BIM awareness and adoption in Malawi, contributing to improved project delivery, industry efficiency, and productivity.

Keywords: Building Information Modelling, Implementation, Strategies, Malawi, Construction

DII-2025-264

Unpacking the Structural and Operational Barriers to AI Uptake in Namibia's Construction Sector: A Quantitative Investigation

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Abstract

The research aims to investigate the barriers to AI adoption in the Namibian Construction Industry. Utilising a quantitative approach, 75 questionnaires were administered to Architects, Engineers and Quantity surveyors. Quantitative data were collected in Namibia and analysed using the mean index and the standard deviation. The study identified the dominance of structural barriers in AI adoption, and this provides insights to developing countries' construction sectors for addressing these impediments. The research recommends that professional governing institutes undertake workshops on the significance and training use of AI. Further, it is recommended that the Namibian context explore the use of Public-Private Partnerships as a funding strategy for AI adoption. The study provides a foundation for policymakers to make informed decisions in AI adoption. Despite the inability to generalise the results due to the small sample adopted in the study, the results deliver insights to enhance efficiency on construction projects.

Keywords: Artificial Intelligence Adoption, Construction Sector, Structural and Operational Barriers, Developing Countries, Namibia

DII-2025-266

Building Information Modelling (BIM) for Monitoring Construction Projects Progress in Zimbabwe: Barriers and Opportunities

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Abstract

Digitalisation has in recent years gained prominence in monitoring construction projects worldwide. However, opportunities and barriers to the exploitation of novel technologies are little known in Zimbabwe. Thus, this paper explores potential benefits and barriers to the full exploitation of BIM in monitoring construction projects in Zimbabwe. A questionnaire survey was administered to eighty construction professionals in Harare. Through mean score computations, the study revealed that BIM is beneficial in quality control, cost control, risk response, change management and project coordination, while major barriers to BIM exploitation include the lack of training and industry support, resistance to change, insufficient data to support BIM and high implementation cost. Considering the potential benefits of BIM in Zimbabwe, the study recommends that industry practitioners attend BIM training programmes and invest money in acquiring BIM technology. The study provides a foundation for policymakers to make informed decisions in BIM adoption on construction projects.

Keywords: Building Information Modelling, Opportunities, Barriers, Monitoring, Construction Project Cost Management

DII-2025-268

Barriers to adoption of Building Information Modelling in Quantity Surveying Firms in Nigeria

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Abstract

Despite the benefits associated with BIM worldwide, its adoption among Nigerian QSs remains limited. The study aims to investigate the barriers to BIM adoption among QS firms in Nigeria. Data was collected from 28 registered quantity surveyors in selected firms in Abuja using a structured questionnaire. Using mean score calculations (MS) and Kruskal-Wallis H test, the findings revealed that the most significant barriers include the lack of BIM expertise, lack of knowledge of the business value of BIM, resistance to change, software complexity, data management complexities and additional costs in BIM training. Thus, the study concludes that BIM adoption by Qs firms is mainly influenced by interpersonal skills. It is therefore recommended that workshops be established to address the identified interpersonal related barriers, and policymakers should develop a national BIM adoption strategy. Despite the usefulness of the results to other contexts, the study is limited by the small sample size.

Keywords: Building Information Modelling, BIM, Quantity Surveying Firms, Barriers, Nigeria,

DII-2025-253

Adoption of Digital Tools in the South African Construction Industry

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Abstract
Despite increasing global adoption of digital construction technologies, their integration in developing contexts remains limited. This study investigates the current level of awareness and usage of digital monitoring and control tools among civil engineers and project managers in South Africa and the key barriers and enablers influencing their adoption. Using a mixed-methods design, the study surveyed 66 professionals in the construction industry to assess tool frequency, perceived challenges, and readiness for adoption. Results show high reliance on traditional methods (mean = 3.55 for Gantt/CPM), and low uptake of advanced tools such as BIM (mean = 2.08) and AI forecasting (mean = 2.03), largely due to cost, technical skill gaps, and system incompatibility. However, 95% of respondents expressed willingness to adopt digital solutions. These findings highlight a readiness for transformation constrained by systemic barriers, suggesting targeted training, investment, and policy reform are essential for progress within the South African construction industry.
Keywords: Digital Construction, Technology Adoption, South Africa, Construction 4.0, Adoption Barriers

DII-2025-292

The Role of Digital Transformation in Construction to Improve Performance

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Abstract

Construction in South Africa experiences high rates of accidents, cost overruns, delays, and rework. The aim of the study reported on was to develop a framework of interventions to mitigate the above. The quantitative study entailed the completion of an online questionnaire using QuestionPro. The sample strata included construction managers and quantity surveyors practising in the Nelson Mandela Bay metropole. The results indicate that the implementation of Building Information Modelling (BIM) and the use of drones can effectively decrease the frequency of accidents, cost overruns, delays, and rework. Conclusions include that BIM and Industry 4.0 technologies can contribute to mitigating accidents, cost overruns, delays, and rework, and enhancing overall project performance. However, where BIM and Industry 4.0 technologies such as drones cannot readily contribute to improving certain factors and aspects relative to accidents, rework, and delays, it is recommended that 'getting the basics right' or a 'back-to-basics' approach, or simply sound or better practice construction management, be adopted.

Keywords: BIM, Construction, Digitalisation, Industry 4.0, Performance

THEME 10: CONSTRUCTION MATERIALS/ ENVIRONMENTAL AND WASTE MANAGEMENT/ LEAN CONSTRUCTION AND VALUE ENGINEERING

DII-2025-255

Unpacking Operational Efficiency Challenges of Local Civil Contractors in Tanzanian Road Projects

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Abstract

Operational efficiency of civil contractors on road projects is a crucial aspect of successful infrastructure delivery. Still, inefficiencies in planning, procurement, and resource use lead to delays, cost overruns, and quality shortfalls, undermining contractor profitability. This paper investigates the challenges to operational efficiency among Tanzanian civil contractors in road projects. Using a structured questionnaire, 113 responses were obtained from local civil contractors working on road projects. Exploratory factor analysis identifies four challenge domains, which are project management, procurement, client and labour, and material and equipment. This paper proposes a Tanzania-specific operational efficiency framework and prioritises interventions via factor loadings. Based on empirical prioritisation, the paper proposes short-term tactical interventions such as project management workshops, standardised bid templates, and bulk purchase agreements. Additionally, long-term interventions include: strategic policies such as regulatory transparency reforms, industry–university capacity-building partnerships and the introduction of local manufacturing clusters.

Keywords: Contractor Performance Bottlenecks, Exploratory Factor Analysis, Operational efficiency framework, Project Delivery Delays, Tanzania

DII-2025-229

Construction Professionals' Perception on the Awareness, Usage and Effectiveness of Epoxy Resin for Concrete Repair

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Abstract

This study investigates the awareness, usage and effectiveness of epoxy resin for concrete repairs with the view to enhancing concrete outcomes in projects. Purposive sampling technique was used to select the sample of 340 professionals, while questionnaires were administered to them. A total of 100 properly filled and returned questionnaires were used for the analysis. Data were analysed with the aid of frequency, mean and standard deviation. The study sheds light that the majority of respondents are extremely aware of and always use epoxy resin for concrete repair. The study concludes that the awareness of epoxy resin for concrete repair varies among professionals, but a larger percentage of them are fully aware of it. There should be collaboration among regulatory bodies and stakeholders on the application of epoxy for concrete repairs. The study holds immense significance in the sustainable repair of concrete' cracks.

Keywords: Concrete Repair, Crack, Epoxy Resin, Structural defect, Sustainability

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Investigation on the Utilisation of Coffee Husk Ashes to Stabilise Expansive Soil for Road's Subgrade Improvement

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Abstract
The use of expansive soils in civil constructions can damage the structure due to volumetric fluctuations. The coffee husk ash was mixed with expansive soil in different proportions, and the laboratory tests, including compaction, free swell, Atterberg limits, sieve analysis, and California bearing ratio (CBR), were used in this study to examine their properties. The neat soil presented high to very high degrees of expansion, reaching a swell of around 1.66% and a plasticity index of 32.16%. To evaluate the effect of coffee husk ash (CHA) in soil-ash mixtures using CHA contents of 5%, 10% and 20%, the results confirmed that as CHA content increased to 20% the properties of neat expansive soil were modified due to reduced clay fraction, increased silt fraction and CBR to 19.70%, and decreased plasticity index and CBR swell to 20.61% and 0.47% respectively.

Keywords: Construction Material, Coffee Husk Ash, Expansive Soil, Local Resources, Stabilisation.

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Country-Specific Opportunities for Synergistic Waste Utilisation in the United Kingdom and China

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Abstract
While technical literature extensively documents the potential of synergistic utilisation of construction demolition waste (CDW) and agricultural waste as cement alternatives, understanding of country-specific implementation contexts remains fragmented. This qualitative study examines how national institutional frameworks, policy discourses, and industry practices shape opportunities for sustainable waste-to-cement strategies in the United Kingdom and China through a comprehensive analysis of secondary sources. Utilising document analysis, this research reveals distinct implementation paradigms that reflect contrasting approaches to construction innovation, environmental governance, and industrial development. The UK demonstrates a regulatory-driven paradigm characterised by comprehensive standards, stakeholder consultation, and evidence-based implementation, while China exhibits a development-oriented paradigm emphasising rapid scaling, policy experimentation, and adaptive management. The result analysis further reveals how these paradigms create fundamentally different opportunity structures for waste utilisation. The UK's approach favours high-specification, niche applications with extensive validation requirements, while China's paradigm enables large-scale deployment through pilot programs and iterative improvement.

Keywords: Construction Waste, Agricultural Waste, Sustainable Construction, Policy Analysis, Implementation Paradigms, United Kingdom, China

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Assessing the Possibilities of Enhancing Infrastructure for Environmental and Waste Management in Soweto

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Abstract

Townships face environmental and waste management challenges due to population growth and inadequate infrastructure. Improper waste disposal, illegal dumping, and limited recycling initiatives contribute to environmental degradation. This study assesses the effectiveness of current waste management strategies in Soweto and the potential of enhancing the infrastructure to support sustainable and inclusive environmental and waste management solutions. Deploying a case study design using a Qualitative approach, including bibliometric mapping and semi-interviews, the research examines existing waste collection infrastructure, exploring innovative strategies for improvement. Findings reveal that while some waste management interventions have been implemented, factors such as insufficient waste collection services and lack of community engagement hinder their success. Further, there is a rise of informal waste reclaimers that assist in recycling efforts but operate under minimal proper infrastructure support. The study highlights the need for integrated infrastructure and sustainable waste management solutions. Additionally, the study recommends the developed strategic conceptual plan.

Keywords: Enhanced Infrastructure, Waste Management, Smart Waste Technology, Soweto, Informal Waste Reclaimers

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Condensation and Mould in Low-Income Housing: Causes, Health Risks and Design Strategies in the Southern Cape

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Abstract

Condensation problems in housing are a common issue that can cause damage to buildings, promote the growth of mould and pose health risks to occupants. The causes of condensation problems are complex, including high humidity levels, poor insulation, inadequate ventilation, and thermal bridging. These issues are exacerbated in modern, energy-efficient buildings prioritising airtightness and thermal performance. This research investigates the factors contributing to condensation problems in low-income housing and their interplay to provide insights and recommendations for improving building design, construction, and maintenance practices to mitigate the risk of condensation-related problems. The study uses empirical data collected from case studies of buildings in South Africa and uses a combination of quantitative and qualitative research methods to identify and evaluate the factors associated with condensation problems in the low-income housing sector. The results will provide a basis for developing appropriate design and building practices that prioritise ventilation and indoor air quality.

Keywords: Low-income housing, Condensation, Ventilation, Structural Degradation, Thermal Bridging

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Evaluation of Biogas Production from Cassava Peels, Cow Dung and Oil Palm Fuel Ash

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Abstract
When the digestion process is not stabilised with chemicals or buffering material in the slurry, biogas from cassava peels and cow dung has low methane concentrations. Two 235L digesters were utilised, digester A had 30 kg of cassava peel, 30 kg of cow dung, and 120 kg of water in the ratios of 1:1:4 and digester B had 30 kg of cassava peel, 30 kg of cow dung, 120 kg of water, and 2.4 kg of oil palm fuel ash, in the ratio of 1:1:4:0.08. A digester named Digester A generated 1070.3 litres of biogas with a maximum methane content of 33.6%. Digester B, on the other hand, generated 1178.1 litres of biogas with a maximum methane content of 60.1%. This result showed that adding oil palm fuel ash as a buffer for pH stabilisation caused a larger amount of produced biogas and methane content.

Keywords: Anaerobic Digestion, Biogas, Environmental Sustainability, Methane, Sustainable Technology

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Food Waste Management in Restaurants of Peri-urban Communities: Evidence from Warri, Nigeria

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Abstract
Food waste, an ecological, social and economic issue, occurs in various ways and if not disposed off appropriately, could pose several problems for both the environment and residents. The study evaluated food waste management practices in 13 peri-urban restaurants in Warri, Nigeria, using both qualitative and quantitative methods, with 410 customers participating in the survey. The study found that waste collection baskets are the most commonly used tool for waste collection in selected restaurants, with 53.8% accumulating and disposing of waste weekly. Only 14.14% of customers praised their waste management practices. While 84.61% of restaurants employ the services of waste management agencies for their waste disposal needs, 30.7% of participating managers confirmed that their restaurant's food waste management and disposal practices pose obvious environmental concerns. The study recommends the use of compostable bins as well as intense public awareness exercises to promote sustainability in restaurant food waste management in peri-urban areas.

Keywords: Environmental Sustainability, Food Waste, Pollution, Restaurants, Waste Management.

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Industrial Solid Waste Management Practices in Ota, Ogun State, Nigeria

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Abstract
One of the targets of the SDGs, Goal 11, is to reduce the adverse environmental impact of waste management practices. This study aims to analyse the components of industrial solid waste generated and the waste management practices in Ota, Ogun State. Data from seventy-seven (77) questionnaires from seven sectors revealed that industries generate an average of 103kg of solid waste daily. The study found that plastic and rubber waste had the highest volume (38%), while easily compostable waste had (23%). Other components identified included glass and metals (9%), aluminium (7%), and paper (10%). Most industries (31%) use open dumping, 23% incineration, and 13% open burning for solid waste management, while a few employ landfilling (12%), burying (7%), and 14% contract this activity. The study recommends the enforcement of laws for recycling waste, and the amount of waste generated annually must be required by law to be reported and audited.

Keywords: Environmental Pollution, Industrial Solid Waste, Sustainable Development, Waste Management, Waste composition