

2026

CONSTRUCTION BUSINESS & PROJECT MANAGEMENT CONFERENCE

4th EDITION



23 - 25 JUNE 2026



**UCT GRADUATE SCHOOL OF
BUSINESS, CONFERENCE CENTRE,
CAPE TOWN, SOUTH AFRICA**

BOOKS OF ABSTRACTS



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FOREWORD

Welcome from the Conference Chair

Professor Abimbola Windapo, University of Cape Town

On behalf of the Construction Business and Project Management Research Group, University of Cape Town, and the entire Organising Committee, it is my honour and pleasure to welcome you to the 4th Annual Construction Business and Project Management Conference (CBPM 2026), taking place from 23–25 June 2026 at the UCT Graduate School of Business Conference Centre, Cape Town, South Africa.

This year’s conference theme, “Towards Resilient Futures: Sustainable Construction and Innovation in the Built Environment,” speaks directly to the urgent need for transformative, inclusive and multidisciplinary approaches to construction business and project management. CBPM 2026 provides an important platform for bringing together academia, industry, government, regulatory bodies, manufacturers, professionals and emerging scholars to exchange knowledge and develop practical solutions for a more resilient and sustainable construction sector. The 2026 programme has been carefully curated to reflect the dynamic interface between research, policy and practice. Day 1 features the Innovative Building Technologies (IBT) Advancement Workshop, designed to move IBTs beyond pilot projects towards scalable implementation. Days 2 and 3 will expand the conversation through keynote addresses, plenary presentations, parallel academic sessions and focused discussions across the conference sub-themes. We are honoured that the Honourable Deputy Minister of Public Works and Infrastructure, South Africa, Hon. Sihle Zikalala, will once again deliver a keynote address. We also warmly welcome our distinguished guest speakers and presenters, including Mr Bongani Dladla, CEO of the Construction Industry Development Board; Mr. Richard Somanje, CEO of Agrément South Africa; Mr Craig Makapela of the National Home Builders Registration Council; Dr Martin Röck; Professor Henry Abanda; and Dr Shaun Lundy.

The academic programme reflects the breadth and depth of contemporary scholarship in construction business and project management. I thank the Scientific Committee, reviewers and editorial team for supporting a rigorous review process and ensuring that the conference continues to serve as a credible platform for research dissemination and industry engagement. I also wish to express our deep appreciation to our platinum sponsorship partners, the Construction Industry Development Board (cidb) South Africa and the National Home Builders Registration Council (NHBRC), for their generous support. We also acknowledge the valued contributions of our institutional partners, professional bodies, participating manufacturers, presenters, panellists and delegates whose involvement strengthens the impact of CBPM 2026.

I encourage all delegates to participate fully in the conference sessions, workshop activities, networking opportunities and the CBPM 2026 cocktail event. Participation in the conference earns 2.1 SACPCMP CPD credits, equivalent to 21 CPD hours, further reinforcing the value of this gathering for professional development and lifelong learning.

Thank you for joining us in Cape Town for CBPM 2026. May this conference inspire new ideas, build lasting collaborations and contribute meaningfully to resilient futures for sustainable construction and innovation in the built environment.

Warm regards,



Prof. Abimbola Windapo
CBPM 2026 Conference Chair

ENDORSEMENTS

The Construction Business and Project Management Conference is accredited by the South African Council for the Project and Construction Management Professionals (SACPCMP) for **2.1 CPD Credits**. The conference is also supported by the Journal of Construction Business and Management.



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The success of the 4th edition of the CBPM Conference is a testament to the dedication and voluntary contributions of the Scientific Committee. We are deeply grateful to its members, whose collaboration with the CBPM Committee ensured a rigorous and constructive peer-review process.

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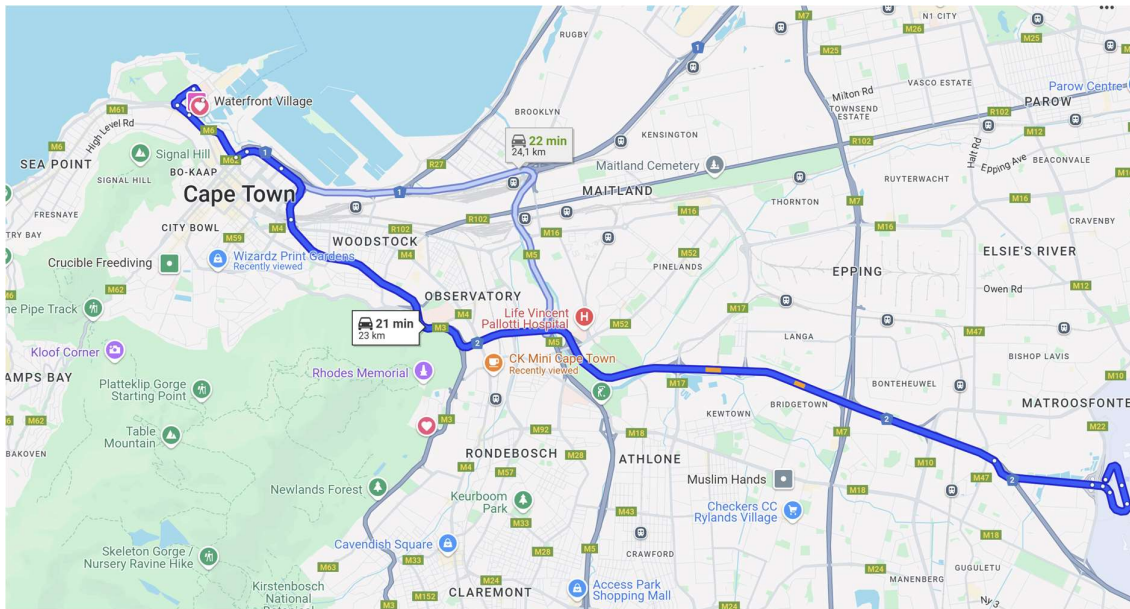
<u>DAY 2 — WEDNESDAY, 24 JUNE 2026</u>		
Parallel Session 1	Session Titles	Tentative Chairs
Room A	Sustainable, Low-Carbon, Climate-Resilient Infrastructure, Buildings and Housing I	Prof Molusiwa Stephan Ramabodu
Room B	Project Governance, Business Strategy, Procurement, Contracting and Financial Performance I	Prof. John Smallwood
Room C	Digital Transformation, AI, BIM, Robotics and Smart Construction Systems I	Dr Adeola Oluwatoyin Osundiran
Parallel Session 2	Session Titles	Tentative Chairs
Room A	Digital Transformation, AI, BIM, Robotics and Smart Construction Systems II	Prof Justus Ngala Agumba
Room B	Project Governance, Business Strategy, Procurement, Contracting and Financial Performance II	Dr Lindelani Matshidze
Room C	Room C: Health, Safety, Wellbeing, Inclusion and Workforce Culture I	Prof Makgopa Tshehla
Parallel Session 3	Session Titles	Tentative Chairs
Room A	Sustainable, Low-Carbon, Climate-Resilient Infrastructure, Buildings and Housing II	Dr Chikezirim Okorafor
Room B	Project Governance, Business Strategy, Procurement, Contracting and Financial Performance III	Dr Athenkosi Sogaxa
Room C	Construction Education, Skills, Capacity Development and Professional Competence I	Prof Nishani Harinarain
<u>DAY 3 — THURSDAY, 25 JUNE 2026</u>		
Parallel Session 4	Session Titles	Tentative Chairs
Room A	Digital Transformation, AI, BIM, Robotics and Smart Construction Systems III	Dr. Zakheeya Armoed
Room B	Project Governance, Business Strategy, Procurement, Contracting and Financial Performance IV	Luviwe Bikitsha
Parallel Session 5	Session Titles	Tentative Chairs
Room A	Sustainable, Low-Carbon, Climate-Resilient Infrastructure, Buildings and Housing III	Dr. Okosun Senator Endurance
Room B	Digital Transformation, AI, BIM, Robotics and Smart Construction Systems IV	Mr Johnbosco Mulwana
Parallel Session 6	Session Titles	Tentative Chairs
Room A	Health, Safety, Wellbeing, Inclusion and Workforce Culture II	Dr Steve Kabemba
Room B	Project Governance, Business Strategy, Procurement, Contracting and Financial Performance V	Mr. Fabio Companie

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CONFERENCE VENUES: VENUE 1 & VENUE 2

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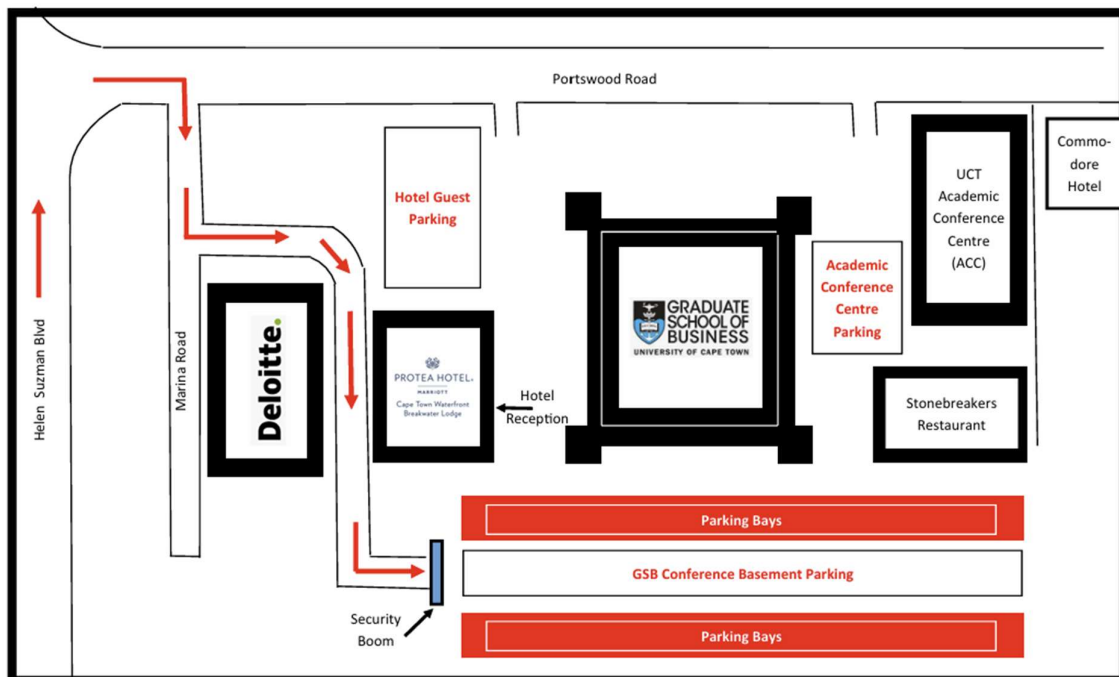


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**FOCUS AREA 1: DIGITAL TRANSFORMATION,
AI, BIM, ROBOTICS AND SMART
CONSTRUCTION SYSTEMS**

ASSESSING CRITICAL SUCCESS FACTORS FOR IMPLEMENTING ARTIFICIAL INTELLIGENCE (AI) IN PUBLIC PROCUREMENT

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Abstract

Artificial intelligence (AI) offers significant potential to enhance efficiency and accountability in public procurement, yet its implementation remains limited, particularly in developing economies. Drawing on Institutional Theory and the Technology-Organisation-Environment (TOE) framework, this study identifies and clusters critical success factors (CSFs) for AI implementation in Nigerian public procurement. A quantitative survey of 71 procurement professionals across federal Ministries, Departments, and Agencies (MDAs) assessed 38 CSFs derived from literature. Data were analysed using descriptive statistics and exploratory factor analysis (EFA) with principal component extraction and Varimax rotation. Results identified appropriate team skills and knowledge, adequate technical know-how in AI tools, and adequate knowledge of AI applications as the top three CSFs. EFA revealed a ten-component model explaining 76.13% of variance, comprising: internal process coordination, data infrastructure, strategic leadership, vendor partnership, early-stage planning, user competence, data governance, project clarity, executive support, and technical compatibility. All components demonstrated acceptable reliability (Cronbach's $\alpha = .623-.891$). The study contributes an empirically derived ten-factor model to guide evidence-based policymaking for AI adoption in public procurement. Limitations include the exploratory nature of the findings and the Nigeria-specific context, requiring validation in other settings.

Keywords: Artificial intelligence, critical success factors, public procurement, implementation, factor analysis, developing economy

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DIGITAL TWINS: IMPLICATION FOR CONSTRUCTION MATERIAL SUPPLY CHAIN

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Abstract

Fragmentation, inefficiency, and poor performance are salient matters affecting the building sector. This research explores the role of Digital Twin Technology (DTT) in mitigating inefficiencies in the construction material supply chain. DTT plays a crucial role in improving the efficiency of the construction materials supply chain. This study outlines the critical roles of DTT in the construction supply chain. This exploratory research reveals the significance of DTT in the construction materials value chain and the implications for sub-Saharan Africa. This research adopts a quantitative research design. A Bibliometric-Systematic literature review was conducted by sourcing peer-reviewed articles from selected databases, including Web of Science and Scopus. Relevant themes on the role of DTT in the CMSC were generated. With the use of Vos Viewer, five critical themes (Management, Efficiency, Performance, Digital Transformation, Safety, Systems, Networks) were generated and explored on the pivotal role of DTT in the CMSC. These themes show the importance of the application of DTT in enhancing construction material supply chains. Findings of the research provide the need to expedite the implementation of DTT within Africa, since there is a lag in implementation due to several factors, such as the unawareness of the capabilities of DTT for strategic decisions in the construction sector. This study is significant because it shows how DTT can improve the construction supply chain management and enhance digital transformation.

Keywords: Construction Supply Chain, Digital Twin Technologies, Sub-Saharan Africa, Bibliometric Analysis, and VOSviewer

ASSESSING THE INTEGRATION AND UTILISATION OF ROBOTICS IN THE SOUTH AFRICA CONSTRUCTION INDUSTRY

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Abstract

Purpose: This study assesses the integration and utilisation of robotics in the South African construction industry by examining the major operational, technological, and cost-related barriers affecting adoption, as well as strategies for improving effective implementation. **Design/Methodology/Approach:** A qualitative research approach was adopted using a systematic literature review (SLR). Fifty-five peer-reviewed journal articles, industry reports, and policy documents were analysed using thematic analysis to identify recurring patterns relating to robotics adoption, cost implications, and implementation strategies within the South African construction context. **Findings:** The findings reveal that robotics utilisation in South African construction remains limited and largely pilot driven. Economic and financial barriers emerged as the most significant challenge, cited in 54.5% of reviewed studies, followed by skills and organisational readiness constraints (49.1%) and technological and infrastructural limitations (41.8%). Cost-related impacts were dominated by upfront capital investment (50.9%) and maintenance and lifecycle costs (47.3%). The study further identified key adoption strategies, including financial incentives, skills development initiatives, technological infrastructure readiness, and regulatory reforms to support Construction 4.0 implementation. **Practical Implications:** The study provides actionable insights for policymakers, contractors, and professional bodies by highlighting the need for funding support, workforce upskilling, infrastructure improvement, and supportive regulatory frameworks. **Originality/Value:** The study contributes context-specific evidence on robotics adoption in South Africa, addressing a gap in African construction research by integrating operational, technological, and financial perspectives. **Research Limitations:** The study relies on secondary data and lacks empirical validation from live construction projects. Future research should incorporate quantitative surveys and case studies to evaluate the performance and return on investment of robotics in construction projects.

Keywords: Automation in Construction, Construction Robotics, Robotics Adoption, South African Construction Industry

DRIVERS AND BARRIERS TO THE ADOPTION OF ROBOTICS AND 3D PRINTING IN CONSTRUCTION IN THE GLOBAL SOUTH: A SYSTEMATIC REVIEW

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Abstract

This study used a systematic literature review guided by the PRISMA approach to identify and critically analyze the main drivers and barriers affecting the adoption of robotics and three-dimensional (3D) printing in construction across the Global South. Peer-reviewed articles, book chapters, and books were examined from the Scopus and Web of Science databases covering 2020 to 2026. The review framework allowed for the organized identification of enabling factors, such as productivity improvements, design flexibility, and sustainability goals, as well as major obstacles, including high capital costs, limited technical skills, infrastructural gaps, and socio-cultural resistance. The results show that while the technological potential of robotics and 3D printing (additive manufacturing) is widely recognized, adoption is mainly hindered by structural and institutional issues rather than technical limitations. By highlighting specific context-related factors, this review advances construction innovation research and offers practical insights for policymakers, industry leaders, and development partners working in the construction sector in the Global South.

Keywords: Automation, Construction Technology, Global South, Robotics, 3D Printing

ROBOTIC TECHNOLOGIES FOR HAZARDOUS CONSTRUCTION TASKS: IMPLICATIONS FOR OCCUPATIONAL HEALTH AND SAFETY

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Abstract

This study examines the potential roles of robotic technologies in executing hazardous construction tasks and advancing occupational health and safety (OHS). Drawing on a comprehensive analysis of accident trends, risk profiles, and limitations of conventional safety management using structured literature review methodology, the study synthesizes current applications of robotics in work at height, demolition, excavation, confined spaces, and emergency response. It evaluates the integration of robotics with digital construction systems (BIM, IoT, and AI) and analyses levels of automation and human–robot interaction. The findings highlight significant potential for risk reduction, ergonomic improvement, and accident prevention, while also identifying emergent safety, psychological, and regulatory challenges associated with collaborative robotics. By examining drivers, barriers, and global adoption patterns, the study advances a socio-technical perspective on safe automation and proposes policy, industry, and research pathways to support responsible and sustainable deployment of robotics in hazardous construction environments.

Keywords: Construction Robotics, Occupational Health and Safety, Hazardous Work, Automation, Human–Robot Interaction

INTEGRATING GENERATIVE AI INTO QUANTITY SURVEYING MEASUREMENTS: IMPACTS ON LEARNING AND PROFESSIONAL JUDGEMENT

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Abstract

The increasing availability of Generative Artificial Intelligence (GenAI) tools is reshaping teaching, learning, and assessment practices in higher education. While GenAI offers opportunities to support independent learning and accessibility, concerns remain regarding student engagement, attendance, assessment authenticity, and competency development within applied disciplines. These concerns are particularly relevant in Quantity Surveying (QS) education, where measurement modules require students to develop technical competence, analytical reasoning, and professional judgement through guided practical activities. This study investigates the relationship between student attendance and academic performance within a Level 4 QS Measurements module delivered at a UK higher education institution. A quantitative research approach was adopted using secondary data analysis of anonymised attendance records and assessment outcomes from 60 undergraduate students. Descriptive statistical analysis was conducted to examine patterns between attendance, coursework performance, and overall module achievement. Findings suggest that students attending seven to ten sessions generally achieved higher average grades and pass rates than students attending fewer sessions. The analysis also identified variation between CW01 and CW02 performance, suggesting that different assessment components may evidence different aspects of students' technical understanding within technology-enabled learning environments. This study contributes empirical evidence to the limited literature on attendance-performance relationships in QS education. The findings suggest that attendance remains an important component of academic performance in Quantity Surveying measurement education and highlight the need for authentic assessment approaches that support technical competency development in AI-enabled learning environments.

Keywords: Student Attendance; Academic Performance; Generative Artificial Intelligence (GenAI); Quantity Surveying Education; Measurement Education

BLOCKCHAIN-ENABLED SOLUTIONS IN CONSTRUCTION DISPUTE RESOLUTION: A BIBLIOMETRIC AND THEMATIC ANALYSIS

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Abstract

This study systematically investigates blockchain-enabled dispute resolution in the context of fragmented frameworks. Notably, a gap still exists in systematic quantification and thematic mapping that directly addresses construction disputes. Thus, the study examines the key constructs, research directions, and theme development in blockchain-based approaches to construction dispute resolution, using a combined bibliometric and thematic analysis. The study employs a quantitative bibliometric design, based on peer-reviewed publications from the Scopus database, spanning 2017 to 2025. It also includes qualitative thematic interpretation of keyword clusters and key publications to support the bibliometric results. The search string TITLE-ABS-KEY (blockchain AND (construction OR "built environment") AND ("dispute resolution" OR claims OR arbitration OR litigation OR "smart contracts")). This study is limited to English-language publications indexed in Scopus, excluding industry and legal reports. A total of 147 documents were analysed for the study using VOSviewer software. The results show a steady increase in scholarly publications over time. The network visualisation demonstrates that blockchain-enabled solutions in construction dispute resolution are organised around four thematic pillars: decentralised digital governance for dispute prevention, blockchain-enabled supply chain and lifecycle accountability, smart contract-driven contractual automation in construction projects, and BIM-based information modelling. The study hereby concludes that integrating decentralised ledgers, automated contracts, secure information management, and lifecycle modelling, blockchain research in construction is increasingly positioned not merely as a technological innovation, but as a systemic mechanism for dispute prevention and resolution.

Keywords: Blockchain technology, Claims, Construction disputes, Dispute resolution, Smart contracts

LEVERAGING ON DIGITAL TECHNOLOGIES FOR ASSESSING COST ESTIMATION ACCURACY IN RENOVATION AND REFURBISHMENT PROJECTS TOWARDS IMPROVED PROJECT DELIVERY

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Abstract

This study investigates the impact of digital technologies on improving cost estimation accuracy in refurbishment projects, with the aim of enhancing project delivery through cost certainty. Conducted in Bloemfontein, Free State, South Africa, the research utilized a mixed-methods approach, combining quantitative data from 30 structured questionnaires with qualitative insights from 4 semi-structured interviews with construction professionals. Descriptive statistics were employed to evaluate the effectiveness of various estimation tools, while thematic analysis identified key barriers and enablers influencing digital technology adoption. Single coding was applied due to the study's small, pilot nature and interpretive focus. Findings reveal that advanced tools such as Building Information Modelling (BIM) and Laser Scanning Technology (LST) significantly improve estimation accuracy; however, their use is limited by high costs, lack of technical expertise, and insufficient as-built data. Despite the superior precision of these digital solutions, manual estimating methods remain dominant due to resource constraints and resistance to change. The study contributes original insight by linking digital tool adoption directly to cost estimation inaccuracies in R&R projects, rather than only examining adoption barriers as in prior BIM research. It highlights an "effectiveness-adoption gap," where advanced technologies like BIM and Laser Scanning/LiDAR are highly valued but underused, while simpler tools such as QTO are more widely adopted due to practical constraints. Integrating digital tools with traditional estimation practices is recommended to enhance accuracy, reduce project risks, and improve project cost outcomes in the construction sector.

Keywords: Digital technologies, Construction Project Management, Renovation and Refurbishment, Cost Estimation

ASSESSING ORGANISATIONAL READINESS FOR AI-ENABLED TOTAL QUALITY MANAGEMENT IN NIGERIAN CONSTRUCTION FIRMS

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Abstract

This study explores the organisational readiness of Nigerian construction contracting firms for the integration of Artificial Intelligence (AI) into Total Quality Management (TQM) systems. Adopting a quantitative approach, data were collected through a structured questionnaire and analysed using descriptive statistics and inferential statistics. The study evaluates key readiness dimensions, including technological infrastructure, data governance, workforce skills, leadership commitment, regulatory environment, cultural attitudes, and financial capacity. These dimensions are conceptualized within the Technology Organization Environment (TOE) framework as an organizing lens. Findings indicate a moderate level of readiness across the sector, with notable variation observed among small, medium, and large firms. Technological infrastructure and TQM maturity show comparatively higher readiness, while gaps exist in data management, workforce competencies, and regulatory clarity. Inferential analysis suggests differences across firm sizes in workforce skills, cultural attitudes, TQM practices, and supply chain integration. The study provides contextual, analytic perceptions from a developing economy setting and offers preliminary insights for industry stakeholders and policymakers seeking to support AI-enabled quality management in construction.

Keywords: Artificial Intelligence (AI); Total Quality Management (TQM); Organizational Readiness; Construction Industry, Nigeria

LEVERAGING ARTIFICIAL INTELLIGENCE FOR SUSTAINABLE AIRFIELD MAINTENANCE: A PROJECT MANAGEMENT PERSPECTIVE FROM AIR FORCE BASE WATERKLOOF, SOUTH AFRICA

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Abstract

Due to the lack of effective airfield maintenance, the study investigated the effect of leveraging artificial intelligence (AI) driven predictive analytics for sustainable airfield maintenance at Air Force Base Waterkloof. The study further investigated maintenance schedules for incorporable systems/elements such as civil, electrical, mechanical and environmental for airfield maintenance practices. AI technology is identified as diagnosis of pavement and lighting systems. Methodological approach was through a prior review of literature and case-based evidence, which informed identification of key constructs and variables examined in the study. It conducted a review of relevant literature and case evidence. Data was collected using survey captured variables related to maintenance practices, operational challenges, and AI enabled applications. There was reliance on the survey method used to collect perceptions. The availability of classified operational information was also limited owing to the nature of the military setting. Study applied a survey-based research design with a qualitative structured questionnaire administered to 316 airfield maintenance personnel ranging from General Worker, Artisans, Civil Technicians, Electrical Technologists, Civil Engineers, Project Manager, Facility Manager, Environmentalist and to Runway Management/Stakeholder using purposive sampling. The findings suggested that integrating technology into requires young professionals that are more receptive to AI. For Gender the study reflected a traditionally male-dominated nature of technical and military environments. There was mid-career experienced cohort with secondary education, few engineer and management cadre. Respondents demonstrated strong support for AI applications, particularly in predictive and automated inspections for decision-support systems. Descriptive statistics (means and standard deviations) and inferential analysis (significance testing using p-values) used to evaluate relationships among variables. Differences among the maintenance programs are significant as all p-values were below 0.05 with predictive maintenance being $p=0.003$. Future research should explore long-term effects and broader educational contexts with AI becoming a tool for transitioning toward predictive systems in the military and other infrastructure-intensive sectors. Study examined the policy and governance aspects of digital transformations in military infrastructure, institutional frameworks, procurement processes, and cyber security. The study will tactically align the South African airfields with 4IR.

Keywords: Airfield Maintenance; Artificial Intelligence; Construction Project Management; Infrastructure; Predictive Maintenance

FACTORS INFLUENCING CONSTRUCTION FIRMS' DECISION-MAKING PROCESSES REGARDING THE ADOPTION OF DIGITAL TECHNOLOGY IN THE SOUTH AFRICAN CONSTRUCTION INDUSTRY

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Abstract

The adoption of digital technology has the potential to improve efficiency, productivity, and competitiveness within the construction industry; however, adoption levels among construction firms in South Africa remain uneven. This study examines factors influencing construction firms' decision-making processes regarding digital technology adoption within the Gauteng construction industry, South Africa. The study aims to identify organisational, technological, and environmental factors shaping adoption decisions. A quantitative research design was employed using a structured questionnaire administered to construction professionals in Gauteng Province. A total of 112 valid responses were obtained and analysed using descriptive statistics, exploratory factor analysis (EFA), and chi-square tests. The findings reveal that the availability of skilled personnel and the cost of implementation are the most influential factors affecting adoption decisions. Furthermore, factor analysis identified three major components influencing decision-making: organisational and strategic factors, external and human resource factors, and cost considerations. The study contributes empirical evidence specific to Gauteng Province and provides insights for policymakers and industry stakeholders to improve digital transformation strategies within the construction industry.

Keywords: Digital technology adoption; Decision-making processes; Construction firms; Gauteng construction industry; Technology adoption factors; Construction innovation

IMPEDIMENTS IN READINESS TO ADOPT BIM TECHNOLOGY FOR H&S AMONG SMALL & MEDIUM CONTRACTORS IN KZN

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Abstract

The construction industry remains hazardous, with ongoing accidents and fatalities. Building Information Modelling (BIM) can improve health and safety (H&S) management through better visualisation, risk detection, and collaboration. While large firms have adopted BIM, Small and Medium Enterprises (SMEs), which constitute the majority of South African construction companies, face challenges in adopting new technologies. Understanding SME readiness to implement BIM for H&S is crucial for targeted interventions and policies to improve safety. This study evaluated SMEs in KwaZulu-Natal (KZN) regarding BIM for H&S management, using a positivist, deductive, quantitative approach. A simple random sample of 130 SMEs registered with the Construction Industry Development Board (CIDB) in KZN completed structured questionnaires. Readiness was assessed across five organisational factors: strategy, leadership, culture, people, and technology. Results showed SMEs in KZN had a neutral readiness level for BIM adoption, neither strong nor weak. Targeted initiatives like affordable training, SME-specific frameworks, leadership campaigns, government incentives, and industry collaborations are needed to raise readiness.

Keywords: Building Information Modelling, Health and Safety, Small and Medium Contractors, Readiness level

EXAMINATION OF THE LEVEL OF AWARENESS AND BENEFITS OF THE ADOPTION OF BUILDING INFORMATION MODELLING (BIM) ON EFFECTIVE PROJECT DELIVERY OF HIGH-RISE BUILDINGS IN SELECTED CITIES IN NIGERIA

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Abstract

This study assessed the level of Building Information Modelling (BIM) awareness and quantifies the perceived benefits of its adoption for effective high-rise building project delivery in Lagos and Port Harcourt, Nigeria. A quantitative cross-sectional survey was conducted with a calculated sample size of 392 registered construction professionals (architects, engineers, builders, and quantity surveyors) in the two cities. A total of 298 valid questionnaires were retrieved and analysed using descriptive statistics, mean scores (1–5 scale), and the Relative Importance Index (RII). Eight refined variables measured BIM awareness: Technical Proficiency, Software Accessibility, Regulatory Framework, Educational Integration, Collaborative Readiness, Cost-Time Perception, Management Support, and Design Integration. Nine refined variables captured perceived benefits: Cost Efficiency, Schedule Optimization, Quality Enhancement, Risk Reduction, Stakeholder Communication, Sustainability Performance, Data Integrity, Lifecycle Management, and Competitive Advantage. Awareness analysis revealed that Collaborative Readiness ranked highest (Mean=3.18, RII=0.636), while Design Integration ranked lowest (Mean=1.82, RII=0.364). Technical Proficiency (Mean=2.43, RII=0.486) and Software Accessibility (Mean=2.01, RII=0.402) showed moderate but insufficient levels. Benefit analysis showed Cost Efficiency (Mean=4.77, RII=0.954) and Schedule Optimization (Mean=4.70, RII=0.940) as the most recognised benefits, whereas Competitive Advantage ranked lowest (Mean=4.46, RII=0.892). A critical perception gap of approximately 40–50% was identified across all variables – professionals perceive BIM as highly beneficial but demonstrate low practical awareness and implementation. Nigerian construction professionals are aware of BIM, but its potential benefits remain underutilised due to systemic barriers: inadequate software access, weak regulatory frameworks, and insufficient technical training. Strategic interventions include mandatory BIM policies for high-rise projects exceeding ten stories, integration of BIM into university curricula, government-subsidised software licences, and the establishment of regional BIM competence centres in Lagos and Port Harcourt.

Keywords: Building Information Modelling (BIM); Awareness; Perceived Benefits; High-Rise Buildings; Project Delivery; Construction Industry; Nigeria

BIM ADOPTION STRATEGIES FOR SMES TO MANAGE CONSTRUCTION PROJECT RISK IN THE WESTERN CAPE PROVINCE OF SOUTH AFRICA

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Abstract

The construction industry plays an important role by creating jobs through small and medium-sized enterprises (SMEs). Despite their importance, construction SMEs in South Africa continue to face substantial project risks. The purpose of this research was to determine Building Information Modelling (BIM) adoption strategies that can be implemented by construction SMEs in the Western Cape Province of South Africa to manage construction project risks. A quantitative methodological approach using a structured online questionnaire survey was used. The research data was analysed using only descriptive (percentages, mean, standard deviation, etc.) statistics. The sample population was construction SMEs registered on the Construction Industry Development Board (cidb) register of contractors between Grade 1 and 6 under the General Building (GB) and/or Civil Engineering (CE) categories. The sample size was 25 construction SMEs selected using the voluntary response sampling method. The top perceived BIM strategies include: government grants that support small businesses; offering of continuous professional development and certification programmes and, collaboration between SMEs and larger construction companies and universities. The findings can assist construction SMEs in the Western Cape to understand the relationship between the strategies for adopting BIM and how it can improve the management of project risks contributing to long-term business growth.

Keywords: Building Information Modelling, Construction Project Risks, Small Medium-Sized Enterprises (SMEs)

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STRATEGIES FOR IMPROVING THE ADOPTION OF DIGITAL TECHNOLOGIES IN THE CONSTRUCTION INDUSTRY

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Abstract

The construction industry can significantly boost productivity, efficiency, collaboration, and project performance through the adoption of digital technology. Despite these advantages, integration in many provinces of South Africa remains slow and inconsistent. This study aims to develop a strategy for improving digital technology adoption within the construction industry. A qualitative research design was employed, and data were collected through semi-structured interviews with 17 construction professionals in South Africa's Free State Province. Thematic analysis was used to identify and interpret key themes related to digital technology adoption. Findings indicated diverse levels of familiarity and engagement with digital technologies among participants, alongside several influencing factors. Based on these insights, a four-step strategy was developed: (1) Defining clear goals for digital technology implementation; (2) Investing in appropriate digital technologies; (3) Fostering collaboration and communication among project stakeholders; and (4) Prioritizing education and skills development. This proposed strategy offers a practical, context-specific framework for construction organizations to facilitate digital transformation and enhance operational efficiency. By moving beyond merely identifying adoption barriers, this study contributes to the growing knowledge on construction digitalization by providing an empirically grounded strategy to support effective digital technology implementation, ultimately promoting improved productivity, competitiveness, and long-term industry development.

Keywords: Construction industry; Digital technology adoption; Digital transformation; Technology implementation strategy; South Africa

AN EVALUATION OF AUTOMATED TENDERING SYSTEMS AS A SOLUTION TO CHALLENGES IN TRADITIONAL TENDERING PROCESSES

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Abstract

Traditional tendering processes are frequently associated with prolonged procurement timelines, high administrative costs, limited transparency, and vulnerability to human error and corruption. Despite growing interest in digital procurement transformation, limited studies have critically evaluated automated tendering systems within the context of procurement efficiency and governance challenges in developing environments. This study evaluates automated tendering systems as a digital solution to the limitations of traditional tendering processes. A qualitative exploratory research design was adopted using a systematic literature review and thematic content analysis of peer-reviewed journal articles, conference papers, and policy documents related to e-procurement and automated tendering systems. The findings indicate that automated tendering systems improve procurement efficiency, enhance transparency and accountability, reduce manual intervention, and improve access to procurement information. However, challenges such as inadequate technological infrastructure, limited digital literacy, regulatory uncertainties, and resistance to organizational change continue to constrain implementation. The study contributes to existing procurement literature by providing an integrated evaluation of both the opportunities and implementation barriers associated with automated tendering systems. The paper concludes that while automated tendering systems present a practical approach to improving procurement performance, successful implementation depends on investment in infrastructure, regulatory support, and stakeholder capacity development.

Keywords: automated tendering, e-procurement, procurement efficiency, transparency, digital transformation

TRANSFORMING CONSTRUCTION EDUCATION THROUGH ARTIFICIAL INTELLIGENCE AND SIMULATION-BASED WORK INTEGRATED LEARNING: A SYSTEMATIC LITERATURE REVIEW

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Abstract

The rapid advancement of Artificial Intelligence (AI) is transforming higher education, particularly in professionally oriented fields such as construction education. At the Central University of Technology, Work Integrated Learning (WIL) plays a vital role in preparing students for industry readiness and digital transformation. However, limited industry placements, assessment integrity, and growing digitalisation have increased interest in simulation-based and AI-enabled WIL models. This systematic literature review (SLR) investigates the integration of AI into simulation-based WIL in construction education. Using PRISMA principles, literature published between 2016 and 2026 was systematically reviewed and analysed. 38 scholarly articles were reviewed. Thematic analysis identified key themes including AI-enabled pedagogy, simulation-based WIL, assessment transformation, governance and ethics, and student readiness. Findings indicate that AI can enhance simulated WIL through reflective learning, technical report writing, problem-solving, adaptive learning, and digital collaboration. AI integration further improves student engagement, workplace preparedness, and access to construction knowledge where traditional placements are limited. Despite these benefits, concerns remain regarding assessment authenticity, overreliance on generative AI, digital literacy inequalities, ethical risks, and weak governance frameworks. The review concludes that effective AI-supported WIL requires a balanced pedagogical approach that combines authentic assessment, educator supervision, simulation-based learning, and responsible AI governance.

Keywords: Artificial Intelligence; Construction Education, Simulation-Based Learning; Work Integrated Learning

A SYSTEMATIC REVIEW OF AI-ENHANCED 3D MAPPING TECNOLOGIES FOR CIVIL INFRASTRUCTURE IN SOUTH AFRICA

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Abstract

Artificial Intelligence (AI) is revolutionising three-dimensional mapping in the civil infrastructure sector. Terrestrial Laser Scanners, GNSS RTK and Robotic Multi-stations are enhanced by AI technologies that assist with data processing, spatial accuracy, and make it easier to monitor infrastructure development. The infrastructure sector in South Africa faces significant implementation barriers. The theoretical framework underpinning the study focuses on the Diffusion of Innovation Theory, highlighting the implementation of AI-enhanced 3D mapping across the sector. Identified articles on AI integration and implementation in the civil infrastructure sector enables the study to systematically examine existing evidence on the adoption, applications, opportunities, and challenges of AI. This approach facilitates the synthesis of current knowledge, identification of research gaps, and development of insights into factors affecting the successful implementation of AI in civil infrastructure. Atlas.ti facilitated a thematic analysis of 50 papers. While the review identified a significant knowledge gap regarding AI-integrated technology systems in South Africa, the underlying causes of this gap were not explicitly established. One possible explanation is the relatively recent adoption of AI technologies within the sector, with AI being noted for its automating feature extraction, improving terrain models, helping build digital twins, and enabling predictive maintenance. Resulting in faster operations, less manual work, and stronger decision-making. Implementation barriers hinder the success of the AI-Implementation Strategy for South Africa, which is based on phased rollouts, collaboration, workforce training, and clearer policy standards. The study concludes that AI can enhance civil infrastructure efficiency and decision-making while providing a phased implementation roadmap.

Keywords: Artificial Intelligence, 3D mapping, Civil works, Digital infrastructure, Geomatics, South Africa

**FOCUS AREA 2: PROJECT GOVERNANCE,
BUSINESS STRATEGY, PROCUREMENT,
CONTRACTING AND FINANCIAL
PERFORMANCE**

IMPROVING HOSPITAL FACILITIES MANAGEMENT THROUGH HUMAN-CENTERED COMPLEXITY SOLUTIONS IN TEHRAN

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Abstract

Hospital facilities management (FM) operates within a complex socio-technical environment where infrastructure, organisational routines, professional roles and human decision-making continuously interact. In high-density metropolitan contexts such as Tehran, this complexity is intensified by increasing service demand, ageing infrastructure, financial constraints and fragmented governance. This exploratory mixed-methods study investigates human-centred drivers of operational complexity in hospital FM and proposes a Human-Centred Complexity Management Framework. Quantitative data were collected through structured questionnaires completed by 40 hospital FM professionals selected through purposive sampling. The instrument included 18 five-point Likert-scale items measuring communication effectiveness, interdepartmental coordination, leadership engagement, role clarity and cultural adaptability. Data were analysed descriptively in SPSS, and reliability testing produced a Cronbach's alpha of 0.82. Qualitative insights from semi-structured interviews and on-site observations were analysed thematically to contextualise the questionnaire findings. Results indicate that communication gaps recorded the highest perceived influence, followed by coordination failures, role ambiguity and cultural resistance. The proposed framework integrates structured communication, cross-functional coordination, role clarification, adaptive leadership and behavioural governance alignment. The study contributes to complexity-informed FM by showing that hospital resilience depends not only on technical maintenance capacity, but also on the alignment of human, organisational and governance mechanisms.

Keywords: Complexity Management, Facilities Management, Healthcare Infrastructure, Hospital Performance, Socio-Technical Systems

Paper ID: 12

KEY DETERMINANTS OF TIME-RELATED PRELIMINARY AND GENERAL (P&G) COSTS IN CONSTRUCTION PROJECTS

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Abstract

Time-related Preliminary and General (P&G) costs represent a significant portion of construction project expenditures. This study aims to identify the key determinants influencing time-related P&G costs in construction projects to support better cost control and project management. This study adopts a qualitative research design using content analysis as the primary methodological approach. The study was conducted across major academic databases using predefined keywords and inclusion criteria. Peer-reviewed journal articles and conference papers addressing construction cost management, site overheads, and project duration were analysed. The literature was categorised to identify recurring determinants and their impact on time-related P&G costs. Project duration is identified as the primary driver of time-related P&G costs. Other significant determinants include project size and complexity, procurement and contract conditions, planning and scheduling efficiency, and contractor management capability. External factors, such as adverse weather, regulatory compliance, and industrial action, further extend project timelines. Client-related factors, particularly scope changes, also exacerbate cost escalation. Overall, the study concludes that time-related P&G costs are predominantly shaped by interconnected managerial and organisational factors rather than discrete technical issues. Effective coordination, competent contractor capability, and robust site management practices emerge as critical levers for minimising delays and controlling cost escalation. The findings imply that project stakeholders should prioritise integrated planning, strengthen contractor selection criteria, and adopt collaborative coordination mechanisms to improve time and cost performance. These insights provide a foundation for more proactive and system-oriented approaches to managing time-related construction costs in complex project environments.

Keywords: Time-related costs, Preliminary and General (P&G) costs, Construction project management, Cost determinants, Systematic literature review

TOTAL QUALITY MANAGEMENT AWARENESS AND PRACTICE AMID CONSTRUCTION DIGITALISATION: INSIGHTS FROM NIGERIAN CONSTRUCTION PROFESSIONALS

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Abstract

This study evaluates the current level of awareness and practices of Total Quality Management (TQM) among construction professionals in Imo State, Nigeria, within the context of construction digitalisation. Data were collected using a structured questionnaire administered to 106 construction professionals from 63 accessible firms, drawn from a target population of 172 firms registered with the Imo State Ministry of Works. Respondents were sampled using purposive convenience sampling. Data were analysed using descriptive statistics and Mean Item Score (MIS) rankings. 72.6% of respondent demonstrated awareness of TQM principles, yet only 48.1% actively apply them in their organisations. The most widely practised TQM principle is procurement quality control through strict adherence to standards (Mean = 4.37), while effective communication between staff and senior management ranked lowest (Mean = 3.28). These findings indicate an awareness implementation gap that digital era tools and governance frameworks can help bridge. The research is limited to Imo State professionals. The use of convenience sampling restricts generalisability to the wider Nigerian construction industry. Professional bodies (NIQS, NIA, NSE, NIOB) should embed TQM-specific modules in continuing development programmes. Policymakers should incentivise TQM adoption through construction procurement policies. Digital communication platforms can directly address the lowest-ranked TQM principle, communication between staff and management. This study provides an empirically grounded baseline of TQM awareness and practice in Imo State that extends the Nigerian TQM literature beyond the supply-side factors documented before studies, specifically situating TQM practice within the digital construction era.

Keywords: Construction Industry, Digitalisation, TQM Awareness, TQM Practice, Total Quality Management

AN EVALUATION OF TIME AND COST PERFORMANCE OF CONSTRUCTION PROJECTS IN IMPLEMENTING TOTAL QUALITY MANAGEMENT PRINCIPLES

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Abstract

Purpose: The study evaluate cost and time overruns in construction projects carried out in Imo State, Nigeria, using Total Quality Management (TQM) principles. **Design:** Structured questionnaires were used; the sample comprised 106 respondents, and data from 42 construction projects were included. The analysis used percentile analysis and a paired-samples t-test, which were presented in tables. **Findings:** The project duration increased significantly, from an estimated average of 33.83 weeks to the actual completion time of 38.83 weeks ($t = 2.305$, $p = 0.026$). The cost analysis shows no statistically significant difference between estimated and actual cost ($t = -0.516$, $p = 0.608$), indicating that cost performance on TQM-associated projects was stable and broadly within budget. The time analysis reveals a statistically significant mean overrun of 5 weeks (12.3%) ($t = 2.305$, $p = 0.026$). The 12.31% overrun is substantially lower than the 70-188% overruns documented in comparable Nigerian studies. **Research Limitation and Implications:** It is limited to construction projects in imo state. **Practical Implications:** Regular use of TQM enhances overall project performance and reduces discrepancies between planned and actual performance.

Keywords: Cost Overrun, Iron Triangle, Time Overrun, Time Performance, Total Quality Management

EVALUATION OF PERFORMANCE OF INDIGENOUS CONSTRUCTION FIRMS IN NIGERIA

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Abstract

This study examines contractor performance in project execution among Indigenous Construction Firms (ICFs) operating within the Victoria Island–Ibeju-Lekki corridor of Lagos State, Nigeria. Although contractor performance has received increasing attention in construction management research, there is limited empirical evidence on the factors influencing project execution among indigenous firms in this region. The study therefore investigates the key success factors and constraints affecting contractor performance during project delivery. A quantitative survey design was adopted, and fifty-five (55) structured questionnaires were randomly administered to construction professionals involved in project execution within the study area. Data were analysed using descriptive statistical techniques, including mean score ranking and percentile grading, to determine the relative importance of the identified factors. The findings indicate that the contractor–client relationship is the most significant factor influencing successful project execution, with a mean score of 4.56. This is followed by site management ability (4.22) and project management techniques (4.09). Working within budget recorded the lowest mean score (3.56). The study further identifies inadequate funding, inflation, delayed payments, poor relationships among consultants, changes in government administration, and contractor registration category as the major factors affecting contractor performance during project execution. The study is limited to indigenous construction firms operating in Lagos State and does not compare their performance with that of expatriate firms or firms in other regions. The findings provide practical insights for government agencies, clients, and policymakers seeking to improve project delivery outcomes. Strengthening contractor–client relationships, enhancing site management and project management capabilities, and addressing funding and payment challenges can improve contractor performance and enhance the competitiveness of indigenous construction firms in Nigeria.

Keywords: Construction Firms, Factors, Indigenous Nigeria, Performance, Project

AN ANALYSIS OF THE IMPACTS OF PRE-CONTRACT AND CONTRACT ESCALATION FOR PROJECT SUCCESS IN SHORT FORM CONTRACTS

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Abstract

This study examines the effects of pre-contract and contract-stage escalation on project success in Short Form Contracts, as escalation is usually not incorporated leading to several project delivery challenges. It also identifies key drivers of escalation and proposes strategies to mitigate associated risks in construction project delivery. A mixed-methods design was adopted, combining 22 structured questionnaires analysed using descriptive statistics with 15 semi-structured interviews analysed through thematic analysis to provide deeper insight into industry practices and challenges. Findings indicate that escalation significantly affects project performance, leading to cost overruns, schedule delays, and reduced quality outcomes. Poor consideration of escalation during the pre-contract stage results in financial inefficiencies, strained client-contractor relationships, disputes over variations, reduced profitability, and cash flow challenges. Key drivers include inflation, market volatility, and delays in applying escalation adjustments. The study highlights the importance of proactive cost management strategies such as comprehensive cost planning, life cycle costing, realistic budgeting, and strategic investment planning. It further emphasises the need for digital technology adoption, competent contractor engagement, and improved project delivery methods, alongside strengthened regulation, financial literacy, and capacity development. Overall, this research contributes to knowledge by offering an integrated framework for managing escalation across both project stages in Short Form Contracts, improving understanding of cost control, risk management, and project performance outcomes.

Keywords: Pre-Contract and Contract Escalation, Short Form Contracts, Cost Estimation, South Africa

SEASONAL PRICE VARIATION OF BUILDING MATERIALS AND CONSTRUCTION PROJECT PERFORMANCE IN NIGERIA

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Abstract

This study investigates the seasonal price variation of building materials and its impact on construction project performance in the Nigerian construction industry. The study specifically evaluates how the prevalence of seasonal price variation of building materials within the construction industry influence construction project performance in Nigeria. A survey research design was adopted, utilizing a structured questionnaire administered to 145 construction contractors across three major Nigerian cities: Lagos, Abuja, and Port Harcourt. Data collected were analysed using descriptive and inferential statistics. The study findings indicate that exchange rate fluctuations emerged as the most dominant factor driving seasonal price variation of building materials, with a mean score (MS) of 4.714. This was followed by inflation and monetary policy (MS = 4.619) and energy and fuel cost dynamics (MS = 4.333), ranked as the second and third factors respectively. Further analysis revealed that seasonal price variations significantly affected project cost and schedule delivery time, while their impact on quality performance was not statistically significant (Spearman rho correlation coefficient = 0.000, $p > 0.05$). The study concludes that seasonal price variation of building materials in Nigeria is less a seasonal anomaly and more a structural economic phenomenon, which undermines cost and in performance in construction project delivery. The study recommends a construction cost stabilization framework that will enhance cost predictability, improve schedule stability, and strengthen resilience against price shocks. Implementing such measures would support more sustainable construction project performance and value delivery in Nigeria.

Keywords: Building materials, Construction project performance, Seasonal price variation, Structural economic phenomenon, and Nigeria

STRENGTHENING FINANCIAL ACCOUNTABILITY IN PROJECT MANAGEMENT UNITS OF EASTERN CAPE METROPOLITAN MUNICIPALITIES

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Abstract

Project management Units play a crucial role in infrastructure development. However, their performance has been inefficient due to structural challenges. Therefore, this study explored the challenges affecting and practical strategies to address the financial accountability inadequacies within Project Management Units (PMUs) of metropolitan municipalities in the Eastern Cape. The study used a qualitative case study approach, focusing on two metropolitan municipalities in the Eastern Cape. Data were collected through semi-structured interviews. Purposively selected senior municipal officials responsible for project and financial management with expertise and insight into the research topic including PMU management, project managers, and finance-related personnel. Interviews were recorded, transcribed, and analysed thematically using ATLAS.ti to identify key patterns and themes. Revealed challenges were Capacity and communication, Documentation and tracking, and Knowledge and Training Gaps. Several strategies to address these accountability challenges were Enhanced professional development and policy training for PMU officials, Implementation of effective internal controls, inclusive stakeholder engagement and transparency, and Resource allocation and project tracking. Strengthening internal controls, improving skills through continuous training, introducing integrated financial systems, and enforcing consequence management are supported as practical resolutions to address financial accountability inadequacies within PMUs. While the study's limited sample size restricts broad generalisability, the results offer a preliminary understanding of systemic challenges and interventions relevant to municipal contexts. The study contributes to public sector project management by providing practical governance, financial oversight and technological strategies that can strengthen financial accountability and improve infrastructure delivery within metropolitan municipalities.

Keywords: Eastern Cape, Financial Accountability, Metropolitan municipalities, Municipal Finance Management Act, Project Management Unit

UNDERSTANDING ROOT CAUSES OF COST AND TIME OVERRUNS IN SOUTH AFRICAN MEGA INFRASTRUCTURE PROJECTS

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Abstract

This study investigates the root causes of cost overruns and schedule delays in South African mega infrastructure projects. Mega infrastructure projects are defined as large-scale developments valued at approximately US\$1 billion or more, characterised by high complexity, multiple stakeholders, and significant socio-economic impact. A qualitative research approach was adopted, using semi-structured interviews with six purposively selected industry experts possessing extensive experience in the planning, management, and delivery of South African megaprojects. Data were analysed using thematic analysis. The findings reveal that corruption, poor front-end planning, optimism bias, incomplete design and contract documentation, and inadequate project management capacity are the primary causes of cost overruns and project delays. Although these factors have been identified in international studies, the findings suggest that governance weaknesses, institutional constraints, and accountability challenges are particularly influential within the South African construction sector. The study is theoretically grounded in Agency Theory and Optimism Bias Theory, providing insight into how governance failures and unrealistic planning assumptions contribute to project underperformance. The research contributes to the limited body of knowledge on megaproject delivery in developing countries. It offers practical recommendations for policymakers, infrastructure clients, consultants, and project managers to improve project performance and infrastructure delivery outcomes in South Africa.

Keywords: MegaProjects, Cost overruns, Project Delay, Infrastructure Projects, Infrastructure Delivery

**PROJECT GOVERNANCE UNDER ECONOMIC TURBULENCE:
ADAPTIVE DECISION ROUTINES OF MICRO-SCALE AEC FIRMS**

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Abstract

Micro-scale architecture, engineering, and construction (AEC) firms are particularly exposed to economic turbulence due to limited financial buffers and high dependency on project-based cashflow. Existing studies largely document the survival strategies adopted by such firms under uncertain economic conditions; however, less attention has been paid to how these strategies are translated into project-level governance routines. This study addresses this gap by proposing a conceptual approach that explains how micro-scale AEC firms embed adaptive decision-making practices into their project governance structures. The study adopts a conceptual research design based on a secondary qualitative synthesis of findings derived from the authors' previously published empirical and review-based studies conducted within the TÜBİTAK 125K269 research project, including systematic literature reviews, interview-based studies with micro-scale AEC firms in Türkiye, and analyses of crisis and post-crisis construction contexts. Through this synthesis, firm-level strategies are reframed as adaptive project governance routines operating across key decision domains such as contracts, cashflow management, procurement timing, stakeholder relations, and project portfolio configuration. The findings suggest that micro-scale AEC firms develop repeatable governance routines that enable flexibility, rapid decision-making, and risk redistribution under economic turbulence, contributing a practice-oriented framework for adaptive project governance.

Keywords: Adaptive decision routines, Economic turbulence, Micro-scale AEC firms, Organisational Resilience, Project governance

Project Success and Professional Perceptions of Public Value in Small-Scale Urban Infrastructure: A Case Study of Green Point Dome Project, South Africa

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Abstract

Small-scale urban infrastructure projects are under-represented in project management research, particularly regarding how success and long-term public value are understood beyond traditional time, cost, and quality metrics. Existing studies largely emphasise operational performance, offering limited insight into practitioner perceptions of value in complex, publicly oriented contexts. This study addresses this gap by examining how technical, managerial, and planning mechanisms shape professional perceptions of project success and sustained public value. A mixed-methods single-case study was conducted on the Green Point Dome (Cape Town, South Africa), a 3D mass timber structure with educational gardens, selected for its innovation and stakeholder complexity. Data were collected using a structured self-administered survey (Likert-scale and open-ended items) from 17 professionals involved in project delivery. Quantitative data were analysed using descriptive statistics, while qualitative responses underwent thematic analysis. Findings show that perceived success is more strongly linked to collaboration, stakeholder engagement, and adaptive planning than to traditional metrics (on-time: 11.8%; on-budget: 23.5%). Long-term public value especially educational use (88.2%), accessibility (82.4%), and cultural relevance (82.4%) emerged as the dominant dimension. Despite its small sample (n=17) and single-case scope, the study highlights the central role of governance and collaborative processes in shaping perceived success and value.

Keywords: project success; public value; urban infrastructure; collaborative governance; infrastructure planning; stakeholder engagement

IMPACT OF ORGANIZATIONAL SUBCULTURES ON BARRIERS TO TOTAL QUALITY MANAGEMENT IMPLEMENTATION IN NIGERIAN CONSTRUCTION MATERIALS MANUFACTURING FIRMS

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Abstract

This study examines the impact of organisational subcultures on barriers to Total Quality Management (TQM) implementation in Nigerian construction materials manufacturing firms. Despite the strategic importance of this sector in influencing construction quality and infrastructure performance, persistent challenges such as substandard materials, inconsistent production quality, and weak regulatory compliance continue to undermine outcomes. Drawing on organizational culture theory and the Competing Values Framework (CVF), the research employs a quantitative approach, utilising survey responses gathered from a sample of 150 participants across construction materials manufacturing firms. Organisational subcultures (clan, adhocracy, market, and hierarchical) were analysed alongside six TQM Implementation barrier constructs: top management support, employee, customer Support, planning, process management, and information management. Data collected were analysed using descriptive statistics and Structural Equation Modelling (SmartPLS). The results reveal that organisational subcultures significantly influence TQM barriers, with clan culture emerging as the most supportive orientation, demonstrating significant relationships with multiple TQM dimensions. Adhocracy and hierarchical cultures showed moderate influence, particularly in process and strategic dimensions, while market culture exhibited limited but targeted effects. Quantitatively, the strongest associations were observed for hierarchical culture with customer-focus barriers ($\beta = 0.76, p < 0.01$); clan culture with strategic-planning barriers ($\beta = 0.58, p < 0.01$), top-management barriers ($\beta = 0.42, p < 0.05$) and measurement-and-analysis barriers ($\beta = 0.41, p < 0.05$); market culture with workforce-management barriers ($\beta = 0.52, p < 0.01$) and process-management barriers ($\beta = 0.41, p < 0.01$); and adhocracy culture with workforce-management barriers ($\beta = 0.46, p < 0.01$). The findings confirm that TQM barriers are culturally embedded and that effective implementation requires alignment between subcultural orientations and quality management practices. The study contributes to theory by integrating subculture perspectives into TQM research and provides practical insights for improving quality performance and regulatory compliance in developing-country contexts.

Keywords: Competing Values Framework (CVF); Construction materials manufacturing; Nigeria; Organisational subculture; Total Quality Management (TQM); TQM barriers

SUSTAINABLE PUBLIC-PRIVATE PARTNERSHIPS FOR EFFECTIVE MANAGEMENT OF SOUTH AFRICA'S PUBLIC HEALTH INFRASTRUCTURE

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Abstract

South Africa's public health system continues to face persistent challenges associated with deteriorating infrastructure and limited capital investment. These challenges have contributed to overcrowded healthcare facilities and inequitable service delivery across many parts of the country. While the public sector provides healthcare services to most of the population, the private healthcare sector serves a smaller proportion of citizens and has comparatively greater access to resources and infrastructure. To address these constraints, Public-Private Partnerships (PPPs) have been increasingly used to leverage private sector expertise, resources, and efficiency in delivering infrastructure and public services. Despite their potential, PPP outcomes have been uneven, often hindered by complex stakeholder dynamics, fragmented policy frameworks, weak governance, inadequate risk-sharing, and insufficient long-term planning. While some projects have delivered high-quality facilities, others have stalled due to mismanagement or conflicting priorities, highlighting a critical gap in sustainable implementation. This study acknowledges that the sustainability of healthcare PPPs extends beyond the successful delivery of physical infrastructure and includes the ability of such infrastructure to support accessible, efficient, and quality healthcare service delivery over time. Existing literature tends to examine governance, sustainability, and stakeholder management as separate concepts, with limited focus on how these factors collectively influence public health infrastructure management within the South African context. This study employs a systematic literature review (SLR) guided by the PRISMA framework and analyses 28 selected studies to examine how sustainability can be integrated into all strategic phases of PPPs, from design and financing to governance and post-project adaptation, to improve infrastructure management and service quality in the public health sector. The findings reveal that fragmented governance structures, stakeholder misalignment, and coordination challenges are among the key barriers affecting the long-term sustainability of healthcare PPPs. The findings provide insights for developing effective, long-term, sustainable PPP models that enhance public health infrastructure resilience and service delivery. This study contributes to the body of knowledge by bringing together previously fragmented literature on healthcare PPPs, emphasising the interconnected role of governance, stakeholder engagement, and sustainability in developing the effective management of public health infrastructure in South Africa.

Keywords: Public-Private Partnerships, sustainability, public health infrastructure, governance

CONSTRUCTION VEHICLE UTILISATION EFFICIENCY

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Abstract

This study examines the efficiency of construction vehicle utilisation, with the aim of identifying the principal factors that undermine logistics performance in material delivery and proposing targeted interventions to enhance operational efficiency. The quantitative study entailed an online survey of general contractors and material suppliers, yielding 27 valid responses from an initial sample of 92, which equates to a 29.3% response rate. Findings reveal pervasive systemic inefficiencies in vehicle deployment, including frequent empty return trips, partial loads, delayed deliveries, and prolonged vehicle dwell times factors that contribute to elevated costs, reduced productivity, and increased carbon emissions. Supplier-led deliveries dominate current practices, often resulting in sub-optimal routing and coordination. Respondents highlighted the need for improved communication, scheduling, and coordination, alongside the adoption of real-time tracking, monitoring tools, and enhanced training for logistics personnel. Basic ICT tools such as mobile communication and GPS tracking are relatively well-adopted, while more advanced solutions data analytics and route optimisation systems show lower utilisation. The findings suggest that strengthening internal coordination, building staff capacity, and integrating digital logistics technologies within a comprehensive supply-chain framework are essential for sustained improvements in efficiency. Isolated interventions are unlikely to deliver meaningful gains without alignment across stakeholders.

Keywords: Construction, Efficiency, Utilisation, Vehicle

IMPEDIMENTS HINDERING HIGHER EDUCATION INSTITUTIONS IN READINESS OF FUTURE PANDEMICS: A CASE OF EASTERN CAPE

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Abstract

Higher institutions of learning are critical to the generation of knowledge among a country's citizens. Despite their importance to knowledge empowerment, they are not immune to future pandemic occurrences. Therefore, this study aims to determine the barriers hindering higher education institutions (HEIs) in the Eastern Cape readiness for future pandemics. A qualitative research method was adopted to achieve the study's aim. Data was collected using semi-structured interviews with seven respondents who were purposively sampled from two public universities. Thematic analysis was used to identify the impediments after the data were transcribed. The findings revealed that institutions readiness is constrained by a lack of governance structures, inconsistent operational preparedness, poorly communicated emergency response plans, and uneven institutional capacity. Although HEIs demonstrated adaptability during COVID-19, particularly by continuing academic activities through digital platforms, their preparedness was largely reactive rather than proactive. The absence of institutionalised disaster management frameworks, limited training, and gaps in policy implementation were identified as critical barriers to effective pandemic readiness. The study's geographical focus was the Eastern Cape province of South Africa, and its reliance on semi-structured interviews prevented the results from being generalised. These barriers reveal the need for sustainable institutional commitment, resource investment, and clear accountability structures.

Keywords: Future pandemic, Higher Education Institutions, Impediments, Readiness

EFFECTIVE SME CONTRACTORS' SUPPLIER RELATIONSHIP AND LOGISTICS TO REDUCE MATERIAL SUPPLY DISRUPTIONS IN THE WESTERN CAPE PROVINCE

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Abstract

In South Africa, material supply disruptions continue to be a significant concern for SME contractors. Most often, these disruptions are the result of supplier relationships, insufficient logistics planning, and disjointed supply chain management practices. The purpose of this study is to investigate effective SME contractors' supplier relationship management and logistics strategies to prevent material supply disruptions and enhance construction project performance for SME contractors. This study adopted a quantitative research method. The survey was distributed to respondents to investigate effective SME contractors' supplier relationship management and logistics strategies for preventing material supply disruptions. To achieve the objectives of this study, the Statistical Package for the Social Sciences (SPSS) version 31 was used to analyse the data gathered, using both mean ranking and principal component analysis (PCA). To ensure the internal consistency of constructs, this study used Cronbach's Alpha. The findings reveal loyalty agreements with high-performing suppliers, long-term contracts with key suppliers, working closely with suppliers on project requirements, tracking shipments from dispatch to site, planning for alternative delivery routes or vehicles, ensuring that materials are delivered just-in-time, financial stability, logistics capability, and maintaining a database to reduce material supply disruptions. Furthermore, PCA findings reveal that SME contractors adopt supplier logistics coordination and implement strategic supplier and logistics management to reduce material supplier disruptions. This study shows that strengthening collaboration, enhancing logistics coordination, and promoting supplier development can significantly improve project outcomes. The research contributes to both theory and practice by providing a framework that supports SME contractors in achieving more efficient and reliable material supply, aligned with industry expectations and regulatory requirements. This study offers insights by integrating supplier relationship management and logistics strategies in the context of SME contractors, offering practices to enhance supply chain resilience and project performance with limited construction resources.

Keywords: Construction procurement, logistics management, material supply disruptions, supplier relationship management, and Western Cape Province

ADOPTION OF LEAN CONSTRUCTION TECHNIQUES BY SMES IN THE WESTERN CAPE PROVINCE, SOUTH AFRICA TO ENHANCE PROJECT DELIVERY

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Abstract

Small and Medium Enterprises (SMEs) in Western Cape construction industry face significant challenges in adopting Lean Construction Techniques (LCT). This work examined the challenges and benefits that come with the adoption of LCT to improve the delivery of projects of SMEs in the Western Cape Province of South Africa. The qualitative research methodology was employed, involving six semi-structured interviews with construction professionals from Construction Industry Development Board (cidb) registered SME constructors (grade1-6) operating within the Western Cape province. A thematic analysis was used to determine the existing practices, limitations and performance results. The results reveal that although LCTs are positively perceived among SMEs, its adoption is still informal and project-oriented because of financial limitations, lack of training, resistance to change, and weak commitment of management to embrace change. Despite these challenges, partial adoption of techniques like the Last Planner System (LPS), Just-in-time (JIT), 5S, and Value Stream Mapping (VSM) contributed to improved workflow coordination, time management, decrease in rework, better performance of safety, and client satisfaction. The findings indicate that LC techniques and management commitment may be institutionalised to boost the performance of SMEs. The study established that Lean Construction techniques are a promising solution to enhance project delivery among SMEs in Western Cape if awareness, systematic training, and policy-backed solutions are given priority.

Keywords: Lean construction; Lean construction adoption; Lean construction techniques; Project delivery; SMEs

ASSESSMENT OF IMPACTS OF POOR PROJECT GOVERNANCE IN A MULTI-STAKEHOLDER PROJECT ENVIRONMENT: STAKEHOLDER INSIGHTS

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Abstract

Good governance in construction projects improves project performance by reducing risks, enhancing transparency and stakeholder trust, preventing disputes and cost overruns, and ensuring timely delivery and quality outcomes. The purpose of this study is to examine how poor project governance affects project performance, relationships, and decision-making within multi-stakeholder project environments from the perspectives of the involved stakeholders. The study used a mixed-method research approach, including both qualitative and quantitative approaches. A total of 83 construction professionals participated in the survey, while 15 additionally took part in the interviews. Quantitative data were analyzed using descriptive analysis, whilst qualitative data were assessed using thematic analysis. The study found that a lack of good project governance negatively impacts the project performance and compromises project objectives. Due to poor communication and inadequate project governance, the projects mostly fall behind on their milestones. The study suggests that enhancing stakeholder collaboration, clarifying roles, and strengthening communication channels can significantly improve governance effectiveness and project outcomes in complex construction environments

Keywords: Project Governance, Stakeholder Engagement, Multi-Stakeholder Environment, Construction Projects, Governance Challenges

CSR IMPLEMENTATION STRATEGIES TO ACHIEVE SUSTAINABLE BUSINESS PERFORMANCE OF LARGE CONTRACTORS IN THE WESTERN CAPE CONSTRUCTION SECTOR

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Abstract

Corporate Social Responsibility (CSR) is becoming a critical constituent in influencing the long-term sustainable business performance of organisations across sectors. Despite CSR being a global driver of sustainable business, large contractors in the Western Cape Province of South Africa continue to face obstacles integrating CSR. In this research, CSR strategies that could be implemented by large contractors in the Western Cape Province, to achieve sustainable business performance were identified. A quantitative methodological approach was utilised with a structured online questionnaire survey. The research data was analysed using descriptive (percentages, mean, standard deviation, etc.) statistics. The sample population comprised of large construction enterprises registered with the Construction Industry Development Board (cidb) between Grade 7 and 9 under the General Building (GB) and/or Civil Engineering (CE) categories. CSR strategies such as promoting energy-efficient product development; Prioritising employee health and safety; Clear reporting on social and environmental performance alongside financial results, and collaborating within supply chains to ensure ethical and environmental standards are maintained throughout the project lifecycle; are among the top strategies that were highlighted. The findings of this study contributes to understanding the interplay between the CSR strategies and how it can strengthen the business resilience of large contractors in the Province, contributing to their sustainability and long-term business growth.

Keywords: Corporate Social Responsibility; Sustainable Business Performance; Large Contractors

**OPERATIONAL, FINANCIAL AND POLICY CONSTRAINTS LIMITING
EMERGING PROPERTY DEVELOPERS' PARTICIPATION IN
AFFORDABLE HOUSING DELIVERY IN POLOKWANE MUNICIPALITY**

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Abstract

Robust emerging property developers are an important step towards dealing with housing shortages and promoting more inclusive housing development in secondary cities in South Africa. However, the participation of this sector is limited by ongoing operational, financial and institutional problems. This paper aims to uncover the operational, financial, and policy-related barriers that limit the ability of emerging property developers in Polokwane Municipality from participating effectively in affordable housing delivery. This will make it possible to recommend possible solutions for enhancing their participation. The qualitative research design was adopted, relying on semi-structured interviews with 15 emerging property developers from the Polokwane Municipality. Thematic analysis was used to analyse the data. The results indicate that there are three sets of challenges: structural and operational, financial exclusion, and weak policy implementation. Major challenges include slow administrative processes, lack of access to serviced land, inadequate infrastructure, high collateral requirements, difficult loan conditions, and uneven application of existing policies. Due to these challenges, project costs and timelines are negatively affected and this limits the competitiveness and sustainability of emerging developers. The qualitative nature of the study and the focus on only one municipality constitute a major limitation in terms of generalisability. Nonetheless, these findings also provide valuable policy and practitioner implications which include ensuring robust municipal administrative capacity, enhancing infrastructure planning, designing inclusive financing mechanisms, and providing capacity building to emerging property developers.

Keywords: Emerging property developers, affordable housing; operational challenges, financial constraints

IMPROVING SKILLS DEPLOYMENT IN MEGA OR LARGE COMPLEX PROJECTS

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Abstract

This study examines how skilled project resources are deployed on mega- and large-scale complex infrastructure projects, with a focus on South African state-owned entities (SOEs). It seeks to assess the contribution of skilled resources to project performance in large, complex infrastructure utility projects. Although existing project management frameworks offer guidance on processes and leadership competencies, they provide limited direction on how skills, competencies, and roles should be configured within temporary project organisations. To address this gap, the study employs a structured content analysis of secondary data, including recent peer-reviewed literature and industry reports, using both deductive and inductive coding techniques. The findings reveal recurring challenges, notably skills misalignment, unclear role definition, and inadequate resource planning. These insights inform the development of a conceptual competency-based framework that links project classification with required capabilities, competencies, roles, and organisational structures. The study contributes to theory by advancing the operationalisation of resource configuration in complex project environments, and to practice by offering a structured approach for aligning skilled resources to improve project performance in South African SOEs.

Keywords: Mega projects, Large Complex projects, Competence, Capabilities, Skills, Project structures

Paper ID: 110

**NARRATIVE INFRASTRUCTURE UNDER DISRUPTION:
RECONFIGURING RESILIENCE NARRATIVES IN LARGE SOUTH
AFRICAN CONSTRUCTION CONTRACTORS**

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Abstract

Large South African construction contractors operate in conditions of recurring disruption shaped by market volatility, project fragmentation, and competing stakeholder demands. Construction strategy research has largely focused on formal plans and tools, with limited attention to how resilience is sustained through the everyday narrative processes that make strategy intelligible and actionable in practice. This paper examines how narrative infrastructure shapes the reconfiguration of resilience narratives under disruption. The study adopted an interpretivist multiple case design across four large South African construction contractors. Data was generated through 18 narrative interviews and supported by organisational artefacts, including planning documents, risk registers, reporting packs, meeting minutes, and internal guidance notes. Analysis combined thematic coding with structural narrative analysis. The findings suggest that narrative infrastructure does more than support communication. Recurring strategic forums, documentary routines, and learning practices help stabilise strategic direction during uncertainty, legitimise shifts in priorities, and convert disruption experience into shared strategic reference points. The paper contributes a practice-based account of resilience by showing how continuity under disruption is accomplished through the ongoing reworking of narrative infrastructure rather than through formal strategy alone.

Keywords: construction contractors, disruption, narrative infrastructure, organisational resilience, strategy-as-practice

COMPLIANCE AND IMPLEMENTATION CHALLENGES OF DHET MINIMUM NORMS AND STANDARDS IN OFF-CAMPUS STUDENT ACCOMMODATION IN SOUTH AFRICA: A SYSTEMATIC LITERATURE REVIEW

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Abstract

This study examines the compliance and implementation challenges associated with the Department of Higher Education and Training (DHET) Minimum Norms and Standards for off-campus student accommodation in South Africa. The growing demand for student housing and increasing reliance on privately managed accommodation have raised concerns regarding accommodation quality, safety, and regulatory compliance. A systematic literature review (SLR) guided by the PRISMA framework was conducted to identify, evaluate, and synthesise existing literature published between 2015 and 2025. The review analysed studies relating to student accommodation conditions, governance, compliance, and student experiences within the South African higher education sector. The findings indicate that compliance with DHET standards remains inconsistent across several areas, particularly safety and security, infrastructure maintenance, facilities and service provision, and accessibility. The review further identified weak governance and regulatory oversight, financial constraints, accommodation shortages, and the prevalence of unregulated accommodation providers as key implementation challenges affecting compliance. The findings also reveal that non-compliance has implications for student well-being, academic performance, and overall accommodation satisfaction. By consolidating existing evidence, this study contributes to the understanding of policy implementation challenges within the student accommodation sector and provides insights that may assist universities, accommodation providers, and policymakers in strengthening compliance and improving the quality of off-campus student housing in South Africa.

Keywords: Challenges, DHET Minimum Norms and Standards, off-campus student accommodation, South Africa, student housing

EVALUATING THE INFLUENCE OF STAKEHOLDER PARTICIPATION ON CONSTRUCTION PROJECT PERFORMANCE IN THE NIGER DELTA REGION OF NIGERIA

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Abstract

Construction project underperformance in Nigeria's Niger Delta region are long-standing challenges in governance and delivery concern but the significance of stakeholder participation throughout the entire project lifecycle has received little empirical attention, especially in riverine public sector contexts. This study rooted in Freeman's Stakeholder Theory, aims to document and analyse active stakeholder participation patterns across the different stages in lifecycle of completed public sector construction projects in Ondo State, Niger Delta, Nigeria. It also to assess the implications of identified participation deficits for project performance. The study used an archival document analysis of records from 48 projects performed by OPADEC and UBEB between 2016 and 2024 to apply a systematic 18 roles of participation assessment framework across four life cycle stages. The findings show that involvement rates remained below 60% throughout the conception, design and planning and construction phases with 100% participation only noted at the commissioning stage. This pattern is interpreted as evidence of performative rather than substantive engagement in which public participation is concentrated at project completion events while the most crucial decision-making phases to project quality and community alignment receive little stakeholder input. The report advocates mandatory participatory governance protocols from project conception to commissioning, institutional accountability reforms for OPADEC and UBEB and the implementation of participatory monitoring frameworks that empower host communities throughout the project's lifespan.

Keywords: Archival document report, Construction project performance, Niger Delta, Project governance, Stakeholder participation

Strategies to Enhance Public-Private Partnerships (PPPs) Effectiveness in Managing Infrastructure Project Delays in the Western Cape, South Africa

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Abstract

The delivery of public sector infrastructure projects is characterized by poor performance consistently, with persisting delays that lead to budget overruns in the South African construction industry. While causes of delays in infrastructure projects have been widely demonstrated in previous studies, the use of Public Private Partnerships as a strategic mechanism to deliver infrastructure projects has been highlighted with benefits of minimizing delays through private sector innovative operational excellence. This study investigates causes of delays in Western Cape infrastructure projects and reports their minimization strategies through PPPs. Through a qualitative research design and purposive sampling method, semi-structured interviews were conducted with four experienced professionals who actively participated in Public-Private Partnership infrastructure projects delivery. The data was analyzed using thematic analysis. The findings reveal that delays are multidimensional and systemic, mostly caused by bureaucratic inefficiency, socio-political interference, fragmented interdepartmental coordination, and scope mismanagement. Results further suggest that strategies to improve PPP projects can be strengthened through institutionalization of social facilitation mechanisms, enhanced interdepartmental coordination and accountability via structures, such as the “stage gate process”, capacity building and knowledge transfer within government institutions, improved communication and transparency among all the project stakeholders. The paper concludes that PPP effectiveness as a governance tool can be realized through hybrid models, integrating the efficiency ideals of New Public Management, the collaborative ethos of New Public Governance, New Public Service participatory values and Public Value Theory. These insights can be applied in improving the PPPs frameworks to achieve timely, inclusive, and sustainable infrastructure provision in the Western Cape.

Keywords: construction project delays, infrastructure development projects, public-private partnerships

GEO-SPATIAL TERRITORIAL CONFLICT AMONG RESIDENTS IN SUB-SAHARAN AFRICA – A PERSPECTIVE FROM OYO STATE, NIGERIA

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Abstract

Geospatial territorial dispute is an emerging spatial planning issue in most states and countries in sub-Saharan Africa (SSA) and Nigeria inclusive. This study conducts a thematic review of existing literature to examine the geospatial foundations of territorial conflicts in Oyo State, Nigeria. Synthesis involves data from peer-reviewed articles, GIS-based studies, government documents, and case-study studies. Analysis indicates that the absence of coordinated spatial data systems and poor institutional coordination are contributing factors to the persistent conflicts in Peri-urban areas of Oyo State. Research findings indicate the exploitation of authority by local elites, violations of customary land rights, and the ineffectiveness of dispute resolution systems. The evidence suggests that Geographic Information Systems (GIS) used in participatory boundary demarcation and tenure regularization can reduce conflict by enhancing the transparency and accuracy of planning. Customary authorities, including family heads and traditional rulers, persist in exerting influence over land allocation and utilisation. The disparity among professionals regarding the Nigeria Land Use Act of 1978 should be revisited to align with the advocacy for the adoption of modern technology (GIS tools) in order to reduce conflict. The study recommended policy for spatial reforms, multi-stakeholder engagement, and inclusive land registration programs that will mitigate territorial disputes, spatial justice and geospatial governance for a sustainable urbanization in Oyo State and Nigeria in general and other similar urbanizing contexts.

Keywords: Geo-spatial analysis, Land governance, Oyo State, Territorial conflict

**FOCUS AREA 3: LOW-CARBON, CLIMATE-
RESILIENT INFRASTRUCTURE, BUILDINGS
AND HOUSING**

IMPACT OF ENVIRONMENTAL STRESS AND ENERGY USE BEHAVIOUR ON THERMAL CONFLICT IN MULTI-PURPOSE-BUILT STUDENT HOUSING IN GHANA

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Abstract

Thermal comfort disputes in shared university student housing are a growing concern, as they combine social tensions with environmental challenges. This study aims to assess the drivers and effects of thermal conflicts on energy use. Using Environmental Stress Theory as a framework, the study surveyed 245 undergraduate students through structured questionnaires in Ghana. The study employed binary logistic regression and multiple linear regression to analyse the effects of thermal disputes on energy behaviours. The findings show that for every 1°C difference in temperature preference between roommates, the likelihood of conflict nearly doubles (93% increase). The odds also rise by 57% with each additional roommate. However, strong communication skills were found to ease tensions, reducing the chances of conflict by 42%. Notably, cultural diversity and mixed-gender accommodations added to the complexity, further increasing the likelihood of disagreements. Thermal conflicts had a measurable impact on energy usage. Each increase in conflict intensity was associated with an additional 0.84 kWh of daily energy consumption, a 1.2°C deviation from ideal thermostat settings, and 7.5 extra minutes spent adjusting the temperature. This calls for holistic approaches that address both interpersonal dynamics and energy efficiency to improve overall thermal satisfaction.

Keywords: Energy use behaviour, environmental stress, thermal conflict, student housing, energy efficiency

RESEARCH TRENDS IN DIGITAL INFRASTRUCTURE AND SUSTAINABLE CONSTRUCTION: A BIBLIOMETRIC ANALYSIS

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Abstract

This scholarship explored research trends and emerging themes in digital infrastructure and sustainable construction using a bibliometric approach. The study leverages quantitative bibliometric research design, analysing peer-reviewed publications indexed in the Scopus database over a 10-year period from 2015 to 2025. Bibliometric indicators include publication trends, publication sources, keyword co-occurrence, and thematic clusters, mapping out the research output. The search string TITLE-ABS-KEY ("digital infrastructure" OR "smart infrastructure" OR "digital construction" OR "construction digitalisation") AND sustainab*. A total of 716 documents were extracted in CSV file and analysed using VOSviewer software. The study is confined to Scopus-indexed documents and English-language publications. The findings show a consistent increase in research output, with dominant themes centred on intelligent urban systems and smart technologies, digital economy and sustainable development policy and energy systems, investment, and environmental performance. Emerging topics outline the growing relevance of digital twin, smart systems, green economy, internet of thing. In conclusion, the findings demonstrate that digital infrastructure is increasingly conceptualised as a systemic enabler of sustainable construction rather than a stand-alone technological intervention, signaling a shift toward integrated, data-driven sustainability transitions in the built environment. The analysis provides important implications for future research by identifying underexplored themes and opportunities for interdisciplinary collaboration. From a practical perspective, the results present valuable insights for policymakers, scholars, and construction professionals seeking to align digital infrastructure investments with sustainability goals. This study mapped the intellectual structure and evolution of digital infrastructure and sustainable construction research, identifying dominant themes, emerging trends, and collaboration networks. It clarifies knowledge gaps, informs interdisciplinary integration, and provides a robust evidence base to guide policy formulation, innovation strategies, and future high-impact scholarly inquiry in sustainable built environments.

Keywords: Built environment; Digital Infrastructure; Research Trends; Smart Infrastructure; Sustainable Construction

ASSESSING THE IMPLEMENTATION OF ESG FACTORS BY NAMIBIAN CONTRACTORS

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Abstract

This paper aims to assess the extent to which Environmental, Social, and Governance (ESG) factors are implemented by registered construction contractors in Namibia. It evaluates the practical translation of ESG principles from policy and regulatory expectations into operational practices within the construction sector, highlighting implementation gaps and areas of inconsistency across environmental, social, and governance dimensions. A quantitative research approach was adopted under a positivist philosophy. Data were collected through a structured online questionnaire distributed to contractors registered with the Construction Industries Federation of Namibia (CIF). Systematic sampling was used to gather data. The assessment of ESG implementation was conducted using descriptive statistics, including mean scores and standard deviations, supported by Chi-square tests and Cramer's V to examine variations in implementation levels across contractors. The findings reveal that ESG implementation among Namibian contractors is generally moderate but uneven across all three dimensions. Environmental practices such as recycling and waste management show relatively higher and more consistent implementation, while technology-intensive practices, including renewable energy use and land disturbance minimisation, remain limited. Social ESG practices are primarily concentrated on regulated areas such as wages and occupational health and safety, although significant variability exists in enforcement and practical application. Governance implementation exhibits the greatest disparity, with formal governance policies moderately adopted, but critical mechanisms such as risk management, transparent ESG reporting, and leadership diversity remaining weak and fragmented. Overall, ESG implementation is largely reactive and compliance-driven rather than strategically embedded. The findings are limited to registered construction contractors operating within Namibia and cannot be generalised to informal contractors or other national contexts with differing regulatory and institutional environments. The study's quantitative focus restricts deeper exploration of the underlying causes of ESG implementation gaps. The results provide empirical evidence of ESG implementation gaps that can inform policymakers, regulators, and industry bodies in strengthening ESG enforcement, developing sector specific guidelines, and supporting capacity building initiatives. The findings also have regulatory relevance by informing mandatory ESG reporting requirements and the incorporation of ESG performance criteria into public procurement policies. Contractors may use the findings to benchmark their ESG implementation maturity and identify priority areas for improvement. The study's most important consequence is that it recognises the necessity of shifting Namibia's construction sector from a mostly compliance-driven strategy to the strategic integration of ESG principles, hence promoting more resilient and sustainable company procedures. This study contributes original, context-specific insights into the actual implementation of ESG practices by contractors in a developing construction market. By moving beyond perceived importance to empirical assessment of implementation, the research advances understanding of ESG operationalisation in Namibia and supports the development of more effective, integrated, and sustainable construction practices.

Keywords: Contractors, Construction Industry, ESG Factors, ESG Implementation, Namibia

ARTIFICIAL PHOTOSYNTHESIS FOR NET-ZERO ENERGY INTEGRATION IN COMMERCIAL BUILDINGS: A SYSTEMATIC LITERATURE REVIEW

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Abstract

The transition toward net-zero energy commercial buildings has intensified interest in emerging sustainable technologies capable of enabling low-carbon and self-sustaining energy systems. Among these, artificial photosynthesis has gained growing attention due to its potential to convert solar energy into storable chemical fuels and integrate with building energy systems. This study presents a systematic literature review of research published between 2016 and 2026, examining the role of artificial photosynthesis in net-zero energy integration for commercial buildings. Guided by the PRISMA framework, a structured search was conducted across Scopus AI, ScienceDirect, Google Scholar, and Springer, resulting in the selection of 37 peer-reviewed journal articles for in-depth synthesis. The review analyses technological configurations, energy conversion pathways, system integration strategies and sustainability implications. Findings indicate that while artificial photosynthesis remains at an early developmental stage for building scale applications, it demonstrates strong potential when combined with photovoltaics, hydrogen systems and smart energy management. However, challenges related to efficiency, scalability, cost and policy support persist. The study contributes a consolidated knowledge base and identifies a future research agenda to inform technological development, policy formulation and net-zero energy strategies in commercial building contexts.

Keywords: Artificial photosynthesis, Commercial buildings, Net-zero energy buildings, Sustainable energy technologies, Systematic literature review

A SOCIO-ECOLOGICAL TRANSITION FRAMEWORK FOR REGENERATIVE FACILITIES MANAGEMENT: THINKING BEYOND OPERATIONAL EFFICIENCY

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Abstract

Traditional facilities management (FM) is attributed by regime-bound performance metrics such as asset optimisation, service reliability, maintenance management and cost control etc. This yardstick tends to constrain the capacity to address complex socio-ecological challenges such as resource depletion, climate vulnerability, and other key sustainability indicators. This study drives the concept of repositioning FM from the perspective of operational efficiency to regenerative practice through the lens of sustainability transition theory, using the Multi-Level Perspective (MLP). A qualitative, theory building approach is deployed for the study. This is achieved through the critical synthesis of interdisciplinary literature with informed insights for the development of a socio-ecological transition framework for regenerative facilities management. The study reveals that traditional facilities management limits sustainability outcomes because it focuses too much on efficiency. A socio-ecological transition framework, based on the Multi-Level Perspective, allows for a shift toward regenerative practices by combining changes in institutions, innovation, and the ability to adjust. This approach improves resilience, ecosystem restoration, and long-term value in the built environment. The developed framework articulates pathways for reconfiguring traditional FM systems and scaling regenerative functions across institutional, organisational and technological dimensions. Furthermore, there is the proposition of FM deliverables beyond conventional efficiency metrics through the infusion of regenerative parameters such as adaptive capacity and ecosystem restoration.

Keywords: Facilities Management, Operational Efficiency, Socio-Ecological Transition, Sustainability

DEMOLITION CONCRETE WASTE MANAGEMENT IN GAUTENG: CHALLENGES AND STRATEGIC INTERVENTIONS FOR CIRCULAR CONSTRUCTION

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Abstract

This paper investigates the challenges of construction and demolition (C&D) concrete management in Gauteng Province, South Africa, and proposes strategic interventions aligned with circular economy principles. A qualitative-dominant mixed-methods design was adopted, comprising semi-structured interviews and open-ended questionnaires with nine construction professionals (contractors, site managers, waste handlers) who have practised for a minimum of five years across multiple sites in Gauteng (Benoni, Springs, Roodepoort, Germiston, Parktown Rosebank and Johannesburg). Data were analysed using thematic analysis following Braun & Clarke's six-phase framework. Construction-phase waste is driven by over-ordering, miscalculations, and a "build-first, manage-later" culture. Demolition-phase waste is exacerbated by lack of pre-demolition audits, inadequate site security, and failure to separate rebar from concrete. Common barriers across both phases include misconceptions that recycled concrete is weak or short-lived, high transport costs, absence of nearby recycling facilities, low Building Information Modelling (BIM) awareness, and inconsistent enforcement of the National Environmental Management: Waste Act (large projects monitored, small projects ignored). The modest sample (n=9) and geographic focus limit generalisability; quantitative waste audits are needed. Integrated strategies include mandatory pre-demolition audits, landfill taxes, decentralised recycling infrastructure, SME-friendly BIM training, and municipal provision of waste storage containers. This study provides the first empirical application of the COM-B behavioural framework to C&D concrete waste in an African urban context, distinguishing construction-phase from demolition-phase barriers.

Keywords: Circular economy, concrete waste management, construction and demolition waste, South Africa, sustainable construction

A PREDICTIVE MODEL FOR ESTIMATING THE SERVICE LIFE OF FLOOR FINISHES IN PUBLIC OFFICE BUILDINGS IN NAIROBI: IMPLICATIONS FOR MAINTENANCE PRACTICE AND POLICY

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Abstract

Service life prediction, a key component of lifecycle-based asset management, remains underdeveloped and underutilized in Kenya's public building sector. The absence of empirical prediction tools has contributed to reactive maintenance leading to inefficient use of resources in public office buildings. The main aim of the study was to develop a predictive model for estimating the service life of floor finishes in public office buildings in Nairobi. The study examined the common types of floor finishes and their service lives, determining the factors influencing service life and examining relevant regulatory frameworks using a mixed-methods approach. Quantitative data was collected from 42 government-owned office buildings through a questionnaire to facility managers as well as observations on the floor conditions. Qualitative insights were obtained from officials at the State Department for Public Works, Kenya Bureau of Standards (KEBS), and the Kenya Association of Manufacturers (KAM). Multiple regression analysis was used to examine the influence of nine determinants on observed service life. The regression model was statistically significant ($F(9,32)=2.313$, $p=0.039$) and explained 39.4% of the variance in service life ($R^2=0.394$). Management practices ($\beta=-0.580$, $p=0.005$), design deficiency ($\beta=0.447$, $p=0.021$), accidents/force majeure ($\beta=0.356$, $p=0.041$), and poor workmanship ($\beta=0.383$, $p=0.043$) were statistically significant predictors. Management-related factors had the strongest influence, highlighting the role of institutional culture in material performance. The study recommended stronger implementation of the existing maintenance policies while standardizing maintenance practices across all public office buildings. The proposed model provides a practical decision-support tool for lifecycle-based procurement and predictive maintenance scheduling for efficient use of public resources.

Keywords: Floor Finishes, Lifecycle Costing, Maintenance Planning, Predictive Modelling, Public Buildings

Paper ID: 63

TOWARDS RESILIENT FUTURES: A MULTIDIMENSIONAL FRAMEWORK FOR SUSTAINABLE HOUSING INVESTMENT IN GAUTENG

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Abstract

Gauteng's housing sector is shaped by rapid urbanisation, spatial inequality, affordability constraints, and fragmented governance, all of which constrain efforts to mobilise housing investment in more sustainable and inclusive ways. This study aims to develop a multidimensional framework for analysing sustainable housing investment in Gauteng, South Africa. A qualitative desk-based design was adopted, combining a structured review of academic literature with qualitative content analysis of selected policy and governance documents from Gauteng, São Paulo, and Greater Manchester. The analysis was guided by Institutional Theory, Stakeholder Theory, and the Resource-Based View to examine how governance arrangements, stakeholder coordination, and strategic resource capacities influence housing investment outcomes. The findings indicate that sustainable housing investment in Gauteng is constrained by fragmented institutional mandates, regulatory uncertainty, weak intersectoral coordination, and limited mechanisms for meaningful stakeholder participation. In response, the study proposes a four-dimensional framework comprising institutional, financial, stakeholder, and spatial-equity dimensions. The paper contributes a context-sensitive analytical framework for assessing housing investment conditions and informing policy and planning debates on sustainable urban development in Gauteng.

Keywords: Sustainable housing investment, urban governance, spatial equity, stakeholder participation, qualitative content analysis,

EXPLORING THE DISASTERS THAT OCCUR IN INFORMAL SETTLEMENTS: A CASE STUDY ON THE LIVED EXPERIENCES OF THE RESIDENTS

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Abstract

The study explores the nature and impact of disasters occurring in informal settlements, focusing on the lived experience of residents. Purpose: This study explores how environmental, social, and infrastructural vulnerabilities shape disaster occurrence and responses in informal settlements, addressing the limited understanding of residents' lived experiences of disaster risks. Design: A qualitative case study approach was adopted, using in-depth semi-structured interviews with 20 purposively selected participants. Data were collected in line with ethical protocols, including informed consent, and analysed using thematic analysis to identify patterns of vulnerability and coping strategies. Data collection continued until saturation was achieved. Findings: Residents experience recurring hazards such as flooding, fires, and disease outbreaks, intensified by inadequate housing, poor service delivery, and weak institutional support. Despite these conditions, strong community-based coping mechanisms and informal support networks enhance local resilience. The findings provide context-specific insights consistent with existing literature on disaster vulnerability and resilience in informal settlements. Research Limitations and Implications: The study focuses on a single informal settlement, limiting generalisability; however, the findings offer transferable insights for similar contexts. The study contributes to understanding the interplay between vulnerability and resilience in disaster-prone informal settlements. Practical Implications: The study highlights the need for targeted disaster risk reduction strategies, including improved drainage systems, housing upgrades, and enhanced service delivery. Effective implementation requires collaboration among local government, NGOs, and community leaders, with interventions structured across short- and long-term planning horizons.

Keywords: Disaster risk reduction; Informal settlements; Lived experiences; Vulnerability; Resilience; South Africa

UNDERSTANDING ENERGY CONSUMPTION AND MANAGEMENT IN PUBLIC BUILDINGS

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Abstract

The built environment accounts for roughly one-third of global energy use, a pattern that carries far-reaching consequences for the natural world, most notably through its contribution to climate change and the progressive depletion of finite resources. This paper aims to raise awareness and deepen understanding of how energy is consumed and should be managed in university buildings, drawing on two complementary theoretical lenses: sustainability theory and socio-technical theory. Methodologically, the paper is grounded in a conceptual narrative review that prioritises constructing reasoned arguments, synthesising scholarly work, and tracing new conceptual linkages, all aimed at generating theoretical insights rather than reporting primary field data. It is openly acknowledged that the absence of original empirical evidence introduces the possibility of interpretive subjectivity. Arguably, the investigation uncovers seven steps ideal for managing energy consumption in university buildings, which include establishing the theoretical foundation underpinning the concepts, recognising energy management as a socio-technical system, mapping stakeholder interactions and motivations, and diagnosing patterns of energy use and identifying hotspots. Additionally, the steps include integrating behavioural change programmes with technological solutions, institutionalising continuous improvement and learning, and fostering a culture of sustainability. The findings attempt to close the gap between academic theorising and day-to-day institutional practice, offering actionable guidance to researchers, facility managers, and university administrators. It is argued that consistent application of this step holds real potential for achieving sustained improvements in energy performance. Nevertheless, the conceptual insights (seven steps) presented in this paper should be tested empirically; future studies are encouraged to collect primary data on the practical effectiveness of sustainability-oriented and socio-technical approaches in real-world university contexts.

Keywords: energy consumption, energy efficiency, energy management, facility management, socio-technical theory, sustainability theory

THE CASE FOR SUSTAINABLE BUILDINGS BASED ON THE CHARACTERISTICS OF CONVENTIONAL BUILDINGS

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Abstract

Existing buildings face environmental, economic, and health-related challenges due to traditional construction methods and the slow adoption of sustainable practices. The study investigates the impact this has on operating costs, marketability, indoor environmental quality (IEQ) and interior material durability for buildings in the Nelson Mandela Bay Metropole (NMBM). quantitative approach a scale questionnaire 65 East Cape Master Builders Association (ECMBA) general contractor (GC) members. 21 surveys result in a 32.3% response rate. The findings indicate that existing conventional buildings perform poorly compared to sustainable buildings in terms of operating costs, marketability, IEQ, and interior material durability. High operating costs were primarily attributed to inefficient occupant behaviour, targeted policy intervention, improved regulatory enforcement, and increased industry awareness to accelerate sustainable practices.

Keywords: [Keywords not provided]

**A SCOPING REVIEW: POLICY “PULL” AND DIFFUSION OF GREEN
BUILDING CERTIFICATION ACROSS AFRICA**

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Abstract

Green building adoption is part of a global response to the environmental impacts of construction. This has led to the adoption of green certification as standards for demonstrating environmental compliance and sustainability. However, the literature shows low adoption rates in developing African countries due to various challenges, including fragmented policy approaches. This scoping literature review explored how policy instruments influence the adoption and diffusion of green building certification across African countries. Using a five-step framework by , the study included forty-six (46) selected sources in the content analysis. The results demonstrate that the green building policy landscape in Africa is underdeveloped, with many countries lacking defined policies to guide sustainable practices. However, adoption of international green certification systems is prevalent on the continent due to the lack of local rating systems and cohesive policy frameworks. Many rating systems are imported, with the U.S. LEED being the most used. Notable policy gaps driving stakeholder interests include the need for technical training, public awareness initiatives, regulations by green building councils, the creation of green financial instruments, and government interventions. Unlike other studies that focus on cost perceptions and lack of technical skills, this study explored how policy instruments influence the adoption and diffusion of green building certification across African countries.

Keywords: Green building, Africa, Policy, Certification, Rating Systems, Regulation

EFFECTS OF GOVERNMENT POLICIES ON THE PROVISION OF HOUSING IN NIGERIA: AN EMPIRICAL ANALYSIS OF AKURE NORTH LOCAL GOVERNMENT AREA

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Abstract

This study examined the effects of government policies on the provision of housing in Akure North Local Government Area, Ondo State, Nigeria. A mixed-methods approach was adopted, utilizing both quantitative data from 120 structured questionnaires and qualitative insights from interviews, observations, and field photographs. Respondents were drawn from five communities: Oke-Ijebu, Igoba, Ita-Ogbolu, Oba-Ile, and Osi, using a stratified random sampling technique to ensure proportional representation. The findings revealed that while a majority of residents live in moderately adequate housing with basic sanitation, they still face common challenges such as poor electricity, leaking roofs, and inadequate plumbing. Land availability was generally rated as adequate; however, land costs remain a constraint, particularly for low-income earners. Perceptions of government housing policies were mixed, with 30% of respondents reporting negative impacts and only 28.3% perceiving a positive influence. The study concluded that existing policies have not sufficiently addressed housing affordability, infrastructure provision, or access to land. It recommends improved policy implementation, regular maintenance programs, and affordable land pricing schemes to enhance housing delivery and residents' well-being in Akure North.

Keywords: Government Policies, Effect, Housing Policies, Housing Provision

EXAMINATION OF THE PERFORMANCE OF ALTERNATIVE BUILDING TECHNOLOGIES USED IN THE CONSTRUCTION OF RECONSTRUCTION AND DEVELOPMENT PROGRAMME (RDP) HOUSING

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Abstract

This study evaluates the suitability of alternative building technologies (ABTs) for the delivery of Reconstruction and Development Programme (RDP) housing in South Africa. The research responds to the persistent housing backlog, poor workmanship, recurring defects, and the labour-intensive nature of conventional brick-and-mortar construction. The aim was to determine which alternative construction method meets or exceeds conventional methods in terms of time, cost, and quality. A mixed-methods design was adopted, supported by literature review, questionnaires, interviews with contractors, regulators, end-user input, and observation through a site visit. The study examined three ABTs: Moladi Construction Technology, Hydraform Interlocking Brick Technology, and Sandbag Construction Technology. Findings show that all three alternatives offer relevant options to conventional methods, particularly through faster delivery, reduced dependence on highly skilled artisans, and potential improvements in sustainability and community participation. Among 23 contractor respondents, Sandbag Construction Technology was the most selected preferred ABT at 30%, while 17% selected Moladi and 17% selected Hydraform; however, the broader comparative assessment identified Moladi as the leading option overall in terms of time, cost, and quality. In addition, 39% of contractors indicated that end-user opinion is an important factor in deciding whether ABTs should be adopted. Responses from 8 end-users also suggest a generally positive attitude toward alternative methods when safety, performance, and access to housing are assured. The study concludes that ABTs, especially Moladi, can support faster, more cost-effective, and more sustainable RDP housing delivery in South Africa.

Keywords: Alternative building technologies, Moladi Construction Technology, Hydraform Interlocking Brick Technology, Sandbag, Affordable housing

EVALUATING COMPLIANCE LEVELS OF INFORMAL HOUSING CONSTRUCTION PRACTICES WITH BUILDING AND ENVIRONMENTAL REGULATIONS IN SOUTH AFRICA

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Abstract

South Africa's rapid urbanization and economic struggles have led to informal settlement growth. While informal housing provides shelter, construction practices often do not comply with building and environmental regulations, causing safety, health, and sustainability concerns. This study aims to determine compliance levels of informal settlement construction practices with these regulations. The research uses a qualitative approach, collecting data on construction practices, materials, builders' skills, and regulatory awareness through observations, interviews in Khayelitsha, Gugulethu, Langa, and Ocean View, while the focus group included informal builders from various locations. Data is analyzed using thematic analysis to identify compliance-related patterns, challenges, and opportunities. Key findings show that residents and informal builders have limited understanding of and adherence to regulations due to socioeconomic constraints, lack of formal training, and the informal nature of settlements. Non-compliant practices create environmental, health, and safety risks. The study highlights the need for context-sensitive policies addressing non-compliance causes such as poverty, lack of affordable housing, and low institutional capacity. Recommendations include improving builders' access to quality materials and training, supporting community-driven initiatives, and implementing flexible approaches to informal settlement upgrading. The findings contribute to knowledge on enhancing living conditions and promoting sustainable urban development in South Africa's informal settlements.

Keywords: informal settlements, construction practices, building regulations, environmental regulations, alternative building technologies

**FOCUS AREA 4: HEALTH, SAFETY,
WELLBEING, INCLUSION AND WORKFORCE
CULTURE**

SMART CONSTRUCTION TECHNOLOGIES APPLICATION TO IMPROVE HEALTH AND SAFETY IN THE SOUTH AFRICAN CONSTRUCTION INDUSTRY: A SYSTEMATIC REVIEW

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Abstract

Purpose: The South African construction industry continues to experience persistent health and safety challenges despite regulatory frameworks. This study systematically reviews the application of smart construction technologies and their potential to improve occupational health and safety outcomes within the South African construction context. **Design/Methodology/approach:** A qualitative systematic literature review guided by the PRISMA framework was adopted. Peer-reviewed journal articles, conference papers, and industry reports published between 2015 and 2025 were sourced from Scopus, Web of Science, and SA ePublication databases. A total of 113 eligible studies were analysed using thematic analysis. **Findings:** The findings reveal that smart construction technologies—including IoT devices, wearable sensors, BIM, drones, and automated systems—significantly enhance real-time hazard detection, worker monitoring, emergency response, and safety management. However, adoption remains limited due to high initial costs, inadequate technical skills, resistance to change, insufficient infrastructure, and weak regulatory support. **Practical implications:** The study highlights the need for targeted training programmes, supportive government policies, and strategic investment to encourage widespread adoption of smart safety technologies across the South African construction industry. **Research Limitations and Implications:** The review relies solely on secondary data and reports findings for only one research objective due to space limitations. Future empirical studies are recommended to validate these findings within live construction projects.

Keywords: Construction industry, health and safety, smart construction technologies, South Africa

LEADERSHIP PRACTICES SUPPORTING WORKFORCE ENGAGEMENT AND INCLUSION IN WESTERN CAPE CONSTRUCTION FIRMS: A PRINCIPAL COMPONENT ANALYSIS

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Abstract

This study identifies leadership practices perceived to support workforce engagement and inclusion in construction project delivery in the Western Cape Province, South Africa. A quantitative questionnaire survey was administered to leaders in cidb Grade 6–9 general building firms, and 64 valid responses were analysed using descriptive statistics, Cronbach's alpha, and principal component analysis. The instrument's reliability was high ($\alpha = 0.910$). Five components were extracted, namely inclusive workplace support, employee empowerment, social support, participative leadership, and workplace clarity, explaining 57.094% of the total variance. The highest-ranked practices were enabling peer support (MV = 4.59) and leadership engagement and visibility (MV = 4.51). The study provides preliminary evidence on leadership-related practices associated with engagement and inclusion in Western Cape construction firms. However, because productivity was not directly measured and the study was limited to one province and a modest sample, the findings should be interpreted with caution.

Keywords: construction management, inclusion, leadership, project delivery, workforce engagement, and the Western Cape

EMOTIONAL INTELLIGENCE AS A CATALYST FOR RESILIENT AND SUSTAINABLE CONSTRUCTION PROJECT MANAGEMENT IN SOUTH AFRICA

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Abstract

The South African construction industry faces a dual challenge: the urgent need for sustainable built environments and the persistent complexity of socio-economic project volatility. While technical proficiency is well-documented, a significant knowledge gap exists regarding the specific behavioural drivers, such as Emotional Intelligence (EI), that enable Construction Project Managers (CPMs) to navigate these unique regional pressures. This study aims to evaluate the level of EI among CPMs and determine its role as a precursor to resilient project delivery. Specifically, the research objectives were to quantify current EI competencies and identify how these attributes underpin collaborative, sustainable outcomes. Guided by a positivist paradigm, the study employed a quantitative design using a structured, closed-ended questionnaire. A purposive sampling strategy targeted CPMs within the Durban metropolitan area. Of the 35 questionnaires distributed, 21 valid responses were received (60% response rate). Data were analysed using SPSS version 30 through descriptive statistical techniques. Findings suggest EI acts as a catalyst, providing the emotional infrastructure necessary to support the technical infrastructure. However, the study acknowledges the small sample size as a primary limitation; while the results provide a valuable localised snapshot, the findings lack broad generalisability. Consequently, the analysis and conclusions are presented as an exploratory foundation for larger-scale regional studies. The study concludes that integrating EI development into professional curricula and organisational strategy is essential for achieving the aim of a more resilient industry. By bridging the gap between ‘soft’ leadership skills and ‘hard’ sustainable outcomes, this research advances our understanding of the human-centric drivers necessary for the evolution of the South African built environment.

Keywords: construction, emotional intelligence, project managers, resilience, sustainable construction

ASSESSING HEALTH AND SAFETY COMPLIANCE AND RISK CONDITIONS IN HIGHER EDUCATION BUILDINGS: A MIXED-METHODS CASE STUDY OF A PUBLIC UNIVERSITY IN THE FREE STATE, SOUTH AFRICA

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Abstract

Purpose: This study aims to assess health and safety compliance and risk conditions within buildings at a public higher education institution in the Free State Province, South Africa. Universities represent complex built environments where inadequate health and safety management can negatively affect user wellbeing, institutional performance, and regulatory compliance. **Design:** A descriptive cross-sectional research design adopting a mixed-methods approach was employed to assess health and safety conditions within university buildings at a specific point in time. The mixed-methods approach integrated quantitative questionnaire surveys, qualitative semi-structured interviews, and building inspection checklists to obtain both numerical and experiential data. Semi-structured interviews were conducted with four purposively selected health and safety professionals to identify regulatory requirements, management practices, and key risk areas. Furthermore, completed questionnaires were obtained from 372 students and 235 staff members to assess perceptions of health and safety conditions within university buildings. A checklist was also used to evaluate building safety conditions. **Research Limitations and Implications:** The study focuses on a single institution, which may limit generalisability. However, the findings provide context-specific insights applicable to similar public higher education institutions in South Africa. **Findings:** The findings showed that while formal health and safety systems exist, their implementation across buildings is inconsistent. Key occupational hazards included blocked emergency exits, inadequate fire safety measures, poor ventilation, insufficient lighting, and ageing infrastructure. Non-compliance was associated with limited safety awareness, delayed maintenance, and weak monitoring, while management commitment supported better compliance. Existing control measures were present but inconsistently applied, reducing their effectiveness and resulting in uneven health and safety compliance across buildings. **Practical Implications:** The study proposes evidence-based recommendations to strengthen health and safety management systems, enhance compliance monitoring, and support risk-informed decision-making in higher education facilities.

Keywords: Facilities governance, Institutional resilience, Occupant safety, Regulatory compliance, Risk prioritisation

MENTAL HEALTH IN CONSTRUCTION MANAGEMENT: THE IMPACT OF WORKPLACE AND ORGANISATIONAL CULTURE

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Abstract

The purpose of this study was to determine how workplace and organisational cultures affected the mental health of construction managers. The study used an interpretivist paradigm and a qualitative approach to fully explore the participants' experiences concerning the phenomenon under investigation. Data were collected through semi-structured interviews with a purposive sample of 11 construction personnel working in managerial and supervisory roles on construction sites. The findings reveal that high workloads, tight deadlines, interpersonal pressures, and an organisational culture that discourages open discussions about mental health contribute significantly to stress, burnout, and emotional fatigue. The study further highlights the role of stigma and limited organisational support in exacerbating these challenges. However, the relatively small sample size limits the findings, potentially affecting the generalisability of the results. Despite this limitation, the study contributes to a growing body of knowledge about psychosocial risks in the construction industry and calls attention to the importance of organisational interventions that promote supportive work environments, improve workload management, and encourage mental health awareness.

Keywords: Construction Industry, Construction management, Mental health, Organisational Policy, Workplace Culture

IMPROVING CONSTRUCTION EDUCATION PEDAGOGY

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Abstract

Globally, improving teaching and learning practices in higher education remains a priority because of the critical role graduates play in economic growth and industry development. However, there is limited empirical evidence on pedagogical strategies that effectively enhance undergraduate learning experiences in construction education, particularly within the South African Architecture, Engineering and Construction (AEC) context. This study investigated the pedagogical strategies perceived as most effective for improving teaching and learning in construction-related disciplines at the Durban University of Technology, South Africa. A quantitative research approach was adopted, using a structured questionnaire administered to 97 participants. Data were analysed using Mean Item Score (MIS) analysis to evaluate and rank the effectiveness of the identified pedagogical strategies. The findings showed that all evaluated strategies achieved mean scores above 3.50, indicating positive perceptions of their effectiveness in enhancing teaching and learning. The five highest-ranked strategies were providing students with opportunities to ask questions (MIS = 4.56), using student questions and responses to facilitate collective learning (MIS = 4.39), ensuring fairness in assessment and marking (MIS = 4.38), providing assessment plans with clearly defined deadlines (MIS = 4.26), and encouraging students to develop a deeper interest in the subject matter (MIS = 4.23). The findings highlight the importance of interactive learning, transparent assessment practices, and student-centred pedagogical approaches in strengthening construction education. The study contributes context-specific evidence to the construction education literature and offers practical insights to enhance teaching effectiveness and student learning outcomes in the AEC sector.

Keywords: Construction, Education, Learning, Pedagogical approaches, Teaching

INTEGRATING HUMAN FACTORS INTO SAFETY, HEALTH, ENVIRONMENT, AND QUALITY (SHEQ) MANAGEMENT SYSTEMS TO ENHANCE OPERATIONAL EFFICIENCY

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Abstract

This study examines how human factors, particularly leadership commitment and employee engagement, affect the operational effectiveness of Integrated Safety, Health, Environment and Quality management systems. The SHEQ management systems are structurally standardised through High-level Structures (HLS), but they often fail to reach full maturity due to an insular focus on technical compliance that excludes human-system interactions. Adopting a systematic literature review directed by PRISMA principles, this paper synthesises 35 peer-reviewed papers from Google Scholar and ScienceDirect published in the period 2014 to 2025. The thematic synthesis sets out four core pillars: structured leadership accountability, collaborative communication, participative learning cultures and cross-functional training. Premised on these findings, we propose a Human-Centred SHEQ Framework that comprises three structural dimensions. These are: the strategic levers, which include executive safety-linked accountability; the operational glue, which entails multi-employer shared communication protocols; and, lastly, the socio-technical enablers, which comprise digital learning dashboards and predictive human reliability observation metrics. This study seeks to integrate fragmented research into a practical, actionable framework specifically designed for emerging economies grappling with institutional isomorphism. This provides clear pathways to simultaneously attain regulatory compliance and operational resilience in South Africa and comparable contexts.

Keywords: Employee Engagement, Human factors, Leadership commitment, Operational Efficiency, SHEQ Management systems

WEARABLE TECHNOLOGY IN CONSTRUCTION: A SOCIO-TECHNICAL PATHWAY TO FATIGUE RISK MANAGEMENT AND SAFETY CULTURE TRANSFORMATION

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Abstract

Fatigue risks remain underreported yet persistent in construction, impairing worker performance and undermining their health and safety. This paper investigates how wearable technology (WT) can be adopted to evolve early fatigue-related interventions in construction health and safety management. The study is underpinned by the socio-technical systems (STS) theory and examines the interplay between human, organisational, and technical dimensions to demonstrate how WT can proactively address fatigue risks while strengthening worker health monitoring. This study adopted a mixed-methods approach to collect qualitative and quantitative data. The qualitative data were collected through semi-structured interviews with 48 construction personnel across estate development, township development, and road maintenance projects. The quantitative data were collected through survey questionnaires administered to 116 research participants, including registered professionals and site operatives. The thematic analysis method was used to synthesise qualitative findings, while the descriptive analysis method was employed to quantitatively validate survey questionnaire results. The findings confirm that construction operatives perceived WT as promising for monitoring fatigue indicators and enabling real-time alerts. However, concerns about comfort, durability, privacy, and surveillance emerged as critical barriers to adoption. Moreover, organisational readiness was identified as a decisive factor for successful adoption. Therefore, future research should explore longitudinal studies to measure WT's long-term effectiveness, cross-sectoral comparisons to assess transferability, and participatory design approaches to strengthen workers' trust and acceptance of WT.

Keywords: Construction, fatigue, health and safety, socio-technical systems, wearable technology

ASSESSING THE IMPACT OF WORK-LIFE BALANCE ON PERFORMANCE OF WOMEN IN NIGERIA'S BUILT ENVIRONMENT: THE ENABLING ROLE OF DIGITAL TECHNOLOGIES

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Abstract

Maintaining a healthy work-life balance (WLB) is a critical factor influencing employee performance. However, women professionals in the built environment persistently experience WLB challenges, which affects performance and retention. While digital technologies have the potential to improve work practices, their influence on WLB for women remains underexplored. This study fills the gap by assessing the impact of WLB on performance of women in Nigeria's built environment, with emphasis on technology as an enabler of gender-inclusive industry transformation. The study adopted a quantitative research approach. Data were collected through structured questionnaire from women professionals in the built environment in Abuja. Mean Item Score (MIS) was employed in analysis of the data. Findings revealed that current balance between work and personal life is unsatisfactory (MIS = 4.01), poor policy provision on maternity leave and return to work exist (MIS = 3.99) and lack of mental health support. Also, lack of digital technologies in enabling flexible and remote work options exist. WLB impedes career growth, develops heightened stress and anxiety. The study concluded that existing WLB impacts negatively on performance of women in the built environment. It was recommended that construction firms should focus on implementation of automated tools and digital training for improved job performance.

Keywords: Built environment; Digital technology; Women; Work-life balance; Performance

AN EXPLORATORY QUANTITATIVE SURVEY OF GENDER-SENSITIVE COMPLIANCE WITH CONSTRUCTION HEALTH AND SAFETY REGULATIONS IN PAKISTAN

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Abstract

Pakistan's construction industry is widely recognised as one of the country's most hazardous sectors, characterised by weak and inconsistent enforcement of occupational health and safety (H&S) regulations. Although prior research has examined general safety deficiencies, limited empirical evidence exists on how gender shapes compliance with health and safety regulations, by implication, associated practices. This paper presents an exploratory study that investigates the extent to which compliance with construction H&S regulations in Pakistan incorporates gender-sensitive measures. A quantitative, cross-sectional survey was conducted among 23 construction professionals in Pakistan using convenience and snowball sampling and a structured online questionnaire. Data were analysed using descriptive statistics, chi-square tests, and Fisher's exact tests. The findings indicate that safety regulations are implemented inconsistently, enforcement is often perceived as unequal, and women are frequently excluded from training. Gender-specific personal protective equipment (PPE) and adequate sanitation facilities are largely absent, while cultural norms, weak enforcement, lack of training, and cost constraints remain key barriers. Inferential statistical analysis shows significant associations between the provision of gender-specific PPE and sanitation facilities and between the observation of gender-specific safety issues and support for gender-sensitive policies. The study concludes that Pakistan's construction safety system inadequately addresses gender considerations and that regulatory reform, inclusive enforcement, and organisational change are required to promote equitable protection for all workers.

Keywords: enforcement gaps, gender-responsive policies, women in construction, worker protection, workplace inclusion

DIGITAL SKILLS AND WOMEN'S CAREER ADVANCEMENT IN THE SOUTH AFRICAN CONSTRUCTION INDUSTRY

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Abstract

The South African construction industry remains male-dominated, with women facing barriers to education, entry, retention, progression and leadership. At the same time, the industry is becoming more digital through tools such as Building Information Modelling, project management software, quantity take-off systems, digital collaboration platforms, sustainability tools, surveying technologies and construction site management applications. This paper examines how digital skills influence women's professional growth in the construction industry. The study adopted a quantitative research approach, using a questionnaire to collect data from 113 randomly selected construction professionals in the South African construction industry. The data collected was analyzed using descriptive statistics. The findings show that mastery of digital tools is perceived to support professional growth through improved work efficiency, access to new responsibilities, recognition, promotion opportunities, and wider participation in technical construction services. Digital tools were also perceived as useful for improving inclusivity, diversity, equality and accessibility in areas such as project management, design, quantity surveying, construction management, data-driven decision-making and sustainability. However, the findings also show that digital skills alone cannot address women's under-representation. Supportive education systems, mentoring, anti-discrimination measures, childcare support, flexible work arrangements, equal pay, gender-sensitive hiring and safer work environments are also required. The paper concludes that digital skills can enhance women's career pathways, but only when supported by wider institutional and workplace reforms.

Keywords: Construction industry, digital skills, gender equality, professional growth, women

**FOCUS AREA 5: CONSTRUCTION EDUCATION,
SKILLS, CAPACITY DEVELOPMENT AND
PROFESSIONAL COMPETENCE**

Paper ID: 29

AUTHENTIC TEACHING AND LEARNING IN UNDERGRADUATE CONSTRUCTION PROGRAMMES: ACADEMIC PERSPECTIVES ON COMPETENCE DEVELOPMENT

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Abstract

Competence development, rather than a predominant focus on disciplinary content knowledge, is increasingly shaping curriculum reform agendas in built environment education. In construction and engineering programmes, graduates are expected to apply knowledge effectively within complex, practice-based project environments that demand collaboration, professional judgement, and adaptability. Authentic teaching, learning, and assessment have therefore gained prominence as pedagogical approaches for strengthening workplace readiness and developing industry-relevant and 21st-century skills. In this context, this paper reports on a qualitative case study of undergraduate built environment programmes at a large research-intensive university in KwaZulu-Natal, South Africa. The study sought to identify the extent to which professional and transferable competences are embedded within units of learning, and how these competences are intentionally developed through teaching, learning, and assessment practices. The study explored academics' perspectives on how authentic teaching, learning, and assessment practices contribute to competence development in construction education. Data were generated through seven semi-structured interviews with academics involved in teaching undergraduate-built environment modules and analysed using thematic analysis. Four themes emerged from the data: (1) competence mapping and professional relevance, (2) authentic learning design through industry-simulated tasks, (3) assessment alignment and constructive coherence, and (4) reflective integration and pedagogical tensions. The findings revealed strong support for authentic pedagogies as a means of developing workplace-relevant competencies; however, academics reported challenges in implementing fully authentic learning experiences due to curriculum coverage requirements, large class sizes, limited access to industry projects, and institutional assessment constraints. Consequently, many academics adopted what may be described as "bounded authenticity," whereby elements of professional practice were incorporated through case studies, simulations, and project-based tasks rather than full industry immersion. The paper contributes to discussions on curriculum reform in the construction business and project management education by highlighting practical strategies for strengthening competence development while balancing institutional realities.

Keywords: Authentic learning, Construction education, Competence development, Curriculum reform

INCLUSIVE ASSESSMENT PRACTICES FOR SUPPORTING DIVERSE STUDENT NEEDS IN UNIVERSITIES: A SYNERGISTIC REVIEW TOWARDS FUTURE-READY BUILT ENVIRONMENT GRADUATES

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Abstract

In the context of climate change, rapid urbanisation, and technological disruption, universities are increasingly expected to produce future-ready Built Environment graduates capable of responding to complex professional demands. This paper examines how inclusive assessment practices support diverse student needs within Built Environment programmes while maintaining professional competency standards. A structured literature synthesis was conducted using peer-reviewed literature published between 2015 and 2025. Searches across Scopus, Web of Science, and Google Scholar yielded 613 publications, of which 57 met the inclusion criteria. The selected studies were analysed using thematic synthesis, guided by inclusive assessment principles, Universal Design for Learning, and assessment for learning. The synthesis identified four dominant themes: flexible assessment design, multiple and authentic assessment formats, feedback and transparency, and institutional and accreditation-related challenges. The originality of the study lies in positioning inclusive assessment within the professional and competency-based demands of Built Environment education, particularly where equity must be balanced with accreditation expectations. Drawing on the synthesis of the literature, the study develops a synergistic framework that integrates flexibility, authenticity, transparency, and institutional support as interconnected dimensions of inclusive assessment. Overall, the findings suggest that inclusive assessment can promote equitable learning while maintaining the standards required for professional practice in the Built Environment. The proposed framework offers a structured approach for universities seeking to strengthen inclusive assessment practices and develop future-ready Built Environment graduates.

Keywords: Built Environment education, Flexible assessment design, Higher education, Inclusive assessment, Synergistic framework

A KNOWLEDGE-BASED COMPETENCY METRIC FOR PROJECT MANAGERS IN SOUTH AFRICA'S ICT SECTOR

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Abstract

Technology-intensive ICT projects in emerging economies, particularly South Africa, continue to underperform despite the widespread use of global competency frameworks such as PMBOK, IPMA and PRINCE2, indicating a misalignment with local contextual realities. This study aims to examine this gap and identify the competencies most critical for project success in digitally intensive environments. A systematic literature review (SLR) with thematic synthesis was employed to analyse recent theoretical and empirical studies on project manager competencies and digital transformation, including artificial intelligence, data analytics and remote collaboration. The findings indicate that, in addition to foundational technical competencies, adaptive, digital and strategic capabilities such as AI literacy, data-driven decision-making, stakeholder sensemaking and contextual intelligence are key determinants of success yet are insufficiently represented in existing frameworks. To address this gap, the study proposes a knowledge-Based Competency Metric (KBCM) comprising four domains: knowledge, performance, personal and agile/adaptive competencies. The proposed metric provides a context-sensitive tool for competency assessment, targeted capability development and governance, thereby supporting improved project performance and more effective leadership in South Africa's evolving digital transformation landscape.

Keywords: Digital transformation, Emerging economies, ICT projects, Project manager competencies, South Africa

Paper ID: 80

ADDRESSING TECHNICAL CAPACITY GAPS IN SOUTH AFRICAN PUBLIC SECTOR INFRASTRUCTURE MEGAPROJECTS: A SYSTEMATIC LITERATURE REVIEW

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Abstract

Infrastructure delivery in developing and emerging economies continues to experience persistent cost and time overruns, despite extensive policy reforms and institutional investments. In the South African public sector, these challenges are compounded by shortages of skilled technical personnel, weak knowledge management systems, and an overreliance on external consultants. This study examines technical capacity constraints within government departments and public entities responsible for infrastructure delivery through a systematic literature review (SLR) of peer-reviewed journals, reports, and policy documents. The findings highlight recurring gaps in skills development, institutional learning, and the design and implementation of capacity-building initiatives, which are often misaligned with organisational needs. Drawing on insights from capacity development and institutional perspectives, the study identifies key factors that limit sustainable capability development in the built environment. Rather than proposing a fully developed integrative framework, the study outlines key principles and considerations for strengthening internal state capability. These insights contribute to a more coherent understanding of how technical capacity influences infrastructure delivery performance and provide a foundation for future empirical and framework-based research.

Keywords: Technical capacity, infrastructure delivery, capacity building

ASSESSING COMPLIANCE AND IMPLEMENTATION CHALLENGES OF DHET NORMS AND STANDARDS IN OFF-CAMPUS STUDENT ACCOMMODATION IN SOUTH AFRICA: A SYSTEMATIC REVIEW

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Abstract

This study examines the compliance and implementation challenges associated with the Department of Higher Education and Training (DHET) Minimum Norms and Standards for off-campus student accommodation in South Africa. The growing demand for student housing and increasing reliance on privately managed accommodation have raised concerns regarding accommodation quality, safety, and regulatory compliance. A systematic literature review (SLR) guided by the PRISMA framework was conducted to identify, evaluate, and synthesise existing literature published between 2015 and 2025. The review analysed studies relating to student accommodation conditions, governance, compliance, and student experiences within the South African higher education sector. The findings indicate that compliance with DHET standards remains inconsistent across several areas, particularly safety and security, infrastructure maintenance, facilities and service provision, and accessibility. The review further identified weak governance and regulatory oversight, financial constraints, accommodation shortages, and the prevalence of unregulated accommodation providers as key implementation challenges affecting compliance. The findings also reveal that non-compliance has implications for student well-being, academic performance, and overall accommodation satisfaction. By consolidating existing evidence, this study contributes to the understanding of policy implementation challenges within the student accommodation sector and provides insights that may assist universities, accommodation providers, and policymakers in strengthening compliance and improving the quality of off-campus student housing in South Africa.

Keywords: Challenges, DHET Minimum Norms and Standards, off-campus student accommodation, South Africa, student housing

EVALUATING PARTICIPATORY APPROACHES IN STUDENT HOUSING QUALITY RESEARCH IN AFRICA: A SYSTEMATIC REVIEW

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Abstract

This paper presents a systematic review of methodological approaches employed in student housing research in Africa. The review uses the PRISMA framework and relies on 345 empirical studies from 42 African countries. The review finds that the methods applied in this research are skewed towards quantitative and cross-sectional designs, often based on non-validated instruments. The methodologies provided essential insights into infrastructural conditions and overall satisfaction with student housing and quality. However, they fail to capture the complexity and contextual specificity of students' lived experiences. Qualitative and mixed-methods research, though less common, offered deeper insights into adaptation behaviours and socio-cultural dimensions of housing, but are rarely grounded in robust theoretical frameworks. Notably, participatory methods are very limited, and ethical considerations are reported inconsistently. The review underscores significant gaps in longitudinal data, representation of marginalised populations, and cross-institutional comparisons. The study calls for a shift towards more inclusive, participatory, and theoretically anchored research methodologies. Furthermore, there is a need to develop validated instruments, implement longitudinal tracking, and establish collaborative governance structures that engage students in research and policy processes. These will enhance the quality, equity, and responsiveness of student housing in African higher education contexts.

Keywords: Adaptive strategies, off-campus hostels, on-campus hostels, student housing quality, student housing satisfaction