PLANNING AND CONTROL STRATEGIES FOR CONSTRUCTION PROJECT RISK AND EFFICIENCY MANAGEMENT

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Abstract
The construction industry is a complex and uncertain field, involving sensitive costs, delays, and requiring planning and control strategies to manage risk and achieve efficiency. This paper discusses the interaction between a project plan, project control, risk control, and efficiency augmentation, with an emphasis on their practical application in the Nigerian construction industry. Based on world and local case studies, the paper emphasizes that faulty planning and inefficient control systems can easily lead to significant cost escalation and time breaches, as frequently occurred with projects, such as the Ajaokuta Steel Mill. On the other side of the argument, however, are investments in modernized systems, such as Lean Construction, Earned Value Analysis (EVA), Just-in-Time (JIT) delivery, and Building Information Modelling (BIM). The implementation of these and others has shown very definite gains in productivity, waste elimination, and the predictability of projects. These advantages are hardly possible to refute, as statistics prove that Lean practices increase labor efficiency by 15-30 percent, and modular construction leads to a 60 percent decrease in waste. In Nigeria, however, systemic issues exist, including a lack of governance, limited technical capacities, and the slow adoption of digitization, which prevent consistent results. The paper suggests that planning and control strategies tailored to the Nigerian scenario are crucial for enhancing resilience, cost efficiency, and sustainable project delivery.

Keywords: Construction project planning, Project control systems, Risk management, Efficiency management, Lean construction, Earned Value Analysis (EVA), Building Information Modelling (BIM), Construction project performance, Cost and schedule overruns

Introduction

Construction projects are fundamental to national development because they provide infrastructure required for housing, transportation, healthcare, education, water supply, and industrial expansion (Ofori, 2019; World Bank, 2020). Construction activities are, however, among the most complex forms of project delivery because they involve numerous stakeholders, temporary organizations, uncertain environments, and interdependent work packages (PMI, 2021; Kerzner, 2022). Unlike manufacturing systems, construction production is largely site-based and influenced by location-specific constraints such as weather, ground conditions, logistics limitations, and regulatory approvals (Hosseini et al., 2018; Love et al., 2020). These characteristics make construction projects highly vulnerable to disruption, inefficiency, and cost escalation when planning and control systems are weak (Aghimien et al., 2019; Yap et al., 2021).

Planning is generally understood as the systematic process of defining objectives, identifying activities, sequencing operations, allocating resources, estimating costs, and determining schedules before execution begins (PMI, 2021; Kerzner, 2022). Control refers to the continuous measurement of actual project performance against approved baselines, followed by corrective actions where deviations occur (Nicholas & Steyn, 2020; PMI, 2021). Effective planning establishes realistic targets, while effective control ensures that those targets remain achievable throughout changing project conditions (Too & Weaver, 2018; Kerzner, 2022). For this reason, planning and control are widely recognised as interdependent functions rather than separate management activities (Walker, 2019; PMI, 2021).

The importance of planning and control in construction is reinforced by the global persistence of delays and cost overruns (Flyvbjerg, 2021; Agyekum et al., 2022). Empirical studies across developed and developing economies consistently identify schedule slippage as one of the most common indicators of project underperformance (Sanni-Anibire et al., 2020; Assaf et al., 2022). Cost overruns similarly remain widespread due to inflation, design changes, poor estimating, productivity losses, and procurement inefficiencies (Love et al., 2020; Flyvbjerg, 2021).

Where delays and overruns occur, projects often experience secondary consequences such as disputes, claims, reputational damage, reduced profitability, and delayed public benefits (PMI, 2021; Yap et al., 2021). This demonstrates that robust planning and control systems are essential not only for contractors but also for governments, investors, and communities (World Bank, 2020; Kerzner, 2022).

Risk management has therefore become a central component of construction planning and control (ISO 31000, 2018; PMI, 2021). Construction risk may arise from technical, financial, environmental, contractual, legal, and political sources (El-Sayegh et al., 2020; Aghimien et al., 2019). Common examples include unforeseen ground conditions, adverse weather, material shortages, labour disputes, safety incidents, exchange-rate volatility, and contractor insolvency (Sanni-Anibire et al., 2020; Yap et al., 2021). If these risks are not anticipated and managed, they can significantly affect project cost, duration, quality, and stakeholder satisfaction (PMI, 2021; Nicholas & Steyn, 2020). Contemporary planning systems therefore integrate risk identification, qualitative and quantitative analysis, response planning, contingency allocation, and continuous monitoring into project controls (ISO 31000, 2018; Hillson, 2020).

One of the most widely adopted modern strategies for improving planning and control is Building Information Modelling (BIM) (Eastman et al., 2018; Succar & Kassem, 2020). BIM enables project stakeholders to create shared digital representations of physical and functional project characteristics (Eastman et al., 2018; ISO 19650, 2019). Through 4D BIM, schedules can be linked to three-dimensional models to simulate construction sequencing and identify logistical conflicts before site execution (Lu et al., 2021; Saka & Chan, 2020). Through 5D BIM, cost information can be integrated into models to improve estimating accuracy and change management (Volk et al., 2020; Lu et al., 2021). Studies indicate that BIM can reduce rework, improve coordination, and enhance decision-making when supported by appropriate organisational capability (Succar & Kassem, 2020; Hosseini et al., 2022).

Lean construction is another major strategy used to improve efficiency and control project uncertainty (Koskela, 2020; Ballard & Tommelein, 2021). Lean construction applies production management principles that focus on value creation, workflow reliability, waste reduction, and continuous improvement (Ballard & Tommelein, 2021; Salem et al., 2022). Techniques such as the Last Planner System, pull planning, look-ahead scheduling, and daily huddles are increasingly used to improve task readiness and schedule reliability (Mossman, 2019; Daniel et al., 2021). Research has shown that lean implementation can improve labour productivity, reduce waiting time, minimise rework, and strengthen collaboration among project teams (Salem et al., 2022; Emuze & Saurin, 2020). These outcomes are particularly valuable in construction environments where fragmented coordination often causes hidden inefficiencies (Walker, 2019; Yap et al., 2021).

Digital transformation has further expanded planning and control through artificial intelligence, automation, and data analytics (Pan & Zhang, 2021; Bilal et al., 2023). Machine learning models are increasingly used for delay prediction, cost forecasting, safety monitoring, and productivity assessment (Bilal et al., 2023; Darko et al., 2020). Computer vision systems can analyse site images to detect unsafe behaviours, track progress, and compare field conditions with planned models (Pan & Zhang, 2021; Son et al., 2022). Predictive analytics also helps managers identify emerging trends earlier than traditional reporting systems (Bilal et al., 2023; PMI, 2021). These technologies suggest that project control is evolving from reactive reporting toward real-time and predictive management (Kerzner, 2022; Nicholas & Steyn, 2020).

Despite these innovations, many construction organisations still fail to realise full benefits from planning tools and control technologies (Love et al., 2020; Hosseini et al., 2022). Common barriers include resistance to change, lack of training, fragmented procurement systems, poor data quality, and weak leadership commitment (Succar & Kassem, 2020; Emuze & Saurin, 2020). Some firms also adopt software platforms without redesigning underlying management processes, which limits performance improvement (PMI, 2021; Kerzner, 2022). This indicates that successful planning and control depend not only on tools but also on organisational culture, governance, and managerial competence (Too & Weaver, 2018; Walker, 2019).

Sustainability and resilience considerations are also reshaping planning priorities in the construction sector (UNEP, 2021; World Green Building Council, 2022). Construction managers are increasingly required to consider carbon emissions, waste minimisation, circular resource use, and climate adaptation alongside cost and time objectives (UNEP, 2021; Opoku, 2022). Extreme weather events, supply chain shocks, and energy volatility have further highlighted the need for resilient project controls and contingency planning (World Bank, 2022; Agyekum et al., 2022). Efficiency management in the modern era therefore extends beyond productivity to include environmental responsibility and operational resilience (Opoku, 2022; World Green Building Council, 2022).

Planning and control strategies remain fundamental to construction project success because they enable coordination, risk reduction, efficient resource use, and performance improvement (PMI, 2021; Kerzner, 2022). Traditional techniques such as scheduling, budgeting, and progress monitoring are now increasingly complemented by BIM, lean construction, predictive analytics, and integrated risk management systems (Succar & Kassem, 2020; Bilal et al., 2023). As construction projects become more complex and uncertain, the need for robust planning and control frameworks continues to grow (Flyvbjerg, 2021; Yap et al., 2021). Accordingly, this study examines planning and control strategies for construction project risk and efficiency management, with emphasis on contemporary approaches for improving project delivery outcomes (PMI, 2021; Nicholas & Steyn, 2020).

Literature Review

Risk in Construction

Risk in construction refers to uncertainties that may negatively affect project cost, time, quality, and safety outcomes. In Nigeria, the construction sector is considered highly risky because of economic instability, weak infrastructure systems, and policy uncertainty. More than 55% of projects reportedly experience cost overruns above 20% of their original budgets, reflecting persistent financial exposure (Forteza et al., 2022). Inflation and exchange-rate volatility also increase procurement risks, especially for imported materials such as steel and cement. Political risks, including policy changes and bureaucratic delays, frequently disrupt public sector projects (Siraj & Fayek, 2019). Operational risks such as low labour productivity, skills shortages, and supply chain inefficiencies continue to delay projects in Lagos and Abuja. Environmental threats, particularly seasonal flooding in poorly drained urban areas, further affect safety and structural quality (Siraj & Fayek, 2019). Contract disputes and corruption may lead to litigation, cost escalation, and reduced investor confidence. Although some Nigerian firms now use Building Information Modelling (BIM) and risk registers, adoption remains limited (Forteza et al., 2022). Strengthening regulation, transparency, and workforce capacity is therefore essential to reduce project risk.

Planning Strategies in Construction Projects

Planning is a critical success factor because it provides direction for managing project complexity. Front-End Planning (FEP) has been shown to reduce cost growth by 20% and shorten schedules by 39% when properly implemented (Rahat et al., 2022). Clear definition of scope, objectives, and resources helps minimise scope creep, delays, and overruns (Khoury et al., 2023). A major planning tool is the Work Breakdown Structure (WBS), which divides large projects into manageable tasks. High-quality WBS structures reduce coordination errors by up to 25% through clearer task ownership and visibility of dependencies (Khoury et al., 2023). This is particularly valuable in large projects such as hospitals or infrastructure developments where foundations, mechanical systems, and electrical works must be separately managed (Jung & Woo, 2024).

Scheduling tools such as the Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT) improve time management by identifying dependencies, estimating durations, and forecasting delays. Over 70% of contractors using CPM and PERT report fewer schedule slippages (Soni et al., 2022). Resource planning is equally important, as poor allocation contributes significantly to global productivity losses estimated at $1.6 trillion annually (Rahat et al., 2022). Matching labour and equipment to critical activities can improve productivity by 15–20%, while early procurement planning may reduce material delays by 30% (Jung & Woo, 2024). Scenario planning and contingency reserves also improve resilience, with formal contingency plans linked to 50% fewer cost overruns (Soni et al., 2022).

Control Strategies for Risk and Efficiency

Control strategies ensure that project plans are translated into measurable results through monitoring, evaluation, and corrective action. Earned Value Management (EVM) is widely used because it integrates scope, cost, and schedule performance. It enables managers to track schedule variance and cost variance, helping identify whether projects are ahead, behind, under budget, or over budget. Organisations using EVM reportedly achieve 30% better schedule compliance and cost predictability (Parsamehr et al., 2022).

Risk registers and probabilistic tools such as Monte Carlo simulation strengthen project control by analysing possible overruns and delays. Projects using probabilistic risk analysis are 40% less likely to suffer major overruns than those relying only on deterministic estimates (Jung & Woo, 2024). Quality control systems such as Six Sigma and Total Quality Management (TQM) are also important because rework can account for 5–15% of total project cost (Tepeli et al., 2019). Digital monitoring technologies, including BIM dashboards, drones, and IoT sensors, now enable real-time progress tracking, equipment monitoring, and safety oversight. Around 61% of contractors using BIM report improved cost performance, while 55% report shorter project durations (Pan & Zhang, 2022).

Risk Management Approaches

Risk management begins with structured identification using hazard analysis, workshops, and historical data reviews (Osobajo et al., 2020). Early identification significantly reduces the likelihood of cost overruns (Pan & Zhang, 2022). Risks are then prioritised through qualitative tools such as probability-impact matrices and quantitative tools such as Monte Carlo simulation and sensitivity analysis. Projects applying quantitative risk analysis are over 40% more likely to stay within initial budgets (Parsamehr et al., 2022).

Mitigation measures include contractual tools such as insurance and liquidated damages, alongside operational strategies like supplier diversification, safety training, and redundancy planning. Proactive mitigation can reduce schedule slippage by 35% (Pan & Zhang, 2022). Continuous monitoring through audits, interim reviews, and live risk registers is equally vital, as actively monitored projects are twice as likely to succeed (Pan & Zhang, 2022).

Efficiency Management Strategies

Efficiency in construction means achieving quality outcomes with minimal waste of labour, materials, and time. Lean Construction and the Last Planner System are increasingly used to reduce waste and improve workflow reliability. Lean methods can raise labour productivity by 15–30% and reduce costs by up to 10% (Himeur et al., 2022). In Lagos road projects, lean practices have improved coordination and reduced idle time. Just-in-Time (JIT) delivery systems also cut storage and handling waste that may account for 8% of project cost (Attaran & Celik, 2023).

Earned Value Analysis (EVA) remains useful in Nigeria's public housing sector, where budget overruns are common, and projects using EVA are 20% more likely to finish on time (Attaran & Celik, 2023). Prefabrication and modular construction in Abuja have accelerated housing delivery by nearly 30% while reducing waste (Osobajo et al., 2020). Sustainability measures further improve efficiency, with green buildings reducing operating costs by 14% within five years (Charef et al., 2021). Together, these strategies show how Nigeria's construction industry can improve both economic and environmental performance.

Methodology

Research Approach

This study adopted a qualitative research approach using a systematic literature review supported by case study analysis. The approach was selected because the study seeks to synthesise existing knowledge, identify recurring patterns, and evaluate practical planning and control strategies for managing risk and improving efficiency in construction projects rather than generate primary numerical data (Snyder, 2019). The review focused primarily on the Nigerian construction sector while also incorporating international evidence to provide comparative insights and broader industry relevance.

Research Design

A descriptive and analytical research design was employed. The descriptive component was used to identify, classify, and explain key planning and control strategies applied in construction project management, including Work Breakdown Structure (WBS), Critical Path Method (CPM), Earned Value Analysis (EVA), Lean Construction, and Building Information Modelling (BIM) (Yussif et al., 2025).

The analytical component examined the effectiveness of these strategies in relation to project performance indicators such as cost control, schedule compliance, productivity, and resource utilisation. This enabled critical assessment of approaches most suitable for high-risk and uncertain environments such as Nigeria (Tukundane and Yang, 2024; Bajaj, 2025).

Data Collection

Data were obtained exclusively from secondary sources. These included peer-reviewed journal articles, conference papers, textbooks, industry reports, government publications, and documented case studies relevant to construction planning, project control, risk management, and efficiency improvement (Alshehhi, Mat and Ermy Azziaty Rozali, 2024).

Electronic databases such as Google Scholar, ScienceDirect, and JSTOR were used to identify relevant literature. Search emphasis was placed on studies discussing WBS, CPM, PERT, EVA, Lean Construction, BIM, and Just-in-Time (JIT) systems as established tools for project planning and control under uncertain project conditions (Alnajjar, Atencio and Turmo, 2025).

Case Study Approach

To complement the literature review, selected case evidence from Nigerian construction projects was examined. These included infrastructure and urban development projects that illustrate both successful and unsuccessful project outcomes. For example, the Ajaokuta Steel Mill project reflects the consequences of weak planning and

poor control through delays and cost overruns, while structured projects in Lagos and Abuja demonstrate improved outcomes through organised planning systems and technology adoption (Olatunji, 2020). The case studies provided contextual understanding of governance issues, skills shortages, and technology adoption barriers affecting project delivery in Nigeria.

Data Analysis

The collected data were analysed using thematic analysis. Key themes were developed around planning strategies, control mechanisms, risk management practices, and efficiency improvement methods. Findings from different sources were compared to identify common trends, successful practices, and implementation challenges (Litmaps, 2025). The study also evaluated the relationship between identified strategies and project outcomes such as cost predictability, schedule reliability, waste reduction, and productivity improvement (Frankenfield, 2023). This comparative process helped determine the most effective approaches for developing economies.

Research Limitations

The study relied on secondary data, which may limit findings to the quality, scope, and availability of published sources. Some studies may not fully capture project-specific realities or recent technological developments. In addition, case study findings may not always be generalisable because project conditions vary across locations and organisations (Tukundane and Yang, 2024). Despite these limitations, the use of multiple credible sources and real-world case evidence improves the reliability and depth of the study's conclusions.

Results

Planning Effectiveness and Project Performance

The results of this research indicate that the structured planning strategies can significantly and measurably affect the performance of construction projects, especially in cost control, schedule reliability, and coordination efficiency. The evidence collected based on the literature reviewed shows that projects with the implementation of the Front-End Planning (FEP) principles achieve significantly better performance in comparison to projects with weak or incomplete planning frameworks (Chadra Magno Abdullahi and Moffat Tembo, 2023). This underscores the need to define project scope, objectives and deliverables at an early stage of decision-making to minimise uncertainty and eliminate scope creep later on in the project implementation stage. Moreover, a Work Breakdown Structure (WBS) experience enhances the clarity of tasks and their distribution among employees, which leads to a decrease in the coordination errors of 25% or more (Althiyabi and Qureshi, 2021). This is more critical in a complex construction environment where various stakeholders and mutually dependent activities have to be aligned. Time management was also noted to be improved through scheduling tools like Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT), which were found to reduce delays and had over 70% of the contractors reporting fewer delays when these tools are used effectively (Ajmal et al., 2021). In totality, these findings suggest that properly planned planning systems provide a solid foundation of project success through the ability to make realistic forecasts, allocate resources in an efficient manner, and enhance communication between project teams.

Control Systems and Performance Monitoring

The findings also indicate that good control systems are necessary in converting project plans into successful results through effective continuous monitoring and corrective action. Among the many tools that have been identified as effective in integrating cost, schedule and scope performance, one of the most effective is the Earned Value Management (EVM). Organisations which use EVM report an improvement of up to 30 percent in schedule compliance as well as predictability of costs, which is indicative of its value in tracking project progress against set baselines (Alexander, 2025). Alongside the conventional methods of control, digital technologies like Building Information Modelling (BIM), drones, and real-time data monitoring systems have had a significant impact on the visibility of the projects and the ability to make decisions in real-time. The results indicate that around 61% of contractors who utilise BIM report that their cost performance is improved, and 55% report that their project durations are reduced. These technologies enable the project managers to detect the deviations early, simulate other scenarios, and take corrective actions on time (Rehman, 2025). Nevertheless, the findings suggest that the effectiveness of control systems is also based on organisational readiness, which includes data quality, staff training, and management commitment. Unless these supporting factors are present, even sophisticated tools might not be able to bring about the expected enhancements, which implies that the process of technology adoption should be accompanied by process integration and capacity development.

Risk Management Outcomes and Project Stability

The research also concludes that integrated risk management is an important factor in mitigating uncertainty and increasing the stability of a project. More than 40% of the projects that follow structured risk management

processes, such as risk identification, risk analysis, risk mitigation, and risk monitoring, are more likely to stay within their original budgets than the projects that adopt less structured risk management processes. Probabilistic tools like Monte Carlo simulation can be used to enhance the accuracy of forecasting since they enable the project managers to consider various risk scenarios and what these risks may do to the cost and schedule (Al Qudah et al., 2026). Moreover, proactive mitigation measures, such as contingency planning and supplier diversification, minimise schedule slippage by about 35%. These findings are further supported by case evidence of the Nigerian construction industry. As an example, a project such as the Ajaokuta Steel Mill can be used to illustrate the extreme consequences of poor risk management, in both terms of cost overruns (more than 300% overruns) and delays (taking more than 30 years to complete). Conversely, projects that have built-in structured risk registers and continuous monitoring systems have a higher resilience and much more predictable results (Álvarez-Pozo et al., 2024). These results affirm that risk management is not an independent activity but rather an inseparable part of both the planning and control processes and has a direct impact on the success of a project and the confidence of its stakeholders.

Efficiency Gains and Implementation Challenges

The findings indicate that efficiency management plans play an important role in promoting productivity, minimising waste, and increasing the overall project value. An example of this is the association between lean construction practices (e.g.) and both the labour productivity gains (between 15% and 30%), and the cost reduction (up to 10%). These benefits are realised by using methods that include workflow optimisation, waste removal and enhanced teamwork within project teams (Álvarez-Pozo et al., 2024). Likewise, Just-in-Time (JIT) delivery systems can save on material handling and storage costs, which can help remedy inefficiencies capable of consuming up to 8% of total project expenditure. Other efficiency contributors are prefabrication and module construction, which reduce project timelines by almost thirty percent and also reduce on-site wastes. Other methods with sustainability, such as green building practices, have long-term efficiency benefits, with operational cost reductions of about 14 percent in five years (Hussein and Zayed, 2020). Although these are positive results, the findings also indicate a lot of challenges that restrict the prevalence of these strategies, especially in a developing environment like Nigeria. These obstacles are low levels of technical capacity, high prices of digital technologies, organisational change resistance, and poor governance structures. Interestingly, just one-third of contractors in emerging economies use the latest digital tools, in contrast to more than three-quarters in developed economies. Such a difference highlights the significance of contextual modification and capacity building in such a way that planning and control strategies provide the same outcome (Chadra Magno Abdullahi and Moffat Tembo, 2023). All in all, the results prove that although modern strategies can provide significant improvement to performance, the effectiveness of such strategies is determined by how well organisations can implement them in the local institutional and operational contexts.

Discussion

Case Examples and Applications in Nigeria

Different consequences of planning and control processes involved in construction projects are evidenced through case studies in Nigeria. A good case is the Ajaokuta Steel Mill project, which was initially planned in the late 1970s and was expected to be commissioned in the 1980s. Billions of dollars have been invested in the project; still, it cannot be considered complete, as costs overruns are more than 300 percent because of insufficient planning, governance failures, and weak control measures (Madhavan et al., 2023). This reflects the international examples, such as the Boston Big Dig, where inefficient risk and efficiency measures frustrate the results.

Nigerian projects, on the other hand, have been having better results in projects that embraced the use of structured frameworks. As an example, road and housing development projects in Lagos and Abuja that incorporated elements of Lean Construction showed a measurable benefit to the use of resources, with almost 15 percent saving in time and waste in the implementation process (Anggraini et al., 2022). Likewise, Lagos has seen improvement in schedule predictability and less rework with the application of Building Information Modelling (BIM) in some of its high-rise developments in the private sphere, as per research findings, which supports the argument that BIM aids in project efficiency (Himeur et al., 2022). The presented cases prove that although the construction industry of Nigeria is somewhat vulnerable to systematic risks, the implementation of sophisticated planning and control measures can significantly enhance the situation if they are customized to fit the national environment (Charef et al., 2021).

Challenges and Gaps

Construction projects are still plagued by problems that restrict their efficiency, despite the ubiquitous availability of tools for planning and control. Among the most urgent concerns is the impact of climate change, which creates new levels of uncertainty, including floods, droughts, and extreme weather phenomena (Gurgun & Koc, 2021). Climate-related hazards have recently accounted for 75 percent of all reported hazards globally, according to the

United Nations Office for Disaster Risk Reduction, resulting in significant risks to construction schedules and budgets in turn (Attaran & Celik, 2023).

Furthermore, the digital divide is a significant obstruction, especially in the emerging world, where the prohibitive cost of services like Building Information Modelling (BIM) and advanced risk analytics limits their enrollment. According to a study conducted by Jung and Woo (2024), only one-third of contractors in emerging markets have adopted the use of digital tools in project control, compared to more than 70% of contractors in developed economies. These are exacerbated by skills gaps, whereby most project managers have not received training on modern risk management methods and thus expose projects to inefficiencies. Moreover, short-term cost demands on managers also tend towards immediate cost reductions at the expense of sustainability and resilience, due to trade-offs that exacerbate long-term risks (Madhavan et al., 2023). These gaps highlight the importance of researching and investing in adaptive, technology-based strategies that strike a balance between efficiency and resilience in various situations.

Conclusion

Risk and efficiency in construction projects cannot be managed without adequate planning and control strategies. International and regional case studies demonstrate that unstructured approaches to planning frequently result in significant cost overruns and schedule slippage. In contrast, performance is significantly improved when controlled methods, such as Earned Value Management, Lean Construction, and Building Information Modeling, are employed (Rahat et al., 2022). This can be further supported by statistics provided by statisticians, which indicate that projects involving advanced planning and risk tools have the potential to increase cost predictability by up to 30% and on-time performance by 20% (Madhavan et al., 2023). However, issues such as uncertainty about climate change, technological advancements, and skills gaps still exist, especially in the developing world. Future research will need to ensure that digital innovation, capacity building, and sustainability principles are integrated into the project management framework to overcome these limitations. After all, constructability and risk tolerance are not the result of a coin toss, but the outcome of a well-considered strategy, so that planning and control are the basis of a successful project.

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