Remittances Review
September 2024,
Volume: 9, No: S 4, pp. 991-1004
ISSN: 2059-6588(Print) | ISSN 2059-6596(Online)
Received : 25 July 2024, Accepted: 18 September 2024
DOI: https://doi.org/10.33282/rr.vx9i2.57

Construction Project Management Efficiency, Strategic Procurement Practices, and Supply Chain Resilience: Key Factors Influencing Mega Project Performance

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Abstract

This study investigates the impact of strategic procurement practices, supply chain resilience, and project management efficiency on the performance of mega construction projects in Pakistan. Drawing on resource-based and contingency theories, the research integrates these constructs into a comprehensive framework to assess their collective influence. Data were collected from 250 project professionals using a structured survey, and Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed for analysis. The findings reveal that strategic procurement practices significantly enhance mega project performance by optimizing resource allocation and reducing risks. Supply chain resilience emerged as the strongest predictor, highlighting its critical role in mitigating disruptions and ensuring operational continuity. Project management efficiency also exhibited a substantial positive effect, emphasizing the importance of effective resource utilization and stakeholder coordination in complex projects. The results underscore the interconnected nature of these variables, offering a theoretical contribution to the literature on mega project performance. Practically, the study provides actionable insights for policymakers and practitioners to enhance project outcomes through improved procurement strategies, resilient supply chains, and efficient project management. This research addresses key gaps by examining

these factors collectively and provides a foundation for future studies exploring the dynamic interactions of project management in diverse contexts.

Introduction

The construction industry has been under increasing pressure to improve project performance in recent years, especially when it comes to mega projects; that is, large scale and expensive projects that necessitate extensive planning, coordination, and management. Such projects are generally complex in nature, having multiple stakeholders and long timelines, and their completion is largely challenging. However, many of these mega projects become delay, cost overruns and suboptimal performance. This has spurred the industry to investigate other means of managing the projects, including strategic procurement practices, and supply chain resilience as key factors in delivering more successful projects. These elements are considered essential for integrating the mega projects to execute them within expected time and budget constraints and to a reasonable quality level. Knowledge of the role of strategic procurement and supply chain resilience in efficient construction project management can greatly increase the mega project performance and minimize the relatively high risks of failure that characterize them.

The success of mega projects depends largely on the efficiency of construction project management, which is the effective coordination of resources, timelines, and tasks, to ensure that a project runs according to plan. This work is one of the main aspects of this efficiency through the application of a strategic procurement practices, which is the process of determining and acquiring goods, services and works to support the project objective and create maximum value. The strategic procurement guarantees that supply of the right materials, contractors, and technologies are provided at the right time and cost, thus the timely completion and budget control of the project. Instead, supply chain resilience means the ability of a project's supply chain to adapt to disruptions, recover from setbacks and perform consistently in spite of challenges. The relationships between procurement practices and supply chain resilience are important because disruptions in the supply chain can cause delays, cost escalation and reduced quality, which in turn affect project performance. Effective management of these two factors can improve construction project management efficiency by making workflows flow smoothly and uncertainties decrease as well as ultimately improving overall project outcomes.

The relationship between strategic procurement practices, supply chain resilience, and construction project management efficiency can be understood through Resource Based View (RBV) and Contingency Theory. Resources and capabilities are sources of competitive advantage according to the RBV. However, in the case of construction project, strategic procurement practices can be interpreted as a resource assisting the project team to make available the required materials and services needed for the achievement of project objectives. Supply chain resilience is also a capability similar to being able to respond to unexpected challenges to continue to keep the project on track. Further, the Contingency Theory supports the need for flexible and adaptive procurement

and supply chain management strategies in that there is not one best way for the management tasks. Mega projects are dynamic; therefore, an elastic approach to procurement and supply chain management is a prerequisite for their effective response to unforeseen challenges and changing circumstances. The theoretical linkage provides the basis for optimizing procurement and supply chain strategies with individual project needs and challenges, thereby enhancing project management efficiency and performance.

Although there is growing interest in understanding what drives mega project performance, several research gaps persist. One important gap is very few empirical studies focusing on the integration of strategic procurement practices and supply chain resilience in construction project management. Though some research has been conducted on procurement strategies or supply chain management individually, there has been relatively little published on how procurement strategies and supply chain management affect each other and project performance, especially in the construction industry. Furthermore, most existing research on mega projects is weighted towards general project management principles without regarding the special characteristics and complexities of mega projects including various stakeholders, high uncertainty, and large scale of operation. Additionally, little research has been conducted to evaluate the mechanisms by which strategic procurement and supply chain resilience add to management efficiency, particularly in the context of project disruptions and unexpected challenges. The aim of this study is to fill the gaps by analysing the effect of these factors on construction project performance in the context of mega projects.

The research problem discussed in this study is that construction projects do not achieve optimal performance in spite of being managed with the use of various management practices. Mega projects are often completed more than one year late and more than one billion dollars over budget despite numerous strategies used by project managers to keep them on time and within budget. The question arises about the utilization of strategic procurement practices and supply chain resilience more effectively to enhance construction project management efficiency and thus improve the overall mega project performance. This study seeks to explore the interrelation between the above factors and their resulting effect on project outcomes with the intent of identifying best practices and providing actionable insights to project managers and stakeholders participating in large scale construction projects. This research aims to give a better understanding of how these aspects aid in minimizing the risks related with mega projects, that is, the supply chain disruptions, the procurement delays, and the budget overruns.

This study has the potential to expand knowledge in construction project management with particular reference to mega projects. Analysis of the relationship between strategic procurement practices, supply chain resilience, and project management efficiency, while it contributes to the scholarly discourse, also provides useful practical insights for practitioners in the construction industry who are interested in enhancing the performance of their projects. This could help project managers to better anticipate and react to challenges that are likely to happen during project

execution, and the findings could also inform the development of new strategies and tools for managing procurement and supply chains in large scale projects. Additionally, this research can be used to inform policy and decision making both in the construction sector and across mega projects in the industry overall, helping to identify ways to establish industry standards and guidelines on how to manage the mega projects. With the vast global importance of infrastructure development in mind, the implications of insights from this study are not only important to the construction industry but also to the economy as a whole, since efficient mega projects spur economic growth and development. This study ultimately aims to enhance the knowledge of the determinants of mega project performance and serves as a basis for future improvement of the mega project management.

2.0 Literature Review

Several foundational theories are studied on construction project management, strategic procurement practices, and supply chain resilience from the perspective of mega projects. One of the most often used theories in project management research is the theory of Resource-Based View (RBV), which argues that the resource and capabilities of the firm provide the competitive edge (Barney, 1991). This paper treats strategic procurement practices as a critical resource for project managers to secure the required materials, services and contractors to ensure successful completion of construction projects. In addition, supply chain resilience as a project's ability to absorb shocks and continue delivering despite challenges can be viewed as a strategic capability that enhances overall project management efficiency (Sheffi & Rice, 2005). This is supported by the Contingency Theory which further states that no one procurement and supply chain management approach fits all situations, therefore the need for adaptive approach strategies depending on the project's own context (Donaldson, 2001). This theoretical framework shows importance of aligning procurement and supply chain strategies with the particular complexities and dynamics of mega projects so that firms may be able to effectively manage resources, and mitigate risks and respond to the uncertainties. Collectively, these theories afford a solid lens for observing the critical factors of project performance of both mega projects and regular projects and, similarly, yield the basis for understanding the relationship between procurement practices, supply chain resilience and project management efficiency.

Some empirical studies have been conducted to examine the interrelationship between procurement practices and supply chain resilience, and between procurement practices and construction project performance, but the literature is fragmented and often lacking a broader analysis on how these variables are related. Construction project success has been recognized as largely determined by strategic procurement. As an example, Hussein & Alqadri (2018) identify that procurement strategies in construction projects have a central role to play in project success, especially in the management of large-scale projects, where a variety of stakeholders interact. According to their study, use of Integrated Procurement Methods (IPMs) such as Design and Build (D&B) or Public Private Partnerships (PPP) improved communication and collaboration among

stakeholders and reduced delays and cost overruns. The early selection of contractors and suppliers for construction project through strategic procurement practice to alleviate risks of time and cost overrun is also argued by Aibinu & Jagboro (2018). In opposition, Alvarez et al. (2020) investigated the function of procurement in danger the management and indicated that strategic procurement practices are helpful in chopping down the effect of dangers equivalent to materials shortages and labor strikes. Nevertheless, previous studies frequently do not directly relate procurement practices with supply chain resilience, a research gap that this study seeks to bridge.

A significant body of literature is aware of the critical role that supply chain resilience plays in ensuring uninterrupted flow of goods and services from the beginning till the end of life cycle of a mega project in terms of the supply chain resilience. In their seminal piece in the context of supply chain resilience, Christopher & Peck (2004) define supply chain resilience as the capability of a supply chain to recover from disruptions and sustain service level. In the construction context, this means how capable a project is to adapt, recognize, change and execute to ensure that disruptions such as delays in material delivery, labor shortages, or natural unpredicted events are handled. Amoah et al. (2021) carried out a study on the influence of construction supply chain resilience on project success and found that construction supply chain resilience comprising flexibility and responsiveness was found to positively affect project management of cost and time overruns. In addition, Zhao et al. (2020) demonstrated that supply chain resilience, in particular, helps construction enterprises to persevere continuity of operations and decrease in project delays particularly across the key stages of the construction process. According to their research, the utilization of technology and innovation, as Building Information Modeling (BIM), is of prime importance for strengthening the resilience of construction supply chain. While these studies have consistently highlighted the positive impact of resilient supply chains on construction project performance, there has been insufficient exploration of how resilience specifically interacts with project procurement practices to affect project outcomes.

Secondly, on the integrated effect of procurement strategies and supply chain resilience of mega construction projects have been one of recent research works. According to Lin & Yen (2020), projects with both strategic procurement practices and resilient supply chains were more likely to succeed with regard to time, cost, and quality. The research found strategic procurement to anticipate disruption, enable supply chain resilience that drives recovery in case of disruption and have the positive impact on project efficiency. Nonetheless, literature gaps exist with regards to how these factors interact specifically in the context of mega projects, or even more specifically in projects with multiple stakeholders across a vast geographical space. In Hwang & Ng (2013) explored procurement and supply chain resilience in context of smaller construction projects and thus left a large room of knowledge to be filled for dynamics of large-scale projects. The mega nature of mega projects with its increased interdependencies and scale necessitates looking more deeply into how project efficiency can be maximized through procurement and supply chain strategies.

Furthermore, new studies also point out that synergies between procurement practices and resilience strategies are essential: all the more so in an age where global supply chain disruptions are skyrocketing. For example, the COVID 19 pandemic revealed major vulnerabilities in global supply chains resulting in huge delays in construction projects (Chong et al., 2021). Goh et al. (2020) contend that in such uncertain times, procurement strategies should not only be prioritized on areas of cost and quality but also on supplier activities which contribute to addressing resilience and adaptability of their suppliers to projected external shocks. The findings reinforce the message of proactive management of procurement contracts and long-term partnership with suppliers that strengthens supply chain resilience. This therefore requires construction firms to move from more traditional procurement techniques to more agile procurement approaches that leverage flexibility and adaptability to enable rapid and timely response to external disruptions without undermining project performance.

While these empirical studies are insightful, they lack research integrating strategic procurement practices, supply chain resilience, and project management efficiency in demonstrating how all these can be integrated on mega construction projects. However, most of the literature has either isolated procurement or resilience or focused on smaller scale projects that are less complex and have fewer externalities. A more integrated perspective is clearly needed that takes into account the among unique challenges and complexities of mega projects. For instance, it entails grasping how procurement and supply chains are adapted for large scale projects, how they interact in reality and how they are contributing in synergy for achieving project success.

Subsequently, based on the theoretical background and empirical evidence reviewed, a number of hypotheses can be proposed to guide future research in this area. The first hypothesis is that strategic procurement practices have a large positive impact on the efficiency of construction project management in mega projects. Based on the Resource Based View, this hypothesis suggests that certain selection of resources (Strategic Procurement) would help to materialize the specific objectives of a project (Barney, 1991). The second hypothesis states that supply chain resilience mediates the relationship between procurement practices and construction project performance. The basis for this is on the fact that the resilience of a supply chain supports the efficacy of procurement strategy by quick turnaround from disturbances (Sheffi & Rice, 2005). The third hypothesis is that the combined effect of strategic procurement and supply chain resilience is positively associated with the likelihood of on-time delivery, within budget completion and adherence to quality standards. The hypothesis is developed based on findings from Lin & Yen (2020), and Zhao et al. (2020) that showed how these factors together affect project success.

The study finally hypothesizes that mega projects utilizing an integrated procurement and supply chain strategy can realize fewer disruptions and also better performance outcomes, compared to mega projects implementing a non-integrated procurement and supply chain strategy. The empirical evidence from studies such a Hussein & Alqadri (2018) and Chong et al. (2021) motivates this hypothesis, as both attributed the significance of developing an integrated approach

to procurement and supply chain management. This study tests these hypotheses with the ultimate goal of furthering our understanding of the role of procurement practices and supply chain resilience as a means of understanding the overall performance of mega projects, an important area of current research that has been neglected.

Finally, although a great deal of work exists on procurement and supply chain resilience in construction project management in isolation, opportunities remain to develop a more comprehensive perspective to characterize how they combine to impact project performance, and particularly in connection with mega projects. This study aims to contribute new insights into the body of literature on construction project management by developing and testing the above hypotheses, both materially and methodologically, thus helping bring about the practical implication for enhancing the performance of large-scale construction initiatives.

3.0 Methodology

This study sought to investigate the effect of strategic procurement practices, supply chain resilience and project management efficiency on performance of mega construction projects in Pakistan. The multifaceted nature of the research question, the need for a holistic understanding of the relationships between the variables and the fact that it is quantitative research dictate thus that a quantitative research design be adopted. This design facilitated systematic numerical data collection and analysis, and the development of patterns and causal relationships between procurement practices, supply chain resilience, and project performance. A positivist research philosophy was applied in the study, which stated that reality is objective, and can be measured by scientific methods. The study was aligned with this philosophy because it was focused on testing hypotheses, and inferring from empirical data, and provided a rigorous framework for explaining the role played by strategic procurement and supply chain resilience to the success of mega projects.

The construction professionals engaged in mega projects in different regions of Pakistan formed the target population of this study. The professionals engaged in these projects were project managers, procurement officers, supply chain managers and other stakeholders involved in decision making in procurement and supply chain process in large scale construction projects. Representative selection of population was made from a wide variety of construction firms in Pakistan ensuring that the study included a wide variety of projects ranging from the public infrastructure and private sector development. As such, professionals across a variety of mega projects in the country were estimated to make up the total population and it was therefore important to target a representative sample from this group.

The use of purposive sampling strategy was to ensure that the sample was sufficiently representative of the population. This approach was used to select people with direct involvement and with experience in strategic procurement and supply chain management in mega construction projects. The sample involved 300 participants drawn from various construction projects that

satisfied the criteria of being large scale and complex, and having high involvement of procurement and supply chain activities. This number made the findings statistically significant and representative of the views and experiences of professionals working in the industry, and was sufficient to permit a reasonable amount of analysis across various sectors within the construction industry. To gain a balanced view in the practices used in both types of construction projects, the respondents were drawn from both private and public sector projects.

A structured survey questionnaire was used to collect data on the key variables of the study, which include strategic procurement practices, supply chain resilience and project performance. The questionnaire included closed ended and Likert scale questions, through which a quantitative measure of respondents' perceptions and experiences of procurement strategies, supply chain management, and project success could be attained. The online and in person survey was carried out among the respondents to accommodate the geographical dispersion of the respondents and inclusion of various stakeholders of the industry. It was developed based on an extensive literature review, and following a pre-test phase to establish its reliability and validity, it was fully deployed. The questions were designed to minimize bias and guarantee the responses truly answered the questions related to the factors that affect the construction project performance.

The data were collected and analyzed through Partial Least Squares Structural Equation Modeling (PLS-SEM), a diagnostic tool that is very efficient at exploring complex associations between variables in the social sciences. The ability to test multiple relationships at the same time and its suitability for conditions where data did not conform to the strict assumptions of traditional structural equation modeling, e.g. normality, made PLS-SEM a good fit. This approach allowed the study to examine the direct and indirect effects of strategic procurement practices and supply chain resilience on project performance, and investigate the interrelationships between constructs. We used SmartPLS software to perform the analysis, since the software is widely used in management research where path models are complex and results are needed to be robust. The measurement model was estimated in order to determine the reliability and validity of the constructs, as well as the structural model tested to test the hypothesized relationships.

The research process itself was prioritized ethically. Prior to the start of the study all of the participants had given their informed consent under the assurance that they were fully aware of the purpose of the study, the nature of their involvement and their rights as participants. Respondents were assured that their responses would be confidential and used only for academic purposes, so participation was voluntary. The respondents were anonymous and the data analyzed didn't contain any personal identifiers. The study additionally guaranteed that participants were allowed to pull out of the survey whenever they feel like without any negative repercussions. The study also followed ethical guidelines regarding the protection of participants to harm and safe guard away from any undue stress or discomfort. Before commencing data collection all relevant institutional and research committee ethical approvals were obtained. The study was intended to address the

ethical considerations involved in the research process, such that the process would be transparent, responsible and that rights of participants were respected.

By following this methodology, the study was based on a rigorous and systematic approach to identifying key factors affecting mega project performance in Pakistan. The research used a structured survey, a robust sampling strategy, and analysis of the data with advanced statistical techniques to derive meaningful insights about the relationship between strategic procurement and supply chain resilience, as well as their impact on the success of large-scale construction projects. In addition to adding to the existing literature, the study provided practical recommendations for construction managers and policymakers interested in enhancing the efficiency and performance of mega projects in Pakistan and elsewhere.

4.0 Data Analysis

1. Reliability Analysis (Cronbach's Alpha, Composite Reliability, and AVE)

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Strategic Procurement	0.902	0.921	0.659
Supply Chain Resilience	0.887	0.908	0.636
Project Management	0.910	0.932	0.687
Mega Project Performance	0.895	0.919	0.645

The reliability analysis proved that all constructs, strategic procurement, supply chain resilience, project management efficiency, and mega project performance hits the goal of high internal consistency since Cronbach's Alpha and Composite Reliability (CR) values are greater than 0.7. In the same line, the Average Variance Extracted (AVE) was over 0.5 for all the constructs, which guaranteed the convergent validity. The results from these items indicate that they measured the latent constructs well and that the data was reliable for further analysis.

2. Validity Analysis (HTMT Ratio)

Results of HTMT (Heterotrait-Monotrait) ratio meant that all inter-construct values are below the threshold 0.85, thereby demonstrating robust discriminant validity among the constructs. This provides evidence that these constructs—strategic procurement, supply chain resilience,

project management, mega project performance—are each conceptually distinct, and each measures a different dimension of the theoretical framework.

Constructs	Strategic Procurement	Supply Chain Resilience	Project Management	Mega Project Performance
Strategic Procurement	-	0.752	0.691	0.734
Supply Chain Resilience	0.752	-	0.798	0.782
Project Management	0.691	0.798	-	0.709
Mega Project Performance	0.734	0.782	0.709	-

3. Multicollinearity Analysis (VIF Values)

All the predictors' VIF (Variance Inflation Factor) values were well within the critical value of 3 (VIF < 3) thus no multicollinearity issues were found. By this, the independent variables (strategic procurement, supply chain resilience, and project management) did not overlap substantially, and hence the model produced unbiased and accurate estimates of the impact of independent variables on mega project performance.

Construct	VIF Value
Strategic Procurement	2.15
Supply Chain Resilience	2.02
Project Management	2.28

4. Model Fit Indices

Model fit indices showed that the structural equation model fit the data very well. Finally, SRMR value (0.043) was less than 0.08 and NFI value (0.912) was more than 0.90 which indicated that the model is well fitted on the observation. The theoretical model adequately captures the association among constructs and therefore supports the study hypotheses.

Model Fit Index	Value	Threshold
SRMR (Standardized Root Mean Residual)	0.043	< 0.08
NFI (Normed Fit Index)	0.912	> 0.90

Model Fit Index	Value	Threshold
Chi-Square	352.12	-
Degrees of Freedom	121	-

5. Structural Equation Model Results (Path Coefficients)

Results of structural equation modeling indicated that all hypothesized paths were statistically significant. All were found to have significant positive effects on mega project performance, strategic procurement practices ($\beta = 0.312$, $p < 0.001$), supply chain resilience ($\beta = 0.423$, $p < 0.001$) and project management efficiency ($\beta = 0.284$ $p < 0.001$). Results show the importance of improved procurement strategies, resilient supply chains, and efficient project management for improving the performance of mega construction projects, thus validating our theoretical framework and its implications.

Path	Beta Coefficient (β)	Standard Error (SE)	t-value	p-value	Result
Strategic Procurement → Mega Project Performance	0.312	0.048	6.50	< 0.01	Supported
Supply Chain Resilience → Mega Project Performance	0.423	0.053	7.98	< 0.01	Supported
Project Management → Mega Project Performance	0.284	0.045	6.31	< 0.01	Supported

Discussion and Conclusion

This study finds that strategic procurement practices, supply chain resilience, and project management efficiency are interrelated, and ultimately serve to support the overall performance of mega projects. It is consistent with the theoretical framework and contributes new evidence to the body of project management and supply chain management knowledge, with both theoretical and practical implications. Discussion of each variable's contribution to mega project performance is presented in detail below, before an overall conclusion that highlights the significance of the study and opportunities for future research.

This positive and significant relationship between strategic procurement practice and mega project performance confirms the significance of developing sound procurement strategies in

handling large scale construction projects. This result fits with known research on the role of strategic procurement in providing timely delivery of resources, cost optimization and risk management (e.g. Walker et al., 2021). Through transparent supplier selection, long term supplier relationships and customer alignment with project objectives, organizations can drive better project outcomes. Furthermore, the paper demonstrates that procurement is not only an operational but a strategic decision, determining project schedule, cost efficiency, and stakeholder satisfaction.

Megaproject performance was most closely linked to resilience of the supply chain, highlighting the need for supply chain resilience as a means to resolve project performance disruptions and sustain continuity construction. By doing so, it matches well with the recent tendency in sustainable project management to consider supply chain resilience as one of the cornerstones (e.g., Ivanov & Dolgui, 2020). Resilient supply chains help break free of certain assumptions on mega projects, which can face frequent uncertainty such as economic instability, material shortages, and logistical difficulties. Further the results reinforce that redundancy and the application of robust risk management practice coupled with digital technologies can lead to improved project supply chain resilience and result in smoother execution.

In addition, they show that the efficiency of project management has a strong positive effect on mega project performance, thereby confirming its importance to project success. Well managed projects keep resources optimally allocated, stay on schedule and hit their goals over and over again (for example, Turner, 2016). The results indicate that advancing projects becomes more efficient if organizations can guarantee a skilled project manager, standardized methodologies, and sophisticated tools. As mega construction project is involved, coordination process between multiple stakeholders and their respective activities is highly complex and efficient management is a critical success factor of the project. To this end, this study contributes to the evidence that project management is more than achieving internal efficiency, it should also be driven by considerations of organizational and project specific goals.

The results of the study also further our theoretical understanding of how these constructs pass one another. The research synthesizes strategic procurement practices, supply chain resilience and project management efficiency via a unifying framework to understand mega project performance. The relationships among the constructs are significant support resource based and contingency theories' theoretical propositions of the need for internal and external resource alignment in achieving organizational performance. In addition, the results answer a conspicuous gap in the literature examining these variables together for mega projects, an area lacking in empirical evidence.

A practical way to utilize the findings of this study lie for project managers and policy makers who are involved in mega construction project particularly in the developing countries of the world such as Pakistan. The conclusion argues for the development of capacity building in procurement and supply chain management, adoption of advanced project management tools, and

building resilience in supply chains. It should also be the task of policymakers to create regulations and incentives creating an opportunity for stakeholders to adopt best practices in procurement and supply chain resilience and thus, maximize the contribution of mega projects to sustainable development goals.

While it represents a contribution, the study does not escape limitations. However, the cross-sectional nature of the data restricts one from deriving causal inferences. This study suggests future longitudinal designs could examine the dynamic interactions of these variables over time. Second, although the study draws on mega projects in Pakistan, such results may not be fully generalizable to other countries with different economic, or regulatory, or cultural context, etc. Deeper insights than mere A/B comparisons across regions or countries into what contextual factors influence the performance of mega projects could have been provided by comparative studies. Finally, the use of survey data means possible survey respondent bias. Future research could also include a more robust approach to the study by using secondary data or observational methods.

Finally, this research presents a more sophisticated perspective of what influences mega project performance by highlighting the critical importance of strategic procurement practices, supply chain resiliency, and project management efficiency. The research fills important gaps in the literature, which provides both theoretical contributions and practical recommendations for improving the performance of mega construction projects. These findings should be built upon in future studies to look at other supporting factors for mega project outcomes, such as technological innovations and stakeholder engagement. Finally, the study highlights the effectiveness of an integrated project management and procurement process as well as supply chain resilience in delivering mega project success in dynamic, challenging environments.

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