

ANALYZING PROJECT SUCCESS: THE NEXUS OF GOVERNANCE, TECHNICAL COMPLEXITY, INNOVATION, AND MANAGEMENT SUPPORT

ABSTRACT: Purpose: This investigation aims to explore the influences of project success in construction company settings, particularly focusing on the related role of project management innovation, project governance, support mechanisms, and technical complexity. This study aims to fill the existing gap in already conducted research, by implementing a comprehensive approach to incorporate these variables and find out their collective impact. Method: A careful methodological approach is used to conduct this research, by utilizing 232 employees of construction sites of the Kingdom of Saudi Arabia. The scales used in this research are adopted, which confirms the reliability and validity of the instruments, while STATA-SEM is used as an analysis tool. Findings: The findings show that project governance and technical complexity, have a direct influence on project success, additionally, project management innovation is found to be an important mediator, while project management support acts as a moderator forming the relationship among the variables. Thus, fruitful understanding can be grasped from this insightful project management dynamics in the construction industry. Implications: A contribution is added to the theoretical concept by providing the momentous role of mediating and moderating variables in understanding project success contributors. Moreover, it addresses past gaps by examining these relationships within the construction industry, particularly in a unique cultural and industrial context. The study's significance lies in its potential to provide actionable insights for practitioners, guiding decision-making and optimizing project management practices within the construction sector.

Keywords: Project Governance, Technical Complexity, Project Management Innovation, Project Management Support, Construction Industry.

1. Introduction

In order to sustain infrastructure and global economic growth, project management is now reliant on the construction industry. Understanding the myriad elements that contribute to a project's success in the construction industry is the driving force behind this research Davila Delgado et al. (2020). A successful project will have excellent results, stay within budget, and finish on time (RezaHoseini, Ghannadpour, & Hemmati, 2020). Project managers, stakeholders, and policymakers should all be familiar with the factors that could make or break a project. The theoretical framework laid out by influential publications in the field of project management allows for the study of critical factors such as project governance, technical complexity, innovation, and support. The construction sector is an excellent area to observe these characteristics in action because of the one-of-a-kind challenges it presents and the fast-paced work environment it provides (Torfing et al., 2021).

This study looks at the management of building projects from different points of view using real-world data. The starting point of this study centers on pioneering research in management and the management

of projects. The research was conducted to study the relationship that among project governance, technicalities, and innovative innovation in project management. With respect to the findings from studies, influences governance structures and adaptive protocols are required in order effectively handle problematic phases of building projects and reach good results. There are many studies that have looked into the possibility that project management can give rise to original ideas. However, the findings of a study that was carried out by the author and colleagues in the previous year, the implementation of creative tactics results in improved project results (Ghaleb et al., 2022). When it comes to project management, it is essential to accept modern approaches and technology in order to achieve success (Rasool et al., 2022). The findings are further clarified by demonstrating how innovation and support in project management operate as intermediates between governance, technological complexity, and the successful completion of a project (Picciotto, 2020). This study synthesizes a large body of empirical research on the topic of construction project management dynamics in order to give a detailed understanding of these dynamics within a specific setting. Organizations whose goal is to finish

Abdullah Faisal Al Naim^{1*}, Kwong Wing Chong²

¹ Management Department, College of Business Administration, King Faisal University, Al-Ahsaa 31982, Saudi Arabia.
Email: afalnaeem@kfu.edu.sa

² School of Professional Studies, Taylor's College, Taylor's Lakeside Campus, No. 1 Jalan Taylor's, 47500 Subang Jaya, Selangor, Malaysia.
Email: wingchong.kwong@taylors.edu.my

building projects effectively will feel the effects of this understanding in a more tangible form (Arinaitwe, 2021).

This work can fill in some important gaps left by earlier empirical research. Although previous research has illuminated the individual characteristics of project management, synthesizing these aspects and analyzing their cumulative impacts on the construction sector is lacking, according to a critical literature review. One example is the impact of project governance systems on project outcomes, as demonstrated by El khatib et al. (2023) in their comprehensive analysis of the topic. Complex technology, creative project management, and governance and support systems are completely at odds with one another. Taking a holistic approach, this study investigates the links between these variables to gain a deeper understanding of the elements that impact project performance. Since most of the empirical studies have employed a Western paradigm, we have little idea how these dynamics play out in different cultural and industrial settings. Project management dynamics have been better understood thanks to Bhatti et al. (2021) and Shahzadi et al. (2021), however these studies mostly focus on one industry and one region. This research seeks to address that knowledge vacuum by investigating these connections in the building sector, with a focus on (Marnewick, 2023). The influences of culture on project management become more intricate and open to more complexity due to this change in location. The study's overarching objective is to provide worldwide viewpoints that account for the specific difficulties and opportunities offered by different construction-related situations.

Empirical studies in project management have sought to unravel its mysteries in an effort to accomplish a number of goals. According to earlier research, technical complexity, innovation, and governance are the three most important factors that determine a project's success (Gębczyńska, 2020). A more in-depth understanding is still required, this study aims to fill the gap in existing research, by implementing a comprehensive approach to incorporate these variables and find out their collective impact. This research is an extension of the previous research, which will benefit businesses and project managers with more comprehensive tools for optimizing project management and research analysis. This study enriches project management practice and research

by its practical and theoretical implications.

2. Literature Review

Project success is heavily dependent upon its careful planning, execution, monitoring, and closure (Bhatti et al., 2021). Wise resource utilization, time execution, and aligning with strategic goals are the main pillars of project management that every business needs to incorporate for success. A comprehensive project management plan gives a roadmap for teamwork, minimizing risk, and promoting flexibility in unforeseen circumstances (El khatib et al., 2023). The project objectives, has to be understood with budget, scope, and timeline is required to begin a project (Hall & Bonanomi, 2021). The start of the phase provides guarantee that all of the project's stakeholders will reach a unanimous consensus regarding the purpose of the project and the results that it will produce (Arinaitwe, 2021). It is possible for the project to successfully complete its goals and remain on track if the objectives of the project are understood in a clear and concise manner.

Working along with a team and having strong communication skills are both important components of progressive project management (Ershadi et al., 2020). Managers of projects are completely occupied for facilitating communication and collaboration among members of the team, stakeholders, and other individuals who have an interest in the effort (Picciotto, 2020). Reducing the likelihood of misunderstandings and increasing the transparency of the project are the goals of effective communication, accurate reporting, and consistent progress updates (Soto Setzke et al., 2023). Project managers who are competent foster cooperation by fostering open and honest communication and creating a secure setting in which members of the team are free to voice their views, address their issues, and offer solutions (Rasool et al., 2022). Through the promotion of collaboration and the maintenance of a collective focus on the target, project management increases the possibility that the project will produce the desired results. It is required to conduct an analysis and make adjustments regarding better results of projects (Picciotto, 2020). At every given point, projects are subject to changes or problems, and they regularly stray from the plans that were initially developed for them. Competent project managers examine the progress that has been made, recognize any potential risks, and evaluate the results based on the standards that have been established beforehand (Awan, Sroufe, & Shahbaz,

2021). Evaluations and assessments carried out on a regular basis allow for fast adjustments, which therefore assist businesses in accomplishing their goals. The people working on a project need to be able to adjust to changing priorities and unexpected obstacles (Ju, Ferreira, & Wang, 2020). When it comes to addressing challenges, making the most of favorable situations, and carrying out initiatives, team leaders have the ability to utilize an approach that is both flexible and strategic (Alqublan, 2023).

Taking into consideration this idea, the success of a project is directly proportional to the effectiveness with its governance is carried out. In the context of managing a project, the term "governance" refers to the collection of rules, processes, and mechanisms that are utilized to develop and direct the standards, procedures, and decision-making processes that govern an initiative (Ershadi et al., 2020). There is data which supports the argument that governance has an effect on the outcomes of projects. According to El khatib et al. (2023), robust governance frameworks improve the management of project risks, as well as teamwork and interaction. Therefore, a strong governance framework helps to limit the amount of miscommunication that occurs among the participants of the project, ensures that accountability is maintained, and speeds the process of decision-making (Wiedemann et al., 2023). The effective finish of the project is impacted by each of these elements. Due to the nature of the matter at hand, it is necessary to conduct an investigation into project governance and the degree to which those goals of the project correspond with those of the organization (El Khatib, AlMaeeni, & Alkamali, 2022). Ma and Fu (2020) state that projects that have a governance structure that has been explicitly developed have a greater likelihood of successfully accomplishing their strategic objectives. Implementing effective governance ensures that the goals of the project and the overall strategy of the organization are aligned (Yan & Zhang, 2020). Because of this, the coherence of the project plan will be increased. The alignment of these elements improves the allocation and prioritization of resources, which ultimately leads to enhanced organizational performance (Young et al., 2020). This is accomplished by ensuring that decisions are made in accordance with the organization's goals and vision. In addition to alignment and coordination, project governance has implications for risk management and compliance assurance. (El Khatib et al., 2022); Zaman, Nadeem, and Nawaz

(2020) examine the principles of governance and the management of project risks. Initiatives that have robust governance procedures tend to have more effective risk identification, assessment, and management processes (Ghaleb et al., 2022). Governance facilitates the implementation of a well-structured risk management framework, enabling teams and project managers to effectively anticipate and address challenges, hence mitigating the likelihood of project failure. Project governance is essential for risk management since it provides guidance for decision-making and ensures alignment, hence influencing project performance.

H1: The success of a project is significantly influenced by governance.

This research primary focus will be on the impact of technical complexity on the success of a project. Technical complexity in project management pertains to the level of difficulty associated with the activities, resources, and procedures required for project completion. In order to verify this theory, it is necessary to analyze the correlation between the level of technical complexity and the outcomes of the project. Technological problems can affect project outcomes. Project completion time, budget, and quality determine the outcome (Ma & Fu, 2020). This notion fosters the study of the relationship between technology complexity, project uniqueness, and project adaptability. Picciotto (2020) found a favorable association between professional difficulty and the need for improved adaptation and creative problem-solving. Project management must respond to unexpected challenges and ambiguities caused by technical complexity. Team creativity and technology are essential for project success (Vrchota et al., 2020). Complex project firms should foster innovation, adaptability, and technical proficiency. According to the theory, technological complexity, together with adaptability and management of resources, impacts the quality of a project's output. The correlation between technically challenging tasks and successful project completion was studied by Kerzner (2022). According to the results, projects that aren't too complicated technically are more likely to be up to par. A project's success is at risk when technical complexity raises the possibility of errors, delays, and rework (El Khatib et al., 2022). Therefore, it is crucial for project managers to understand and control technological complexity since it has a direct impact on a project's ability to complete its goals within the allotted time, budget, and quality restrictions.

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H2: Project complexity (technical) significantly influences the project's success.

Although there is a correlation between effective governance and the accomplishment of project goals, the implementation of innovative project management strategies has the ability to lessen this association (Fernandes & O'sullivan, 2023). Innovation in project management is characterized by the employment of novel methodologies, techniques, and technology in order to improve both the outcomes and the processes (Zada et al., 2023). In order to prove this hypothesis, it is required to investigate the complex interrelationships that exist between the successful completion of a project, an innovative management approach, and effective governance. Pasian and Williams (2023) state that project governance frameworks that are already in place have the potential to foster innovation in the field of project management. Effective governance frameworks have the potential to make it easier to deploy new ways to project management, which, in turn, can have an effect on the outcomes of the project (Wang, Müller, & Zhu, 2023). This is because these frameworks encourage and support creative and original thought processes, which is the reason why this is the case. With this approach, the primary focus is on analyzing the influence that innovation in project management has on governance. Tijani, Jin, and Osei-Kyei (2023) found that the application of novel project management strategies improves communication, decision-making, and governance. This was discovered in the course of their research.

Through the implementation of efficient project governance, the purpose of creative project management and management is to increase the likelihood of a project's successful completion (Yan & Zhang, 2020). Companies that apply new project management approaches and take an approach that is forward-thinking may realize that governance has a considerable influence on the results of projects, which ultimately results in projects that are more adaptable, efficient, and successful (Wiedemann et al., 2023). According to this theory, new approaches to project management have a direct impact on the final product and on the quality of governance overall. (RezaHoseini et al., 2020) research lends credence to the premise that cutting-edge methods of project management yield superior and more fruitful results. Stakeholder happiness, project adaptability, and problem-solving abilities can all be enhanced (Zada et al., 2023). Thus, new approaches to project management not only moderate the connection between good project

governance and fruitful outcomes, but also serve as a primary driver of such outcomes (Wiedemann et al., 2023). To achieve their objectives through strategic project management, organizations must understand the interconnected nature of success, innovation, and governance.

H3: Project management innovation significantly mediates the relationship of project governance and the project's success.

There is a clear correlation between the presence of technical complexity and the success of a project; nevertheless, the use of contemporary project management approaches helps to ameliorate this link (Ershadi et al., 2020). The term "project technical complexity" refers to the degree of difficulty that is related with the process, technology, and procedures that are involved in the project (Soto Setzke et al., 2023). Obtaining an understanding of the relationship between technological complexity and innovation in project management will be of great assistance to businesses in effectively managing complex projects and achieving their goals. The authors (Picciotto, 2020) observed that complex technical projects frequently call for the use of creative project management solutions in order to successfully manage unforeseen events, speed up procedures, and maximize resources (Arinaitwe, 2021). Based on these data, it appears that using approaches for innovative project management could be an effective way to lessen the influence that technological complexity has on the success of a project (Shahzadi et al., 2021). In addition to this, the concept suggests conducting research into the ways in which the application of novel project management practices might assist humans in adapting to complex technologies.

Teams that are able to think outside the box are better able to handle challenges, come up with innovative solutions, and lessen the risks associated with complex technology issues (El khatib et al., 2023). So, cutting-edge project management does more than just change the correlation between technical complexity and success; it also makes the project more flexible right away, which could affect how well it achieves its goals within the given quality, time, and financial restrictions (Bhatti et al., 2021). In addition to its function in adaptation, innovation in project management is expected to impact the overall quality of project outcomes. Research by Alqublan (2023) indicates that using creative project management strategies can improve project outcomes by reducing

technical complexity-related errors and delays. By implementing innovative solutions and making technical procedures more efficient, project teams can raise the bar for output quality (Arinaitwe, 2021). As a moderator that controls the effect of technological complexity on project success and directly enhances project results, innovation plays a multifaceted function in project management, as this example shows. Companies aiming to enhance their project management skills and handle technically complex projects effectively would do well to familiarize themselves with this connection.

H4: Project management innovation significantly mediates the relationship of project complexity (technical) and the project's success.

Project management support acts as a moderator in the relationship between project governance and project success, as proposed below (Ghaleb et al., 2022). Project management support refers to the provision of tools, data, and resources that enhance the execution of project management operations. This idea must be validated by investigating the intricate connections between project governance, project management support, and project success. Project governance systems may be more effective if well-designed mechanisms for supporting project management are in place, according to research by Picciotto (2020). Consequently, companies that are well-supported may discover that governance plays a bigger role in determining project success (Fernandes & O'sullivan, 2023). In addition, the hypothesis necessitates research into the processes via which project management is used to settle disagreements and issues within the project governance framework (Torfing et al., 2021). Good project management support can mediate disputes stemming from governance-related issues, according to research by Wiedemann et al. (2023). A platform for project members to communicate, share ideas, and resolve issues can be provided by support mechanisms. In addition to reinforcing the link between governance and success, this demonstrates that project management support plays a critical moderating role in creating an environment of cooperative and supportive governance, which in turn improves project outcomes (Wang et al., 2023). Beyond its function in conflict resolution, project management is seen to have an immediate effect on the success of projects. Pasian and Williams (2023) and others have shown that projects with strong support networks usually end up being more successful. Having sufficient help can lead to better decision-making, more efficient use of resources, and more flexibility to adapt to changing

project conditions (Yan & Zhang, 2020). Consequently, the link between success and governance is changed and project management assistance affects the final result of the project independently. Successful project completion is dependent on businesses' ability to optimize project management processes by understanding the interconnected nature of success, support, and governance.

H5: Project management support significantly moderates the relationship of project governance and the project's success.

The argument here is that project management drastically alters the correlation between the technical difficulties faced by a project and its ultimate success (Wiedemann et al., 2023). The technical complexity of a project is the degree to which its tasks, technologies, and approaches are challenging (El Khatib et al., 2022; Ghaleb et al., 2022). To gain a complete grasp of this idea, one must investigate the ever-changing connections between project complexity, project management support, project success, and the like. According to studies conducted by Ghaleb et al. (2022), having full support from project managers can play a significant role in reducing technological complexity. An adequate support system provides the information, resources, and tools needed to overcome the challenges posed by complicated technology, which in turn lowers risks and increases the likelihood of a project's success (Pasian & Williams, 2023). Similar reasoning underpins studies investigating the ways in which project management support fosters innovation and flexibility in the context of technological complexity (Zada et al., 2023).

Efforts requiring a high level of technical sophistication sometimes necessitate flexible and innovative problem-solving, according to research by Zaman et al. (2020). As a mediator, project management support may set the stage for an environment that encourages innovative thinking. Even while working on complex projects, teams may overcome unexpected challenges, solve challenging technical assignments creatively, and complete them on schedule with the correct knowledge and resources (Young et al., 2020). It appears that the capacity for innovation and adaptation of a project is directly affected by the level of support for project management, which in turn moderates the relationship between technical complexity and success (Yan & Zhang, 2020). It is believed that, in addition to being creative and adaptable, project management help has a direct impact on the completion of projects. Projects

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with robust support networks tend to have higher success rates, according to study by Ma and Fu (2020). Effective allocation of resources, streamlined decision-making, and improved project management efficiency all necessitate adequate support. Hence, project management assistance changes the connection between technical difficulties and project success and the independent component that leads to good project outcomes (El Khatib et al., 2022). This complex link

is vital for companies working on technically difficult projects since it shows how support mechanisms could improve project management processes and help projects finish successfully.

H6: Project management support significantly moderates the relationship of project complexity (technical) and the project's success.

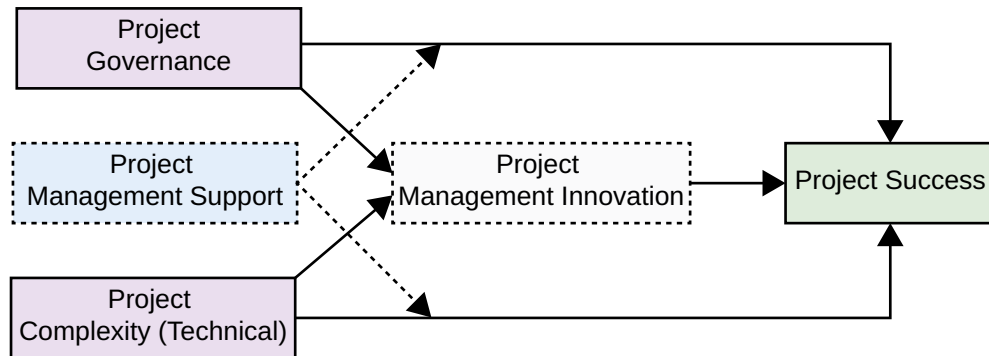


Figure 1: Research Model.

3. Methodology

232 workers of the Kingdom of Saudi Arabia who were employed full-time on construction sites participated in the study. The objective of the participant selection process was to get a heterogeneous representation of persons occupying a range of positions in the construction sector, encompassing project managers, engineers, supervisors, and workers. Combining stratified and random selection methods allowed the sampling approach to provide a representative and thorough sample that was representative of the heterogeneous workforce in the construction industry. Structured surveys were given to the chosen individuals in order to gather data for the study. Scales from previous studies were added into the survey instruments to guarantee the validity and reliability of the measurements. The purpose of the survey items was to gather data on project success, technical difficulty, project governance, and assistance from project management. Online and physical approaches were used to accommodate various working conditions of site workers.

The scales utilized are adopted, (see Appendix 1) which rectifies the validity of constructs. To quantify the number of resources, knowledge, and instruments provided to workers for efficient projects, a validated scale was used. From the review of the literature, many items were used to evaluate project governance, getting to know about the governance framework influences in the construction industry. A metric was used to analyze task, technology,

and methodology technical intricacy in the next phase. The project's breadth, excellence, longevity, and financial resources were assessed using a comprehensive scale. A scale of ten items from the study of Joslin and Müller (2016) was used to measure the project governance. Project complexity technical was measured on three items developed by Bjorvatn and Wald (2018). Project success was measured on five items scale of Ul Musawir et al. (2017). Project management innovation was measure in this study based on four items scale of Nieves (2016). The six items scale to measure the project management support was adopted from the work of Jitpaiboon, Smith, and Gu (2019). The assessments helped compare the three project aspects. We used STATA-SEM and Structural Equation Modeling (SEM) for statistical analysis. The complex model was examined using structural equation modeling (SEM). We studied the role of project management to determine the relationship between technical complexity and project completion. To advance in the field, the model had to be developed, its parameters calculated, and its performance assessed.

4. Results

Table 1 shows the variables' Cronbach's Alpha coefficients, demonstrating their dependability and internal consistency. With 0.889 on the Cronbach's Alpha scale, Project Success has the highest score, followed by Project Governance with 0.860. Every occurrence demonstrated the criteria' reliability. Their ability to accurately evaluate

the study's fundamental components is made possible by the scales, which offer robust and dependable measuring capabilities. Cronbach's Alpha scores of 0.837, 0.819, and 0.786 suggest that the project's complexity, creativity, and support all exhibit internal consistency through their respective levels of consistency. Specific values provide an indication of the degree of compatibility that exists between particular components. These findings provide more evidence that the data are accurate, support the methods of measurement, and make it possible to conduct additional research on the dynamics and interactions of critical structural elements. Furthermore, they offer evidence to back up the information that they present.

Table 1: Cronbach's Alpha.

Variable	Cronbach's Alpha
Project complexity	0.837
Project success	0.889
Project management innovation	0.819
Project management support	0.786
Project governance	0.860

Table 2 shows composite reliability and AVE. These values reveal construct accuracy and consistency. The fact that there is a substantial level of homogeneity across all of the categories of the composite dependability ratings is evidence that there is a robust internal structure present. It was discovered that the performance of the project had a composite reliability of 0.937, which indicates that it had a high level of dependability. It can be deduced from this that the research was conducted exclusively on projects of exceptional quality. Both the complexity of the project, which is demonstrated by a correlation value of 0.906, and its governance, which has a correlation coefficient of 0.882, both reflect a substantial level of composite dependability. This lends credence to the notion that the method of measurement that was utilized is trustworthy and reliable. The composite reliability scores of 0.863 and 0.827 for Project Management Innovation and Support, respectively, contribute to the overall reliability of the structures under consideration.

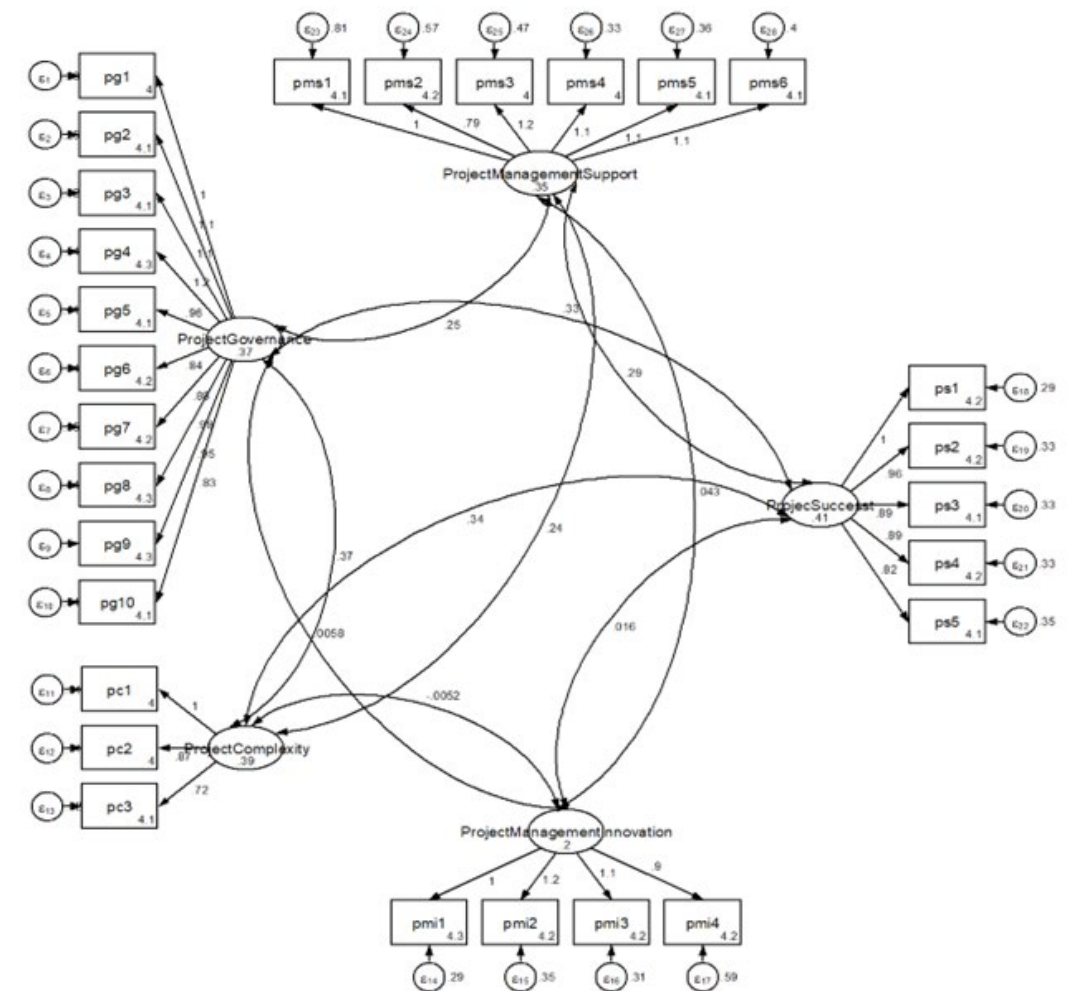


Figure 2: Estimated Model.

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The study of average variance extracted (AVE) supports the measuring scales' convergent validity. In this sense, Project Success remains excellent; its AVE of 0.696 indicates that the success construct accounts for a considerable portion of the variance. Project Management Innovation and Project Complexity have AVE values of 0.673 and 0.638, respectively, confirming their strong convergent validity. Despite their decreased AVE values of 0.578 and 0.603, Project Governance and Project Management Support continue to provide adequate levels of variance extraction. When considered together, these findings confirm the validity and reliability of the measuring tools and provide a solid foundation for future research into the complex interactions between project management factors in the study's setting.

Table 2: Validity and Reliability Confirmation.

Variable	Composite Reliability	Average Variance Extracted (AVE)
Project complexity	0.882	0.638
Project success	0.937	0.696
Project management innovation	0.863	0.673
Project management support	0.827	0.603
Project governance	0.906	0.578

Table 3 presents the findings of the Confirmatory Factor Analysis (CFA) and provides insights into the relationships between the observable and hidden variables in the project management framework. The following are the coefficients: project governance (PG), project success (PS), project management innovation (PMI), project management support (PMS), and project complexity (PC), together with the related standardised error, z-value, and confidence interval. The unconstrained loadings demonstrate the magnitude and intensity of the correlations between the latent variables and the observable indicators. For instance, the Project Governance items PG2, PG4, PG5, PG8, and PG9 exhibit robust and statistically significant loadings, indicating their substantial contribution to the assessment of the latent construct of governance. Likewise, Project Success's PS2, PS4, and PS5 parts have noteworthy loadings that emphasise their importance in capturing the essence of project success. Confirmatory factor analysis results provide empirical support for the appropriateness and validity of the chosen measurement model, opening the door for additional structural equation modelling to explore the complex relationships between these important project management factors.

Table 3: Confirmatory Factor Analysis.

Measurement	OIM Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
PG1	1	(constrained)				
PG2	0.728	0.067	10.360	0.000	0.596	0.859
PG3	0.535	0.060	8.544	0.000	0.418	0.652
PG4	0.851	0.067	12.205	0.000	0.721	0.791
PG5	0.852	0.078	10.446	0.000	0.699	0.813
PG6	0.624	0.065	9.194	0.000	0.497	0.751
PG7	0.312	0.062	4.798	0.000	0.190	0.434
PG8	0.585	0.068	9.749	0.005	0.487	0.803
PG9	0.829	0.078	11.698	0.002	0.682	0.841
PG10	0.670	0.067	9.500	0.000	0.538	0.802
PS1	1.000	(constrained)				
PS2	0.771	0.063	11.784	0.000	0.648	0.894
PS3	0.691	0.081	8.181	0.000	0.533	0.849
PS4	0.854	0.056	14.680	0.000	0.745	0.772
PS5	0.871	0.068	12.214	0.000	0.737	0.813
PMI1	1.000	(constrained)				
PMI2	0.739	0.060	11.301	0.000	0.622	0.857
PMI3	0.810	0.057	12.987	0.000	0.698	0.739
PMI4	0.717	0.068	13.473	0.000	0.674	0.867
PMS1	1.000	(constrained)				
PMS2	0.737	0.063	10.714	0.000	0.614	0.861
PMS3	0.835	0.065	11.713	0.000	0.707	0.780
PMS4	0.700	0.064	10.082	0.000	0.576	0.825
PMS5	0.769	0.063	11.117	0.000	0.645	0.893
PMS6	0.810	0.074	9.937	0.000	0.665	0.774
PC1	1.000	(constrained)				
PC2	0.660	0.056	10.637	0.000	0.550	0.771
PC3	0.674	0.058	10.573	0.000	0.560	0.787

The fitness statistics for the measurement items inside each variable are shown in Table 4, which helps assess the goodness-of-fit of the measurement model in capturing the underlying constructs. The provided values, or factor loadings for each indicator in the original sample, represent the degree of correlation between the observable variables and the related latent constructs. The Project Governance indicators (PG1 through PG10) have factor loadings that range from 0.642 to 0.941, which is noteworthy and satisfactory. With their exceptionally large loadings, PG6 and PG9 appear to have a major influence on project governance measurement. The PC1 through PC3 Project Complexity Indicators exhibit robust factor loadings, ranging from 0.824 to 0.876, indicating their potential utility in evaluating project complexity. High factor loadings demonstrate how well these indicators capture project performance (PS1 to PS5), especially for PS2 and PS3. Additionally, the indicators for project management support (PMS1 to PMS6) and innovation (PMI1 to PMI4) exhibit suitable factor loadings, suggesting that these items are suitable for assessing innovation and support in project management. Overall, the assessment items' fitness statistics support the suitability of the selected indicators for assessing the underlying constructs. This offers a solid foundation for other studies that explore the complex relationships inside the project management system.

Table 4: Measurement Items Fitness Statistics.

Variable	Indicator	Original Sample
Project governance	PG1	0.865
	PG2	0.855
	PG3	0.761
	PG4	0.823
	PG5	0.885
	PG6	0.912
	PG7	0.939
	PG8	0.642
	PG9	0.941
	PG10	0.830
Project complexity	PC1	0.824
	PC2	0.858
	PC3	0.876
Project success	PS1	0.713
	PS2	0.961
	PS3	0.909
	PS4	0.874
	PS5	0.722
Project management innovation	PMI1	0.658
	PMI2	0.785
	PMI3	0.844
	PMI4	0.889
Project management support	PMS1	0.913
	PMS2	0.826
	PMS3	0.706
	PMS4	0.698
	PMS5	0.619
	PMS6	0.606

Table 5 presents the Chi-square fit statistics together with goodness-of-fit information for the structural equation model. In comparison to the saturated model, the likelihood ratio chi-square value of the model is 14280.839, indicating the degree of difference between the actual and expected covariance matrices. It is implied that there is a statistically significant difference because the matching p-value is reported as 0.000. In addition, a p-value of 0.001 and a chi-square value of 11203.552 are provided for the baseline in comparison to the saturated model. While chi-square fit statistics are widely used to assess model fit, it is important to keep in mind that when working with large samples, their sensitivity to sample size may lead to significant values. Thus, supplementary fit indices are often considered by researchers for a more comprehensive examination. Even though Chi-square is sensitive to sample size, the results shown in Table 5 inspire additional research into various fit indices to provide a more nuanced picture of the model fit inside the structural equation modelling framework.

Table 5: Chi-square Fit Statistics.

Fit Statistic	Value	Description
Likelihood ratio	14280.839	model vs. saturated
p > chi2	0.000	
chi2_bs(2356)	11203.552	baseline vs. saturated
p > chi2	0.001	

Table 6 shows the model goodness of fit statistics for the estimated and saturated models, with a focus on the Standardised Root Mean Residual (SRMR) as a critical indicator. The saturated model, or optimal fit, has an SRMR value of 0.062. On the other hand, the Estimated Model, which is derived through the structural equation modelling process, has the marginally higher SRMR value of 0.078. The difference between the expected and observed covariances is measured using a metric called the average absolute standardised residual, or SRMR. Even though the SRMR for the Estimated Model is marginally higher than the Saturated Model's, the closeness of these values suggests a reasonable fit between the suggested model and the observed data. It is important to keep in mind that the SRMR is just one fit index out of many; researchers typically consider a combination of indices in order to completely assess the level of fit. The values provided in Table 6 support a nuanced interpretation of the model fit and stimulate more research into supplemental fit data to guarantee a comprehensive evaluation of the structural equation model.

Table 6: Model Goodness of Fit Statistics.

	Saturated Model	Estimated Model
SRMR	0.062	0.078

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The R-square statistics of the major variables in the structural equation model are shown in Table 7, which indicates the percentage of variance in each construct that the model can account for. Project Complexity indicates that the structural equation model can account for 62.9% of the variability in this variable, with a significant R-square value of 0.629. Similarly, Project Management Innovation has a significant R-square value of 0.448, meaning that the model accounts for 44.8% of the variance in project management innovation. Project Governance has a comparable R-square value of 0.387, meaning that the model can account for 38.7% of the variation in governance systems. These R-square statistics, which provide a quantitative evaluation of how well the proposed model explains and captures the observed fluctuations in the defined constructs, show the explanatory power of the structural equation model. Table 7's values contribute to a comprehensive understanding of the model's operation and its ability

to elucidate the relationships between the complex dynamics of project management.

Table 7: R-square Statistics.

Variable	R Square
Project complexity	0.629
Project management innovation	0.448
Project governance	0.387

Table 8 presents the results of the direct and mediating path analysis, offering insights into the relationships among key variables within the structural equation model. The coefficient for Project Governance is reported as 0.356 with a standard error of 0.093, indicating a statistically significant influence on project success ($z = 2.560, p = 0.001$). Similarly, Project Complexity (Technical) exhibits a significant direct effect on project success, with a coefficient of 0.826 and a standard error of 0.460 ($z = 1.660, p < 0.000$). The analysis also explores the mediating role of Project Management Innovation in these relationships.

For the relationship between Project Governance and Project Success, the coefficient is 0.278, with a standard error of 0.101 ($z = 2.775, p = 0.006$), signifying a statistically significant mediating effect. In the case of Project Complexity (Technical) and Project Success, Project Management Innovation again serves as a significant mediator, as indicated by a coefficient of 0.895

and a standard error of 0.499 ($z = 1.800, p < 0.000$). These findings contribute to a nuanced understanding of the complex interplay between project governance, technical complexity, project management innovation, and their collective impact on project success within the context of the study.

Table 8: Direct and Mediating Path Analysis.

	OIM Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
Project governance significantly influences the project's success.	0.356	0.093	2.560	0.001	0.175 0.438
Project complexity (technical) significantly influences the project's success.	0.826	0.460	1.660	0.000	0.632 0.800
Project management innovation significantly mediates the relationship of project governance and the project's success.	0.278	0.101	2.775	0.006	0.081 0.475
Innovation in project management has a crucial role in moderating the relationship between the presence of technological complexity and the successful completion of a project.	0.895	0.499	1.800	0.000	0.686 0.867

A demonstration of the influence that Project Management Support has on the variables of the structural equation model can be found in Table 9, which contains the moderating route analysis. Taking into consideration the coefficient of 0.267 and the standard error of 0.097 ($z = 2.665, p = 0.006$), it can be concluded

that Project Management Support has a moderating function in the link between Project Governance and Project Success. This illustrates that having access to comprehensive project management help improves both the governance of the project success.

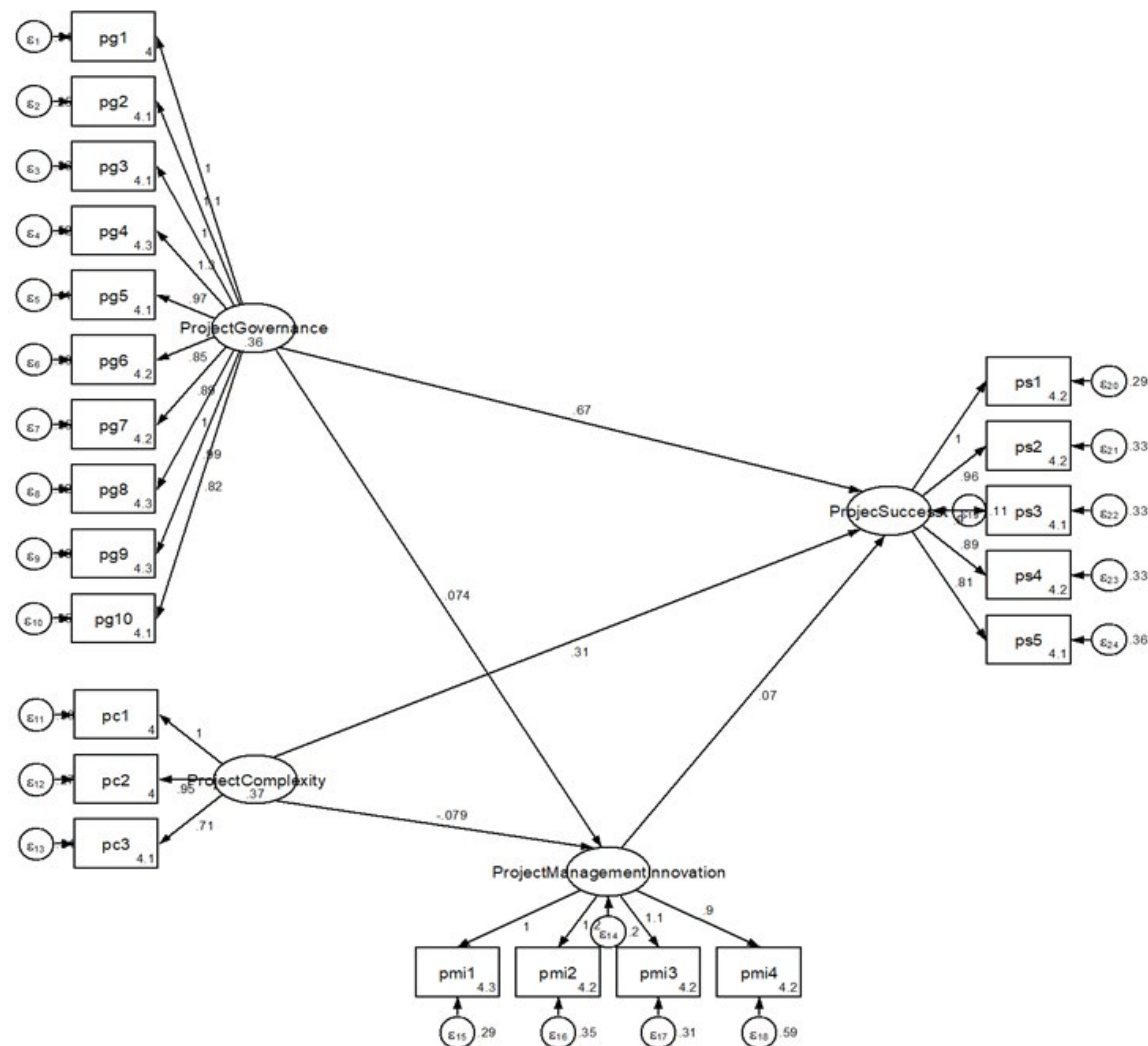


Figure 3: Structural Model for Direct and Mediated Path Analysis.

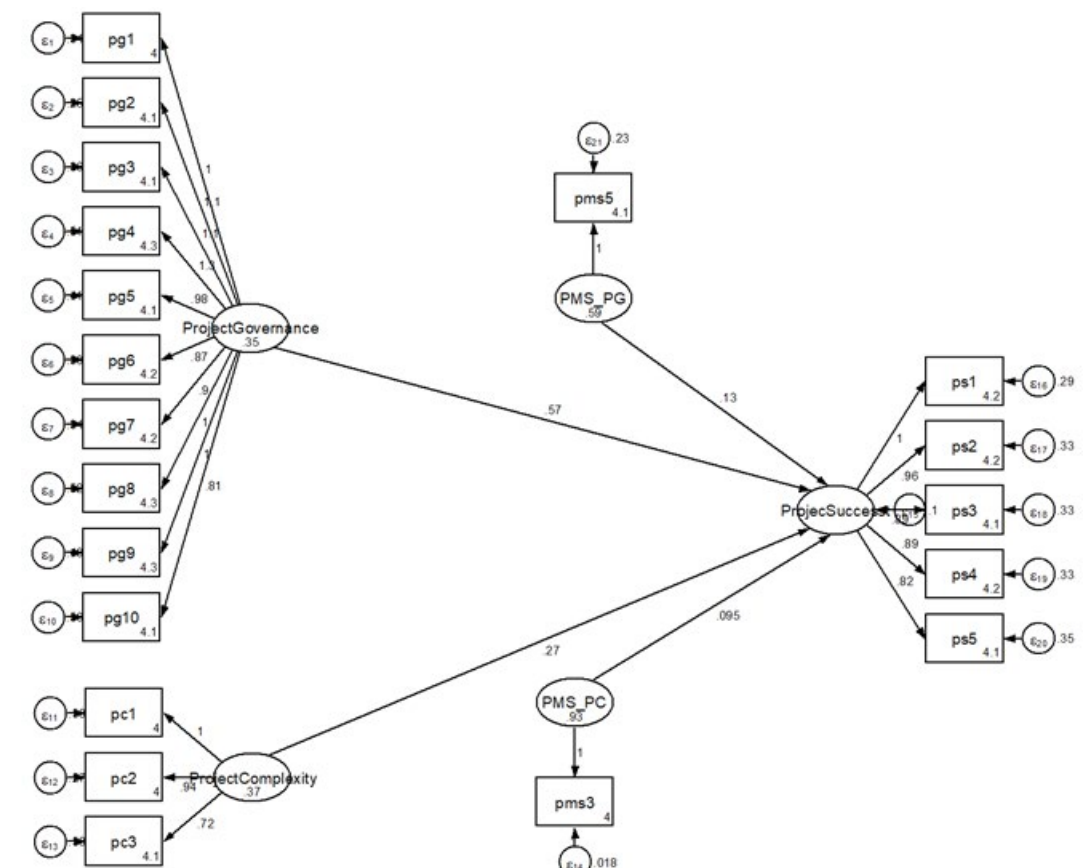


Figure 4: Structural Model for Moderating Path Analysis.

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The presence of project management support has an effect on the relationship between the complexity of a technical project and its level of success of the project. The statistical significance of this association is demonstrated by the coefficient of 0.860 and the standard error of 0.479, with a z-value of 1.729 and a p-value of less than 0.000. The influence of

technological complexity on the successful completion of a project can be mitigated by more effective project management. The findings illustrate the impact that Project Management Support has on these relationships and offer a glimpse into the management of projects in the situation that was investigated.

Table 9: Moderating Path Analysis.

	OIM Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
The existence of project management support has a substantial impact on the governance of the project as well as the success of the project generally.	0.267	0.097	2.665	0.006	0.078	0.456
Support for project management effectively reduces the association between the level of technological complexity and the level of success achieved by the project.	0.860	0.479	1.729	0.000	0.658	0.833

5. Discussion

This section is aligned with the findings, that discuss the determinants and their understanding leading toward project success. All the hypothesis extends an understanding of the complexities in attaining project success and the influence of factors like project governance, innovation, and technical complexity. The first hypothesis extends the importance of project government in project success. Past researches also show that organizations that spend their resources on project governance framework are more likely to combat the hurdles on the way to project success. The second hypothesis justifies the importance of technical complexity for the project's success. Past literature also indicates the need for technical advancement in the success of a project (Ghaleb et al., 2022; Torfing et al., 2021). The project managers may not be familiar with the technical aspects, so a need is aroused to align with the demanding advanced technical dynamics.

Innovation as a mediator between project governance and project success indicates the rationale behind innovation in projects. Previous researches show that innovation can improve projects substantially (Yan & Zhang, 2020; Young et al., 2020). It not only combats hurdles but also enhances project adaptability. Overall, to embed this mediation, flexibility is a must. The fourth hypothesis is accepted showing innovation mediates significantly between project complexity and project success when it comes to technological changes. The role of technical complexity in the organizations is evident, this research offers a vulture of teamwork that can surely resolve this issue. The moderating variable, project management support is very crucial for the efficient working for which supportive

infrastructure is required. Thus, this increases the governance strategies, creating a win-win culture. This discussion helps in academic as well as practical project management (Vrchota et al., 2020).

This research is a model for the KSA 2030 vision, to make that project a success. The mentioned governance structures can help in achieving infrastructure and economic targets. The perplexity of technical aspects is very important for project performance in the rapidly expanding construction sector, mandating a deliberate focus on flexible methodologies to meet complex project demands. Innovation in project management serves as a mediator connecting technical complexity, project success, and effective governance, aligning with Saudi Arabia's commitment to technological progress. The moderating influence of project management support underscores the importance of a supportive infrastructure for maximizing governance structure benefits in complex construction projects. Overall, these findings stress the need for a comprehensive, adaptable, and innovative project management approach tailored to the specific characteristics of construction projects in Saudi Arabia.

6. Conclusion

This research attempted to study the complex determinants of project success in project management in the KSA construction industry. A significant impact on project success is seen, by employing data from 232 employees of the construction industry and analyzing the data by STATA-SEM OF adopted valid scales. The findings indicated project management innovation, project governance, support mechanisms, and technical complexity as influences on project success. The results indicate project governance and technical

complexity, have a direct influence on project success, additionally, project management innovation is found to be an important mediator, while project management support acts as a moderator forming the relationship among the variables. These results present an in-depth comprehension for academics as well as stakeholders for any project. It sets the foundation for project management methods, adaptability, and probability for success, particularly in construction sites. For it to happen an adroit governance framework, skilled management and technical settings, innovation, and supporting system.

Implications of the Study

It is possible that the findings will have a substantial impact on the way development projects are managed in Saudi Arabia. First and foremost, the evidence reveals that widely established theoretical frameworks for project management are applicable in real-world situations. It is possible for construction sites to make use of these concepts by drawing upon research-based measures of project performance, innovation, support, and governance within the construction industry. Theories of project management have the potential to become more durable and universally applicable if they include theoretical foundations from a variety of contexts into specific sectors and geographies. In addition, the research makes use of structural equation models in order to facilitate and regulate methods that improve theoretical frameworks. Based on the data, it can be concluded that the support provided by project management has a moderating function in the connection between technical complexity, progress, and governance. There is also a connection between this relationship and innovative project management.

These findings suggest that more theoretical research is needed to understand mediation and moderation settings. Academics and project managers can better understand project outcomes by following thorough instructions informed by theoretical advances. The research illuminates the intricacy of project outcome elements, improving theoretical discussion. A project's success depends on great ideas and a skilled project manager. Technological complexity and governance efficiency affect the project's success. Whether a project succeeds or fails, its complicated links between its numerous components affect its outcome. This all-encompassing viewpoint casts doubt on fundamental assumptions concerning the performance of construction projects in particular geographical and industrial contexts. This is accomplished by analyzing the theoretical implications of dynamic interdependencies among the

various components of project management. By pushing for a more sophisticated understanding of dynamics that takes into consideration specific features, the work that is presented here contributes to the enhancement of the theory of project management.

This research has the potential to provide decision-makers, stakeholders, and construction managers with useful insights that are both strategic and practical, as well as support. I would like to bring to your attention the fact that these initiatives call for individuals who show advanced managerial abilities as well as technical ability. Before anything else, it is essential to keep in mind.

Our analysis shows that Saudi Arabia's building budget emphasizes project governance systems. To complete tough technical tasks, you need a professional workforce, cutting-edge technology, and flexible management. According to research, creativity aids project management. Thus, rewarding project managers for their creativity may improve project success. Innovative problem-solving and cutting-edge computer technology can help construction companies overcome unexpected challenges. Construction firms can receive this funding. The study found that progressive project management may overcome technical constraints and increase project quality. To boost project efficiency, construction firms should encourage creative thinking. Project management helps with governance, technology, and goals. This factor affects resource allocation and organizational policy. Managers and decision-makers can use this information to prioritize talents, tools, and resources. Improved project management help is essential for organizations seeking to improve governance and simplify technological applications. Pedagogical help, collaborative discourse, and the availability of resources and equipment for project teams are all instances that fall under this category. Prioritizing the resolution of complaints pertaining to project management support is something that construction companies should do in order to maximize their return on investment and fulfill the expectations of their stakeholders.

Limitations and Future Research Directions

Although the study's limitations must be acknowledged in order to arrive at a just interpretation, the research has provided valuable insight into the dynamics of building project management. First of all, the study only looked at construction sites in Saudi Arabia, thus the findings might not be generalizable. Cultural, legal, and economic variations across countries may impact the relevance of the discovered links due to the diversified nature of the construction industry. To

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improve our understanding of project management in general and of its situational features in particular, future studies should expand upon and reproduce similar findings in other contexts. This will boost the study's external validity. Answer bias and common method bias are further issues with self-reported survey data. Data accuracy could be compromised if respondents misunderstand the survey questions or provide replies that are deemed socially acceptable. By integrating survey results with quantitative performance measures or qualitative assessments, future research might use mixed-methods to strengthen and verify findings. The factors of project management can change and impact project performance, but this may only be revealed by studies that follow projects through time. Innovation in project management, technological challenges, governance, and help are all highlighted in the report. While these criteria are crucial, other aspects that contribute to a project's success may be examined in building research. The ever-changing construction industry's complex project management can be better understood with the use of digital technologies, stakeholder involvement, and environmental sustainability. There is no mention of how economic and geopolitical considerations can impact project performance in the report. Researchers can provide more useful information to decision-makers and project managers by investigating the impact of these exogenous factors on the established connections.

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Appendix 1 Project Governance

1. To what extent are project goals and objectives clearly defined and communicated within your project team?
2. How well is decision-making authority distributed and communicated across various levels of the project hierarchy?
3. In your opinion, how effectively does the project team adhere to established project policies and procedures?
4. To what extent are project risks identified, assessed, and communicated among project stakeholders?
5. How would you rate the level of accountability within the project team for meeting project milestones and deadlines?
6. In your experience, how transparent is the flow of information between project team members and key stakeholders?
7. How well are conflicts resolved within the project team, ensuring a harmonious working environment?
8. To what extent do project leaders foster a collaborative and inclusive culture within the project team?
9. How effectively does the project team adapt to changes in project scope or objectives?
10. How satisfied are you with the overall governance structure of the project?

Project Complexity (Technical)

1. How would you rate the technical intricacy of the tasks involved in the project?
2. To what extent do you perceive the project's technical requirements as challenging?
3. In your opinion, how complex are the technical aspects of the project compared to similar projects in the industry?

Project Success

1. To what extent was the project completed within the scheduled timeframe?
2. How closely did the project adhere to the initially budgeted financial resources?
3. In your perspective, how well were the project objectives achieved?
4. To what extent did the project meet or exceed stakeholder expectations?
5. How satisfied are you with the overall success of the project?

Project Management Innovation

1. How frequently does the project team explore and adopt innovative project management approaches?
2. To what extent is the project team open to integrating new technologies to enhance project efficiency?
3. How well does the project team encourage and implement novel ideas for project improvement?

4. In your experience, how effective are innovative practices in optimizing project outcomes?

Project Management Support

1. To what extent do project team members have access to necessary resources and tools for project tasks?
2. How satisfied are you with the level of expertise and guidance provided by project management leaders?
3. In your opinion, how well does the project team foster effective communication and collaboration?
4. To what extent are project team members supported in managing workloads and addressing challenges?
5. How satisfied are you with the overall level of support provided by project management within the team?