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Complex Projects, Complex Outcomes: A Stakeholder-Centric Investigation of Performance Challenges in the Development Sector

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ABSTRACT

This research examines the effect of project complexity (PC) on project performance (PP)—specifically delay and cost overrun—in the context of complex development sector projects in Pakistan. While prior research has acknowledged the presence of complexity in development projects, the underlying mechanisms through which it affects performance have remained largely underexplored. This research addresses that gap by thoroughly probing stakeholder management process and does so by considering stakeholder conflict (SC) as a mediating variable in the relationship between project complexity and project performance. Moreover, by assessing the moderating role of stakeholder satisfaction (SS) as well. Statistical analysis of data using PLS-SEM, gathered from 381 respondents of development sector highlighted that project complexity has significant direct effect on project performance as well as stakeholder conflict. The effect of stakeholder conflict on project performance was also found vital. In case of mediation, the intervening effect of stakeholder conflict between project complexity and performance was substantial, which establishes the vitality of effectively & timely managing stakeholder conflicts within complex projects. Lastly and interestingly, with respect to moderation, stakeholder satisfaction did not appear as a significant factor between stakeholder conflict and performance. These findings cumulatively highlight the importance of managing conflicts in diverse projects, and demonstrate that, if not managed effectively this complexity can drastically impact project performance, especially in terms of delays and cost over runs. The research holds vitality in theoretical as well as practical context. Project management practitioners can utilize these findings and effectively manage the complexity and conflict in their projects to elevate their performance outcomes.

Introduction

Over the last few decades, project complexity has become a key field of study for project management researchers and practitioners, instigated largely by the increasing number of megaprojects worldwide (Jia, Xiang & Chen, 2023; Majeed et al., 2023). The development sector is most susceptible to this complexity, largely because large-scale development processes inherently involve risks and uncertainties (Damayanti, Hartono & Wijaya, 2021). Factors such as uncertainties due to unknown budgeting frameworks, project sprawl and size, incorporation of next-generation technologies, community participation, global stakeholders, and environmental factors significantly enhance the complexity of development projects (Shi et al., 2022; Majeed et al., 2023).

Despite their well-documented performance challenges, large and complex community-oriented development projects have become increasingly conventional (Jia et al., 2023). One of the fundamental causes of project failure in such contexts remains the inadequate management of scale and complexity (Ayat et al., 2023; Azmat & Siddiqui, 2023). Research indicates that stakeholder-centric risks and technological dependencies are among the core drivers of complexity in megaprojects (Guo et al., 2025; Zhang et al., 2022). Particularly in developing regions, stakeholder actions and social network dynamics contribute to heightened conflict and coordination challenges, making stakeholder management even more critical (Kadan & Wium, 2025).

Despite the increasing trend of megaprojects over the past decade, the issue of project complexity has also grown significantly (Ghaleb et al., 2022). However, the aspect of efficiently managing this complexity has not received adequate attention, often resulting in negative consequences for project outcomes (Majeed et al., 2023). Although poor performance is frequently attributed to the complexity of projects, there remains limited empirical evidence to substantiate this relationship (Wu et al., 2017). In the context of development projects, project complexity has predominantly been conceptualized from a technical perspective, with minimal exploration of its broader effects on project performance. While complexity is often assumed to be linked to performance outcomes, the theoretical underpinnings and empirical validations of this connection are still insufficient (Damayanti et al., 2021). Zheng et al. (2023), in their recent study, emphasized that project complexity is a multifaceted construct and that there remains a strong need to examine its various dimensions across diverse project types. They further pointed out that most existing research has focused only on intra-organizational and team-level variables in relation to delays and cost overruns. Given that complex projects involve a wide range of stakeholders beyond these internal groups, other contextual factors—such as stakeholder conflict—may exert a significant, and possibly greater, influence on project performance, warranting further investigation (Bjorvatn & Wald, 2018; Wu et al., 2019).

Complex projects have multiple departments, diverse teams and various external stakeholders that operate simultaneously whereas the changing project expectations of these diverse stakeholders and their contradicting point of views causes conflict that additionally decrease the chances of project management success (Bjorvatn & Wald, 2018; Tian et al., 2025). In their extensive SLR of stakeholder management in projects, Mashali (2023) highlights the importance of managing conflict between stakeholders of diverse projects and making sure their satisfaction, and deems it a crucial factor in project management that needs to be validated further. Moreover, Wu et al., (2019) suggested to explore the potential effect of different nature of conflicts in diverse project environments (i-e stakeholder conflict) on project performance. Secondly, existing research probes the future researchers to study the mediating effects of conflicts on the relationship between

diverse teams and performance, specifically in large scale development projects (Guo et al., 2025; Wu et al., (2019). Additionally, the importance of stakeholder satisfaction in regard to project performance is agreed upon Hedborg et al., (2020), However, Mashali (2023) states that satisfaction in stakeholder and organizational perspective is characteristically unclear is a very subjective concept, due to which its measurement is very erratic and inconsistent even though it has been used in arbitrating project performance over the years. Therefore, there exists a need to effectively study impact of stakeholder's satisfaction in different natured projects (Guo et al., 2025; Hedborg et al., 2020; Mashali et al., 2023).

This research explores the effect of project complexity on performance results—cost and schedule—under the setting of large-scale development projects in Pakistan, filling a critical knowledge gap in project management literature (Mashali et al., 2023). It explores the role of stakeholder management, suggesting stakeholder conflict as a mediator and stakeholder satisfaction as a moderator of the complexity–performance relationship. By situating these dynamics within Pakistani projects, the research adds useful contributions to both practice and theory. The results provide project managers, especially in the development sector, with practical advice on how to manage complexity and stakeholder issues to improve project performance.

Literature Review

Project Complexity and Project Performance

Existing studies (Azmat & Siddiqui, 2023; Zhang et al., 2022;) have indicated a negative relationship between project complexity and performance. Majeed et al. (2023) validated this relationship for complex projects using dimensions such as technological, task, information, environmental, goal, and organizational complexity. The findings confirmed an inverse relationship where information and goal complexity had the strongest negative impact on project performance.

Ishtiaq et al. (2023) examined the impact of environmental factors and project complexity on project success in Pakistani context. They analyzed six factors, six elements, and four components of environmental complexity, project complexity, and project success, respectively. The complexity factors identified were task diversity, hierarchical levels within the organizational structure, the impact of external stakeholders, complexity in contractual relationships, interdependent schedules, and uncertainty in project management tools and methods. Hypotheses were formulated to test the impact of project complexity on project success, and the findings confirmed a direct negative relationship.

In order to further substantiate the hypotheses of project complexity and performance, multiple pertinent studies were examined. Azmat and Siddiqui (2023) established that project performance worsens with an increase in complexity. Zhang et al. (2022) also determined organizational and technical complexity as key drivers of decreased performance. Van Tam et al. (2023) emphasized the role of project novelty and technological attributes in influencing performance. But they also added that embracing complexity management measures like uncertainty reduction can result in better project performance.

As has been uncovered in multiple studies and given the overall findings, project complexity and the overall success of the project is inversely related (Majeed et al., 2023; Zheng et al., 2023). Within the literature, this construct was heavily focused on and studied since it is extremely crucial

in the sense of time and cost overruns of megaprojects (Qazi et al., 2016). Project uncertainty or complexity results in additional cost and considerably affects project performance if not initially handled at the project life cycle stages of the project team (Jia et al., 2023; Shi et al., 2022). Likewise, complexity of the project is one of the key characteristics determining the cost and schedule performance at the delivery selection of the project (Azmat & Siddiqui, 2023). The cause of failure of projects is because of the primary reason that is increasing complexity, proposed by Ayat et al., (2023). Additionally, Khalilzadeh et al., (2023) posited that performance improvement of less complex projects can be caused by difficult goals. Therefore, based on these instances from existing research, this study proposes the following hypothesis.

H1: Project Complexity negatively impacts project performance.

Mediating Impact of Stakeholder Conflicts among Project Complexity & Performance

Conflict has been defined as a condition of competition between two or more entities with both of them aware of it (Boulding, 2018). Interaction of various project teams within a project and outside stakeholders may lead to differences thus arise task conflicts which can cause harm to the performance of a project (Freeman & Phillips, 2002).

In development projects, individuals from different disciplines collaborate to constitute temporary project teams such as donors, implementation partners, contractors, subcontractors, designers, and consultants—each with unique knowledge, ability, culture, and professional experience (Wu et al., 2017). Even though the diversity tends to generate task-related conflicts with a positive influence on project performance, it can result in relationship conflicts that delay progress (Wu et al., 2019). Recurring conflicts among stakeholders tend to lead to project delays or failure. Proper management of stakeholders is thus necessary in order to complete projects on schedule and without disruptions (Yang et al., 2015). This is even more important for public sector projects, where stakeholders expect integrity, accountability, and transparency in procurement and implementation (Liu et al., 2016).

In complex development projects, the chances of success of project management decrease due to interdisciplinary teams, frequently evolving and variety of project objectives, and clash in the interests of stakeholders (Bjorvatn & Wald, 2018). Likewise, Shi et al. (2022), in their comprehensive systematic review of megaproject management, highlight that conflict management among stakeholders is extremely important and view it as a basic building block of project management. Freeman and Phillips (2002) emphasize that project managers must anticipate possible stakeholder conflicts and align their management strategies that are fitting in given context and enhance project outcomes.

Significance of stakeholder management process in the projects was underscored in the Freeman theory of Stakeholder (1984) and remains under research and implementation. The current study opts to investigate the Freeman's stakeholder management process, specifically highlighting the conflicts and satisfaction elements of stakeholders in complex projects. Timely and effective resolution of conflicts among stakeholders reduces the direct operational cost associated with stakeholder resistance. Besides, effective stakeholder management substantially downgrades the project risks, litigation, disputes, and uncertainties in both direct and indirect ways (Jia et al., 2023). Existing research (Shi et al., 2022), also emphasize that complex projects must be evaluated more thoroughly, especially those with diverse stakeholders and excessive uncertainty levels, in order to gain a clearer insight into the underlying processes.

In addition to this, from the project performance point of view, typical measures of project performance can be divided into three dimensions; i.e., overall project performance in terms of cost, time and quality, realization of project goals and stakeholders' satisfaction (Osuizugbo & Okuntade, 2020). Previously, Bakhshi et al. (2016) have emphasized how structural complexity in projects negatively affect performance. In a similar manner, Bjorvatn & Wald. (2018), ascertain that in complex projects involving professional and demographic diversity among team members, structural complexity further intensifies the need for information processing and clear coordination. This added complexity, if not managed properly, can impede the formation of shared norms, raise the likelihood of coordination failure, and undermine trust—ultimately weakening the effectiveness of project management processes. Wu et al. (2019) point out the significance of stakeholder conflict and its impact on project performance, indicating an inverse relationship between the two. They suggest that future studies should take into account the nature of the project environment and context when investigating such conflicts.

Therefore, to conclude, existing research recognizes stakeholder conflict and its impact on project success (Hedborg et al., 2020) and emphasizes the contribution of managing stakeholder expectations towards shaping project performance (Olanipekun et al., 2018). In complex projects, varied definitions of success by diverse stakeholders can derail performance. Shi et al. (2022) highlights stakeholder satisfaction, while Hedborg et al. (2020) prioritize conflict management essential for project management. Even though existing literature identifies the importance of stakeholder conflict management and conflict has been utilized as a moderating variable by some models like Liang et al. (2012), there is yet no direct research regarding its influence on the relationship between complexity and performance, particularly in development sector. Thus, drawing from available literature and filling the gap, this study suggests the following hypotheses.

H2: Project complexity give rise to stakeholder conflict.

H3: Stakeholder conflict negatively impacts project performance.

H4: Stakeholder conflict significantly mediates the relation between project complexity and project performance.

Moderating Effect of Stakeholder Satisfaction in Complex Projects

Stakeholder satisfaction is where the stakeholders have clear expectations of project outcome and believe that they are met at the final stage (Li et al., 2013; Freeman, 1984). The term has gained increasing popularity in recent years (Khalilzadeh et al., 2023; Mashali et al., 2023), particularly in developmental projects, where it is considered more significant than traditional success criteria such as time, cost, and quality (Hedborg et al., 2020). As development projects are designed to create broader societal value (Huijgens et al., 2017), different groups of stakeholders have the tendency to shape project implementation based on their respective expectations (Olanipekun et al., 2018). Liang et al. (2012) propose a six-factor index for stakeholder satisfaction measurement, focusing on the importance of communication, grievance redressal, and client focus with time, cost, and quality as secondary measures.

Based on the stakeholder theory (Freeman, 1984), the development project managers must coordinate, plan, arrange, and work efficiently to produce functional outcomes and coordinate timely and effectively with relevant stakeholders. Stakeholder management can be viewed as satisfaction with the organization as well as associated stakeholders (Li et al., 2013). Although literature varies in what project success refers to, the stakeholder satisfaction is generally

considered a success factor, even when the project fails to meet the traditional factors criteria such as scope, time and cost, it may still be considered successful if the stakeholders are satisfied with it (Mashali et al., 2023). For example, the Sydney Opera House and Thames Barrier took too much time and cost for the completion but at the end the project is considered successful by the stakeholders because they get the outcome of the project. Therefore, completion of project depends more on the customer's satisfaction (Khalilzadeh et al., 2023; Shi et al., 2022). In contrast, various stakeholders got dissatisfied with the set-up deficiencies in Heathrow termina (Osuizugbo & Okuntade, 2020) project although the time, cost and quality requirements were set as mark (Jia et al., 2023; Wu et al., 2017).

Collectively, stakeholder satisfaction is therefore identified as an essential determinant of overall project success or failure. In earlier research (Hedborg et al., 2020; Wu et al., 2017) stakeholder satisfaction is noted to play a significant role in determining the performance of development projects, which frequently are designed to benefit communities or the public. Yet, past studies have not specifically analyzed stakeholder satisfaction as a moderating variable together with conflict management within the stakeholder management process. With this limitation in mind, the present study suggests the following hypothesis.

H5: Stakeholder satisfaction will positively moderate the effect of stakeholder conflict on project performance.

Research Model

Based upon the above-described literature review of all constructs and their proposed relationship with each other, the research model with the hypotheses is given in the figure below:

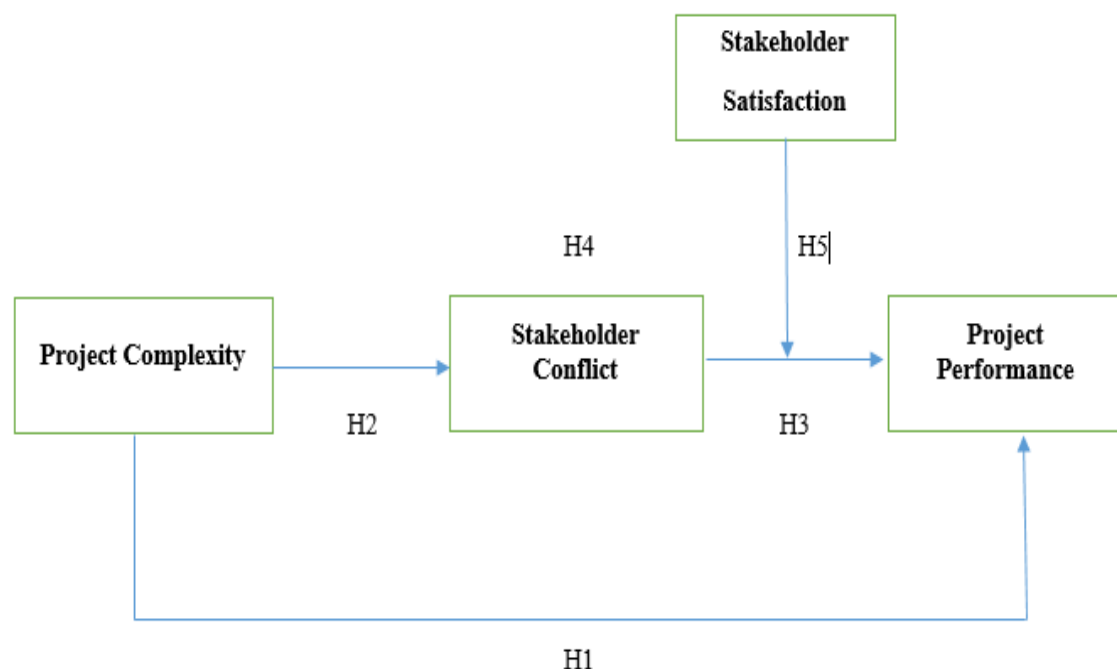


Figure-1: Research Framework

Research Methodology

Data Collection

The current study involves a type of causal investigation since the constructs of the conceptual model have causal relationships (Elias, 2011). The research focuses on capturing responses from project team members within Pakistan's development sector, representing a diverse range of roles, including project managers, team leads, team members, and contractors among other roles. A total of 381 valid responses were collected, which aligns with Roscoe et al. (1975) guideline that a sample size of 30-500 is appropriate for unknown populations. Convenience sampling was employed to ensure accessibility and practicality in data collection.

Measures

All study variables were measured using standardized scales adapted for this research context. A 5-point Likert scale was employed, with responses ranging from 1 (strongly disagree) to 5 (strongly agree). The specific measures included: Project Complexity (PC): Adapted from a unidimensional scale developed by (Bjorvatn & Wald, 2018). Stakeholder Conflict (SC): Measured using a multidimensional scale capturing relationship, process, and task conflict. Stakeholder Satisfaction (SS): Adapted from the work of (Huijgens et al., 2017), focusing on satisfaction with project outcomes and financial performance. Project Performance (PP): Focused on budget and schedule performance, using a scale developed by Bjorvatn and Wald (2018).

Data Analysis

Descriptive statistics were used to understand the demographic distribution and general characteristics of the sample. The structural model was assessed using Partial Least Squares Structural Equation Modeling (PLS-SEM). Model reliability and validity were established through Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). Hypothesis testing was conducted using the bootstrapping technique, ensuring robust results.

Data Analysis & Results

Descriptive Statistics

The sample consisted of 58.6% male respondents and 41.4% female respondents. Most participants (51.1%) were aged between 20 and 30 years, followed by 34.5% aged between 30 and 40 years. A smaller proportion (14.4%) fell within the 40-50 years age range. Regarding experience, 47% reported 1-5 years of experience, 21.8% reported 5-10 years, and 22.2% had less than 1 year of experience. Only 7.8% of participants reported over 10 years of experience in the sector.

Measurement Model

The outer loadings for the measurement model ranged from 0.596 to 0.922. One item with a slightly lower factor loading of 0.596 was retained as it fell near the acceptable threshold. Composite reliability (CR) values ranged from 0.833 to 0.936, exceeding the threshold of 0.7 (Hair et al., 2014). Cronbach's alpha values were above 0.8, indicating high reliability. Average variance extracted (AVE) values ranged from 0.514 to 0.676, meeting the criterion of 0.5. Discriminant validity was assessed using the Heterotrait-Monotrait (HTMT) ratio, with all values below the threshold of 0.9, confirming the absence of collinearity issues.

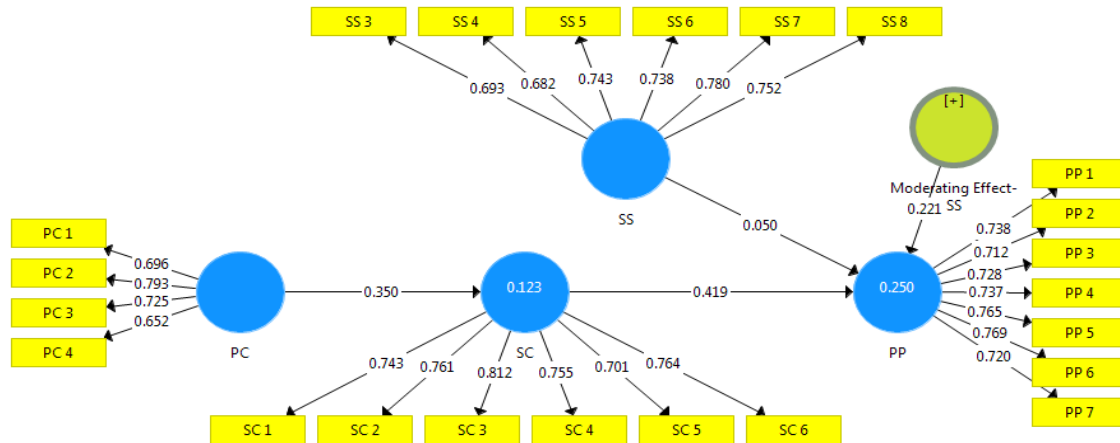


Figure-2: Measurement Model with Outer Loadings

Structural Model

Hypothesis testing was conducted using a bootstrapping algorithm. The initial run of the PLS algorithm resulted in model adjustments, which were subsequently used in bootstrapping. Key findings include: **H1**: Project complexity significantly and negatively impacts project performance ($\beta = -0.423$, $p < 0.001$). **H2**: Project complexity positively influences stakeholder conflict ($\beta = 0.378$, $p < 0.01$). **H3**: Stakeholder conflict negatively impacts project performance ($\beta = -0.346$, $p < 0.01$). **H4**: Stakeholder conflict mediates the relationship between project complexity and project performance ($\beta = -0.132$, $p < 0.05$). **H5**: Stakeholder satisfaction does not significantly moderate the relationship between stakeholder conflict and project performance ($\beta = 0.211$, $p > 0.05$).

Table-1: Reliability Analysis of Constructs

Variable	Items	Outer Loadings	CR	Cronbach's Alpha
Project Complexity	PC1	0.696	0.809	0.698
	PC2	0.793		
	PC3	0.725		
	PC4	0.652		
Project Performance	PP 1	0.738	0.894	0.862
	PP 2	0.712		
	PP 3	0.728		
	PP 4	0.737		
	PP 5	0.765		
	PP 6	0.769		
	PP 7	0.720		
Stakeholder Conflict	SC 1	0.743	0.889	0.850
	SC 2	0.761		
	SC 3	0.812		
	SC 4	0.755		
	SC 5	0.701		
	SC 6	0.764		

Stakeholder Satisfaction	SS 3	0.693	0.874	0.829
	SS 4	0.682		
	SS 5	0.743		
	SS 6	0.738		
	SS 7	0.780		
	SS 8	0.752		

Table 2: Discriminant validity using HTMT ratio

	PC	PP	SC	SS
PC				
PP	0.381			
SC	0.446	0.514		
SS	0.096	0.108	0.110	

Table-3: Direct Relationships Results

	Original Sample	T Statistics	P Values
PC -> SC	0.350	7.998	0.000
PC -> PP	0.182	3.285	0.001
SC -> PP	0.378	8.763	0.000

Table-4: Total Indirect Effect

	Original Sample	T Statistics	P Values
PC -> PP	0.132	4.777	0.000

Table-5: Specific Indirect Effects

	Original Sample	T Statistics	P Values
PC -> SC -> PP	0.132	4.777	0.000

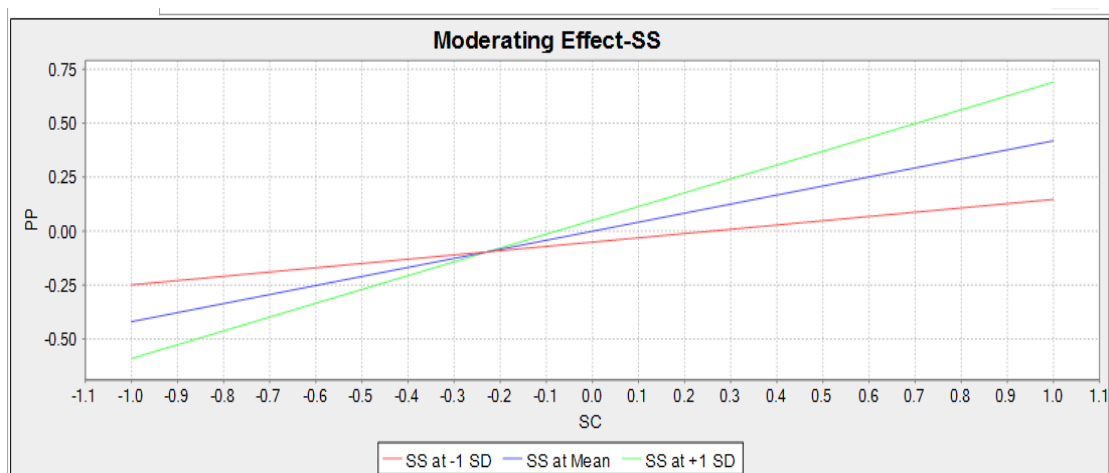


Figure-3: Moderating Effect

Discussion

This study offers essential insights into the relationship among project complexity, stakeholder conflict, and performance outcomes in the development sector. The complexity of a project, defined by intricate interdependencies, technical obstacles, and varied stakeholder interests, significantly influences project performance. These results are consistent with earlier findings (Bjorvatn & Wald, 2018; Wu et al., 2019) by demonstrating that complex projects are prone to cost overruns and schedule delays owing to the intrinsic uncertainties and risks linked with these projects. This study primarily contributes to existing research body by emphasizing the mediation of stakeholder conflict. Conflicts among stakeholders, whether task-related (e.g., divergent objectives), process-oriented (e.g., disputes over techniques), or relational (e.g., interpersonal misunderstandings), exacerbate the difficulties associated with project complexity. This conclusion aligns with the work of Ayat et al., (2023) and stakeholder theory of Freeman (1984), which highlighted the significance of managing stakeholder relationships to improve project outcomes. The findings emphasize that unresolved disagreements intensify delays and inefficiencies, highlighting the essential requirement for conflict resolution solutions.

Effective conflict management strategies, such as fostering regular and transparent communication, promoting stakeholder alignment through workshops, and using conflict mediation tools, can help reduce the adverse effects of conflicts. Project managers are encouraged to adopt a proactive approach by identifying potential conflicts during the planning phase and addressing them through participatory decision-making processes. Interestingly, the hypothesized moderating role of stakeholder satisfaction on the relationship between stakeholder conflict and project performance was not supported. This suggests that while stakeholder satisfaction is important, it does not significantly alter the adverse effects of conflicts on performance outcomes in this context. This finding opens avenues for future research to explore alternative moderating variables, such as leadership styles or organizational culture, which may better explain the variations in performance outcomes.

From a practical perspective, the findings of this study have significant implications for project managers and practitioners in the development sector. Addressing project complexity requires a multifaceted approach, including thorough risk assessment, detailed project planning, and stakeholder management strategies. Incorporating advanced tools for complexity analysis and stakeholder mapping can help managers better understand and mitigate potential risks. Additionally, fostering a culture of collaboration among stakeholders is crucial. Projects that involve diverse stakeholders often face challenges in aligning objectives and expectations. Managers should prioritize building trust and fostering open communication to create a cohesive team environment. This can be achieved through regular stakeholder meetings, conflict resolution training, and implementing systems for transparent decision-making. The interconnected nature of project complexity, stakeholder conflict, and performance underscores the need for a holistic approach to project management. This approach should integrate technical expertise with interpersonal skills to navigate the complexities of modern development projects effectively. By focusing on both technical and relational aspects, managers can enhance project outcomes and drive overall success.

Lastly, this study calls for further research to explore the dynamic interactions between complexity, conflict, and satisfaction across different sectors and cultural contexts. Expanding this framework to include additional variables, such as trust or leadership effectiveness, could provide deeper insights into achieving optimal project performance in complex environments.

Conclusion

This paper presents stakeholder management (conflict and satisfaction) model to examine role of complexity on the performance and has corroborated both constructive and destructive nature of conflicts. Both destructive and constructive effects of complexity were established but it was seen that complexity was destructive to performance more than it was constructive. It is quite typical for inequality in development projects. While the owners take the main parts, the contractors are in secondary positions. The same can be said of the relationship between a contractor and a subcontractor. Interests of the teams working on development projects may clash during the course of fulfilling a project and thus, the project managers have to manage such conflicts. However, project teams require to improve on the working relations and build trust. When the project is being developed, there are relationships between the project teams and therefore if trust develops, the interpersonal will also enhances. Hence, project teams need to be more proactive in managing task conflict and process conflict if these two types of conflict are not to turn into relationship conflict.

Limitations and Future Research Directions

Future researchers can focus on exploring these other dimensions of stakeholder management process or could solely concentrate on the complete stakeholder management process with respect to complexity and project performance. This will add new findings to the stakeholder theory literature. Secondly, we considered stakeholder satisfaction as a moderator variable in this framework, while the result didn't present it as a significant factor it was interesting to see the subjective nature of the concept of satisfaction among stakeholders. Future researches can investigate the satisfaction perception in different stakeholders in contextual way to give better understanding of the concept. The cultural and situational context should be assessed that whether it will affect the stakeholder management process and project performance in the organizations or not.

Additionally, this research was focused on exploring complexity in development sector of Pakistan. Complex projects from other sectors especially technologically advance projects from Informational Technology sector, Telecom sector, applied medical, can be taken as the future area of the research with the same research framework.

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