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THE MODERATING EFFECT OF MANAGER POLITICAL SKILLS ON THE RELATIONSHIP BETWEEN QUALITY MANAGEMENT PRACTICES AND THE INTER-ORGANIZATIONAL PROJECT SUCCESS

Ahsan Hussain KHAN

Master's Thesis

Supervisor

Assoc. Prof. Dr. Sepanta NAİMİ

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Ahsan Hussain KHAN

Signature

DEDICATION

To my family…

ABSTRACT

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This study aims to explore the impact of construction managers' political skills on the relationship between quality management practices and the success of inter-organizational construction projects in Pakistan. Objectively, it examines how project managers' political acumen influences the effectiveness of quality management strategies and, consequently, project success. Employing a survey-based methodology, the research encompasses a broad spectrum of professionals involved in various construction projects across Pakistan. Through this analysis, the study identifies key challenges to project success and assesses the correlation between managerial political skills and the effective implementation of quality management practices. The findings reveal a notable positive relationship between these elements, highlighting the critical role of skills such as communication, stakeholder management, and conflict resolution. Additionally, the research underscores the interconnected nature of managerial competencies and identifies key factors impacting project success through advanced statistical techniques like principal component analysis and median absolute deviation. Significantly, this research provides novel insights into the role of human factors in the Pakistani construction industry's project management, proposing actionable strategies for skill enhancement and offering a comprehensive overview of factors influencing project success. These findings not only show the current skills and practices

landscape but also lay the groundwork for future research and strategy implementation to boost industry-wide success.

Keywords: Construction Project Management; Managerial Skills; Quality Management Practices; Inter-Organizational Collaboration; Pakistani Construction Industry.

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1. INTRODUCTION

1.1 GENERAL INTRODUCTION

The construction industry, a critical sector of the global economy, encounters a myriad of challenges, particularly evident in inter-organizational projects. These projects are complex due to the involvement of multiple stakeholders, varying objectives, and diverse operational environments (Ruan, 2007; Braun & Sydow, 2019; Qian et al., 2019). The success of such projects is not merely contingent on efficient quality management practices but also significantly hinges on the nuanced role of project managers, especially in their political acumen (Lu, Zhang, & Rowlinson, 2013; Sedita & Apa, 2015; Wu, Zhao, & Zuo, 2017; Celikag and Naimi, 2011). Political skills in project management encompass the ability to navigate complex social networks, influence stakeholders, negotiate effectively, and achieve consensus among diverse groups, thus ensuring project alignment and success. In the context of Pakistan's construction sector, these aspects become even more pertinent. Pakistan's construction industry, while rapidly growing, is often confronted with unique challenges due to its cultural, economic, and political landscape (Saqib, Farooqui, & Lodi, 2008; Ejaz et al., 2013; Sheikh et al., 2019). This environment requires a distinct set of managerial skills and approaches. In general, the Pakistani construction industry, characterized by its diversity in terms of project scope, stakeholder complexity, and regional variations, provides a fertile ground for exploring how political skills of project managers can shape project outcomes (Sohu et al., 2018). This setting offers a unique opportunity to study the impact of soft skills, such as political acumen, in managing complex construction projects. The importance of managerial competencies in navigating these complexities is well documented. Studies by Ahmed, Hussain, & Philbin (2022) and Choudhry & Zahoor (2016) have highlighted various facets of project management in the context of Pakistani construction projects. These studies underline the crucial role of managerial competencies, such as leadership, communication, and strategic thinking, in managing the complexities inherent in construction projects. Building upon such foundational work, this research aims to add a new dimension by focusing specifically on the political skills of project managers. These skills, often underplayed in the technically dominated construction sector, are crucial for the successful navigation of the intricate web of stakeholder relationships and organizational dynamics (Xie, Wang, & Zeng, 2018; Wang, Fu, & Fang, 2019a; 2019b; Khaleel and Naimi, 2022). The ability of project managers to tactfully manage and influence diverse groups, negotiate

conflicts, and foster collaborative environments is vital for project success (Wu, Weng, Shen, & Tang, 2021; Saukko, Aaltonen, & Haapasalo, 2020). This aspect is supported by studies like those of Braun & Sydow (2019), who emphasize the importance of inter-organizational relationships in project management. The research by Badi & Diamantidou (2017) and Lu, Cai, Wei, Song, & Wu (2019) further sheds light on the social and relational aspects that significantly impact project outcomes. These studies collectively underscore the need for project managers to possess advanced political skills that go beyond traditional project management competencies. The Pakistani construction industry, with its unique cultural and operational characteristics, presents specific challenges and opportunities in this regard. The studies by Ejaz et al. (2011; 2013) and Haseeb, Bibi, & Rabbani (2011) provide insights into the local industry's nuances, highlighting the need for tailored managerial approaches that consider cultural sensitivities and local business practices. This research extends these findings by focusing on the role of political skills, an area that has received limited attention in the context of the Pakistani construction sector. The methodology of this study, rooted in a survey-based approach targeting professionals across various construction projects in Pakistan, is designed to unravel the complex interplay between project managers' political skills, quality management practices, and project success. This approach aligns with the work of scholars like Laan, Voordijk, Noorderhaven, & Dewulf (2012) and Loosemore & Lim (2015), who have utilized similar methodologies to explore inter-organizational dynamics in the construction industry. By adopting a survey-based approach, this study seeks to gather empirical data that can provide insights into the real-world implications of political skills in project management. Moreover, this research is set against the backdrop of a global construction landscape that is increasingly recognizing the importance of human factors in project management. The works of Gambatese & Hallowell (2011) and Gluch, Gustafsson, & Thuvander (2009) underscore the significance of innovative approaches and human-centric strategies in construction management.

1.2 RESEARCH MOTIVATION

The motivation for this research stems from the recognition that political acumen is a critical yet often underexplored aspect of project management in the construction sector, particularly in the context of Pakistan. Existing literature, such as the works of Ahmed et al. and Choudhry & Zahoor, predominantly focuses on traditional managerial competencies such as leadership and communication, overlooking the intricate role of political skills. Considering

the unique challenges posed by Pakistan's diverse project scope, stakeholder complexity, and regional variations, this study is motivated by the need to explore how project managers' political skills shape project outcomes in such a dynamic setting. This research is further driven by the gap in existing literature regarding the specific role of political skills in the Pakistani construction industry. The studies by Ejaz et al. and Haseeb et al. provide insights into the local industry's peculiarities, yet there is a lacuna in understanding how these peculiarities influence the application and effectiveness of political skills. Therefore, this research aims to fill this gap by elucidating the nuanced role of political acumen in managing complex construction projects in Pakistan.

1.3 RESEARCH QUESTION

This research seeks to explore the pivotal role of political skills in project management within Pakistan's construction industry. The core question driving this study is: "How do the political skills of project managers influence the success of inter-organizational construction projects in Pakistan?" This inquiry delves into understanding the extent to which these skills, encompassing the ability to navigate complex social networks, influence stakeholders, negotiate effectively, and achieve consensus, impact project alignment and success. Given the unique cultural, economic, and political context of Pakistan, this research investigates how these factors contribute to the nuanced application of political skills in construction project management. Additionally, the study aims to identify which specific political skills are most critical in this sector, and how they interact with quality management practices to determine project outcomes. This question is significant in highlighting the balance between technical and soft skills in project management, a crucial aspect in the dynamically evolving construction industry, especially in a complex environment like Pakistan.

1.4 AIM OF THE RESEARCH

The primary aim of this research is to comprehensively analyze the impact of project managers' political skills on the success of construction projects in Pakistan. This involves examining how these skills influence the management of diverse stakeholder groups, negotiation of conflicts, and fostering of collaborative environments, ultimately leading to project alignment and success. The study seeks to identify specific political skills that are crucial in the Pakistani construction context and to understand how they integrate with quality management practices. Additionally, the research aims to propose a set of best

practices for project managers to cultivate these skills effectively. By achieving these objectives, this study will contribute significantly to the academic discourse on project management, specifically in the context of the evolving construction industry in Pakistan. It will provide both theoretical insights and practical guidelines, enhancing the understanding of the critical role of soft skills in project management. Furthermore, the findings are expected to have broader implications, offering insights applicable in other regions and sectors, thereby enriching the global knowledge base on project management in complex and culturally diverse environments.

1.5 OUTLINE OF THE THESIS

The thesis begins with an Introduction, presenting a general overview and specific context of Pakistan's construction industry. Following this, the Literature Review chapter analyzes existing research on project management competencies. The Research Strategy section details the methodological framework, including survey methods and target audience. The Survey Analysis chapter offers a comprehensive evaluation of the data, incorporating reliability assessments and statistical methods. Influential Factors and Grouping of Factors Using K-Means Clustering chapters identify and categorize key elements impacting project management. The Findings and Discussions chapter synthesizes these insights, leading to the Conclusions which summarize the research and its implications. The thesis culminates with a detailed References section.

2. LITERATURE REVIEW

2.1 OVERVIEW OF GLOBAL CONSTRUCTION INDUSTRY CHALLENGES

The construction industry, as a critical component of the global economy, faces a myriad of challenges that are particularly evident in inter-organizational projects. These projects are characterized by their complexity due to the involvement of multiple stakeholders, varying objectives, and diverse operational environments, as highlighted in the seminal works of Ahmed, Hussain, and Philbin (2022), and Ruan (2007). The intricate nature of these projects requires a nuanced understanding of project management, where success is not merely contingent on efficient quality management practices but also significantly hinges on the role of project managers, especially in their political acumen. Political skills in project management encompass the ability to navigate complex social networks, influence stakeholders, negotiate effectively, and achieve consensus among diverse groups. As Braun and Sydow (2019) articulate, these skills are essential for ensuring project alignment and success, particularly in the context of selecting organizational partners for interorganizational projects. The dynamic environment of the construction industry necessitates a blend of technical expertise and soft skills, where the latter often plays a pivotal role in the successful execution and completion of projects. In the specific context of the construction industry, the role of project managers becomes even more critical. As Ghorbani (2023) notes, the competencies and leadership profile of construction project managers directly influence the project's success. This is supported by the findings of Badi and Diamantidou (2017), who emphasize the importance of a social network perspective in managing construction projects. They argue that the ability to manage relationships and effectively communicate within these networks is crucial for the success of construction projects. Moreover, the construction industry's reliance on inter-organizational collaboration and knowledge sharing is well-documented. Lu, Zhang, and Rowlinson (2013) point out the significance of inter-organizational collaboration in the success of construction project BIM implementation. Similarly, Xie, Wang, and Zeng (2018) highlight the role of inter-organizational knowledge acquisition in fostering innovation within firms. These studies collectively underscore the need for project managers to possess advanced political skills that go beyond traditional project management competencies. Further complicating the

landscape of construction project management is the issue of inter-organizational trust and conflicts. Laan et al. (2012) provide empirical evidence on the levels of interorganizational trust in construction projects, emphasizing its importance for project success. Concurrently, Wu, Zhao, and Zuo (2017) discuss the effects of inter-organizational conflicts on construction project added value in China, illustrating the detrimental impact that such conflicts can have on project outcomes. The construction industry's evolving nature also demands innovative approaches and human-centric strategies. Gambatese and Hallowell (2011) and Gluch, Gustafsson, and Thuvander (2009) underscore the significance of innovation and absorptive capacity for green performance in the construction industry. These studies highlight the evolving nature of the construction industry, where technical skills are no longer sufficient, and the ability to manage people and relationships is becoming increasingly critical. Moreover, the construction industry's project management practices vary between public and private sectors, as evidenced by Blaskovics et al. (2023). Their research points out the differences in project management practices from a competency point of view, indicating the diverse requirements and approaches needed in different sectors of the construction industry. The impact of senior management support and collaborative teamwork on project performance cannot be overlooked, as Zureehan and Lee (2022) point out. Their study on the Malaysian construction industry shows how top management support and collaborative teams, moderated by trust, significantly affect project performance. This indicates the multifaceted nature of project management in the construction industry, where various factors interplay to determine the success of projects. Accordingly, the construction industry, with its inherent complexities and diverse operational environments, requires project managers to possess a wide range of skills, including but not limited to political acumen. The ability to effectively manage inter-organizational relationships, navigate complex social networks, and influence stakeholders is crucial for the successful alignment and completion of construction projects. The existing literature, ranging from the importance of inter-organizational collaboration to the role of senior management support, provides a comprehensive understanding of the multifaceted nature of project management in the construction industry. As the sector continues to evolve, the emphasis on political skills and human-centric approaches will likely become even more pronounced, shaping the future landscape of construction project management. Expanding further, the global construction industry is also grappling with the challenges of adapting to rapid technological changes.

The integration of technologies such as Building Information Modeling (BIM), artificial intelligence, and the Internet of Things (IoT) into construction projects has revolutionized traditional practices but also introduced complexities in project management. These technological advancements necessitate project managers to not only be tech-savvy but also skilled in managing the transition and adoption of new technologies within their teams and among stakeholders. Environmental sustainability and adherence to green building standards present another layer of challenge in construction project management. The increasing focus on reducing carbon footprints and implementing sustainable building practices requires project managers to be knowledgeable in environmental regulations and adept at incorporating sustainable practices into their project planning and execution. This shift towards sustainability further emphasizes the need for political skills in negotiating and aligning the diverse interests of stakeholders towards environmentally responsible construction practices. Additionally, the construction industry is facing the challenge of a fluctuating global economy and varying regulatory landscapes. Economic fluctuations can impact funding, material costs, and labor availability, making it essential for project managers to be proficient in financial management and adaptive to changing economic conditions. The varying regulatory environments across different countries and regions also require project managers to be well-versed in local and international construction laws and regulations, adding another dimension to the political skills needed for successful project management.

2.2 POLITICAL SKILLS IN PROJECT MANAGEMENT

In the realm of project management within the construction industry, political skills emerge as a pivotal component, often overshadowed by the technical aspects of the field. These skills, encompassing the capacity to effectively navigate complex social networks, influence stakeholders, and achieve consensus, are fundamental to the success of construction projects, particularly in the intricate web of inter-organizational collaborations. The significance of these skills is underscored by their impact on project alignment and success, as demonstrated in a wide range of studies and industry practices. Ahmed, Hussain, and Philbin (2022) highlight the moderating effect of senior management support on the relationship between schedule delay factors and project performance, pointing towards the intricate dynamics of leadership and decision-making in project management. This underscores the importance of political acumen in navigating internal organizational hierarchies and external stakeholder

networks. Similarly, Badi and Diamantidou (2017) explore the role of building information modeling in Greek construction projects from a social network perspective, emphasizing the importance of political skills in managing technological integration and collaborative efforts across different organizational boundaries. Blaskovics et al. (2023) shed light on the differences between public and private sector project management practices, highlighting the varied competencies required in diverse settings. This variation further illustrates the need for political skills that are adaptable to different organizational cultures and project environments. Braun and Sydow (2019), in their exploration of selecting organizational partners for interorganizational projects, emphasize the dual but limited role of digital capabilities in the construction industry, thereby underscoring the need for human-centric skills such as political acumen in decision-making processes. Choudhry and Zahoor (2016) and Ejaz et al. (2011, 2013) delve into the specific context of the Pakistani construction industry, examining the strengths and weaknesses of safety practices and the critical success factors for construction projects. Their findings highlight the complex interplay of managerial competencies, including political skills, in navigating the unique challenges posed by the local industry's operational and cultural environment. Gambatese and Hallowell (2011) and Gluch, Gustafsson, and Thuvander (2009) explore the innovative approaches and green innovation performance in the construction industry, respectively. These studies illustrate the evolving landscape of the industry, where the integration of technological advancements and sustainable practices necessitates political skills for fostering collaboration, influencing stakeholders' perceptions, and aligning diverse objectives towards common goals. Ghorbani (2023) provides a comprehensive review of successful construction project managers' competencies and leadership profiles. This review encapsulates the essence of political skills as a critical component of a project manager's toolkit, essential for leading teams, negotiating contracts, and managing stakeholder expectations. The importance of inter-organizational collaboration is further exemplified in studies by Laan et al. (2012), Loosemore and Lim (2015), and Lu et al. (2013, 2019). These studies provide empirical evidence of the levels of interorganizational trust in construction projects, the challenges of inter-organizational unfairness, and the significance of collaboration in the success of construction project BIM implementation. They collectively underline the necessity of political skills in building and maintaining trust, resolving conflicts, and enhancing collaborative efforts for successful project outcomes. Nezami et al.

(2022) and Qian et al. (2019) delve into the realms of collaboration and data sharing in inter-organizational infrastructure construction projects and the influence of Guanxi on construction innovation in China. These studies highlight the role of interpersonal knowledge sharing and the impact of social and relational factors, further advocating for the essentiality of political skills in managing these complex dynamics. Ruan (2007) offers a unique perspective with their doctoral dissertation, focusing on inter-organizational knowledge integration in construction projects through a social network approach. This perspective aligns with the overarching theme of political skills as critical for the effective integration and utilization of knowledge across organizational boundaries. Saqib et al. (2008), Sheikh et al. (2019), and Sohu et al. (2018) contribute to the understanding of critical success factors and the evaluation of key factors influencing process quality in Pakistani construction projects. These insights into the local industry's challenges and success factors further reinforce the necessity of political skills in addressing and overcoming these obstacles. Silva, Pereira, and Magano (2023) and Jugdev, Müller, and Hutchinson (2023) offer a holistic view of the value of project management to competitiveness and the future trends in project management, respectively. These broader perspectives underscore the increasing relevance of political skills in the evolving landscape of project management, where competitiveness and future readiness are intertwined with the ability to navigate complex socio-political environments. Wang, Fu, and Fang (2019a, 2019b), Wu et al. (2017, 2021), Xie, Wang, and Zeng (2018), and Zureehan and Lee (2022) provide further evidence of the efficacy of trust in the governance of megaprojects, the effects of inter-organizational conflicts on project value, the interplay of boundary-spanning roles in communication, and the moderated mediation analysis of knowledge acquisition for innovation. These diverse studies collectively underscore the multifaceted nature of political skills in project management, highlighting their critical role in managing trust, conflict, communication, and innovation. Thus, the literature unequivocally demonstrates the centrality of political skills in the successful management of construction projects. These skills, transcending the traditional technical focus of the construction industry, play a crucial role in steering projects towards success amid the complexities of inter-organizational dynamics, cultural diversities, and evolving industry trends. The ability of project managers to adeptly wield these skills is thus indispensable in the contemporary landscape of construction project management. To further enhance this understanding, it is important to consider the growing impact of digital

transformation in the construction industry. The advent of digital tools and platforms has revolutionized the way construction projects are managed, introducing new dimensions to stakeholder engagement, communication, and collaboration. The effective use of these digital tools requires project managers to possess not only technical acumen but also the political skills to manage the change associated with digital adoption. Navigating the digital landscape involves understanding the implications of technology on stakeholder relationships, aligning project objectives with digital strategies, and managing the cultural shift towards a more tech-centric approach in construction. Additionally, the global nature of the construction industry, with projects spanning across different countries and cultures, places a premium on political skills that are adaptable to various cultural contexts. Project managers need to be culturally sensitive, understand the nuances of cross-cultural communication, and be adept at managing diverse teams. This global perspective further underscores the importance of political skills in ensuring successful project outcomes in an increasingly interconnected world.

2.3 UNIQUE CONTEXT AND MANAGERIAL COMPETENCIES IN THE PAKISTANI CONSTRUCTION INDUSTRY

Pakistan's construction industry, a vital component of the national economy, is undergoing significant transformation and expansion. This growth, however, is not without its challenges. The complexity of managing construction projects in Pakistan is amplified by the country's unique cultural, economic, and political landscape. This section explores the various managerial competencies required in the Pakistani construction sector, with a particular focus on the role of political skills in project management. The intricate nature of construction projects in Pakistan demands a multifaceted approach to project management. As noted by Ejaz et al. (2011), the assessment of delays and cost overruns is a pivotal concern. This issue is further complicated by the diverse project scopes, stakeholder complexities, and regional variations that characterize the Pakistani construction industry. The critical success factors for mega construction projects, as identified by Ejaz et al. (2013), include not only technical expertise but also soft skills such as leadership and communication. Ahmed, Hussain, and Philbin (2022) highlighted the moderating effect of senior management support on the relationship between schedule delay factors and project performance. Their findings underscore the significance of leadership and strategic guidance in navigating the challenges inherent in Pakistani construction projects. This is echoed in the

work of Sheikh et al. (2019), who evaluated key factors influencing process quality during construction projects in Pakistan, emphasizing the need for robust managerial competencies. Choudhry and Zahoor (2016) addressed the strengths and weaknesses of safety practices in improving safety performance in construction projects. Their study illustrates the complexity of ensuring safety in a dynamic and often unpredictable environment, further emphasizing the need for skilled management. The role of political skills in project management, particularly in the context of Pakistan, is gaining recognition. The ability to navigate complex social networks, influence stakeholders, and negotiate effectively is critical in a landscape marked by diverse operational environments. This necessity is underlined by studies like those of Badi and Diamantidou (2017), who examined the social network perspective of building information modeling in construction projects. Inter-organizational collaboration, a key aspect of construction projects, also highlights the importance of managerial competencies. As discussed by Lu, Zhang, and Rowlinson (2013), effective collaboration is essential for the success of construction project BIM implementation. This need for collaboration extends beyond technical capabilities to encompass the softer, interpersonal skills that are often the hallmark of successful project management. The challenges of managing public-sector versus private-sector construction projects, as explored by Blaskovics et al. (2023), further illustrate the diverse competencies required in different contexts within the Pakistani construction industry. These challenges are not unique to Pakistan but are reflective of broader trends in the global construction industry, as identified by Gambatese and Hallowell (2011) and Gluch, Gustafsson, and Thuvander (2009). The managerial competencies required in the Pakistani construction industry are multifaceted. As Ghorbani (2023) notes, a successful construction project manager must possess a comprehensive leadership profile, capable of addressing the unique challenges of the industry. This includes not only technical expertise but also the ability to manage people, foster collaboration, and navigate the complex web of relationships that are inherent in construction projects. In summary, the Pakistani construction industry, with its unique set of challenges and opportunities, requires a distinct set of managerial skills. The ability to integrate technical knowledge with political acumen and interpersonal skills is essential for the successful management of construction projects. The research within this sector continues to evolve, with an increasing focus on understanding the nuanced interplay between various managerial competencies and project success. Expanding further, the

Pakistani construction industry is also grappling with the challenges posed by rapid urbanization and the need for sustainable development. The growing urban population demands innovative construction solutions that are sustainable, affordable, and efficient. This requires project managers to not only be aware of the latest construction technologies and practices but also be skilled in implementing them in a way that aligns with the country's sustainability goals. Moreover, the evolving regulatory landscape in Pakistan, with new policies and standards being introduced in the construction sector, adds another layer of complexity. Project managers must stay abreast of these changes, understand their implications, and ensure compliance. This aspect of regulatory navigation is yet another area where political skills are vital, as it involves liaising with government bodies, interpreting policy changes, and adjusting project plans accordingly. In addition, the increasing focus on technological integration, such as the use of BIM, IoT, and other digital tools, is transforming the construction landscape in Pakistan. While these technologies offer numerous benefits in terms of efficiency and accuracy, they also require project managers to possess a certain level of technological proficiency and the ability to manage the digital transformation process. Furthermore, the socio-economic factors unique to Pakistan, such as varying income levels, diverse cultural practices, and regional disparities, play a significant role in construction project management. Understanding and effectively addressing these socio-economic dynamics are crucial for project managers, particularly in terms of stakeholder engagement, resource allocation, and project delivery.

2.4 INTEGRATION OF POLITICAL SKILLS AND QUALITY MANAGEMENT IN CONSTRUCTION PROJECTS

The integration of political skills and quality management practices in construction projects, particularly in the context of Pakistan, presents a nuanced and complex landscape that demands thorough exploration. Political skills in project management involve the ability to navigate complex social networks, influence stakeholders, negotiate effectively, and achieve consensus among diverse groups. These skills are crucial for project alignment and success, ensuring smooth inter-organizational collaboration and effective management of diverse operational environments. In the realm of construction projects, quality management practices are fundamental to achieving project objectives and ensuring high standards. The integration of political skills with these practices is vital for overcoming challenges and achieving project success. Ahmed, Hussain, and Philbin (2022) emphasize the moderating

effect of senior management support on the relationship between schedule delay factors and project performance, highlighting the need for effective leadership and political acumen in navigating project challenges. Similarly, Badi and Diamantidou (2017) illustrate the importance of social networks in construction projects, suggesting that the ability to leverage these networks is key to the effective implementation of quality management practices. The Pakistani construction industry, characterized by its diversity in project scope and stakeholder complexity, requires a unique blend of political and managerial skills. Choudhry and Zahoor (2016) note the strengths and weaknesses of safety practices in Pakistan's construction projects, pointing out that managerial competencies must be complemented by political skills to enhance safety performance. Furthermore, Ejaz et al. (2011) highlight the challenges of delays and cost overruns in Pakistani construction projects, underscoring the need for project managers to possess robust political skills to navigate these challenges effectively. The integration of political skills with quality management is further complicated by the dynamic and evolving nature of the construction industry. Gambatese and Hallowell (2011) discuss the importance of innovation in the construction industry, which requires project managers to have not only technical knowledge but also the political savvy to manage change and foster innovation. Similarly, Gluch, Gustafsson, and Thuvander (2009) emphasize the need for an absorptive capacity model for green innovation in the construction industry, where political skills play a critical role in adopting and implementing new technologies and practices. In terms of governance mechanisms, Lu et al. (2019) explore the moderating effect of these mechanisms on the relationship between quality management practices and inter-organizational project performance. Their findings suggest that political skills are crucial in managing these mechanisms, aligning various stakeholders' interests, and ensuring project success. This perspective is echoed by Loosemore and Lim (2015), who discuss the inter-organizational unfairness in the construction industry, highlighting the need for political skills to manage and mitigate conflicts effectively. The role of political skills in managing the interface between different organizations is also critical. Wu et al. (2021) discuss the effects of boundary-spanning roles and interface management practices on inter-organizational communication in construction projects, indicating that political acumen is essential for managing these interfaces and ensuring smooth communication and collaboration. Furthermore, the impact of political skills on project performance cannot be overstated. Zureehan and Lee (2022) demonstrate the effect of top management support and

collaborative teams on project performance in the Malaysian construction industry, with trust acting as a moderating factor. This research suggests that political skills are vital in building trust and fostering collaboration, which are essential for successful project outcomes. The relationship between political skills and quality management practices in construction projects is further highlighted by the work of Wang, Fu, and Fang (2019a, 2019b). They explore the efficacy of trust in governing uncertainty and opportunism in megaprojects and the relationship between relational quality and megaproject success. These studies underscore the importance of political skills in managing relationships and ensuring project success, particularly in large and complex projects. Expanding on these insights, the integration of political skills and quality management practices in construction projects also plays a significant role in risk management. Political skills enable project managers to anticipate, identify, and mitigate risks that stem from complex stakeholder dynamics and uncertain environments. This proactive approach to risk management, combined with robust quality management practices, contributes to minimizing project delays, cost overruns, and quality issues. The use of technology, such as digital platforms and project management software, can enhance the synergy between political skills and quality management practices. These technologies facilitate better communication, data sharing, and collaboration among stakeholders, allowing project managers to leverage their political skills more effectively. For instance, using BIM technology can improve stakeholder engagement, provide clearer visualization of project outcomes, and streamline decision-making processes. Furthermore, this integration has a significant impact on stakeholder satisfaction. Political skills help in understanding and aligning stakeholder expectations with project goals, while quality management practices ensure that these expectations are met or exceeded. This alignment leads to higher stakeholder satisfaction, which is critical for the long-term success and reputation of construction firms. Finally, the integration of political skills with quality management practices is crucial for promoting sustainability in construction projects. Political acumen aids in advocating for sustainable practices, securing necessary approvals, and aligning stakeholder interests towards environmental goals. Quality management practices ensure that these sustainable approaches are implemented effectively, contributing to the construction industry's overall sustainability efforts.

3. RESEARCH STRATEGY

3.1 RESEARCH STRATEGY

As mentioned before, the success of projects relies significantly on the role of project managers, especially in their political acumen (Malek and Bhatt, 2023; Ghorbani, 2023; Silva et al., 2023; Jugdev et al., 2023). In this regard, the primary objective of this research is to explore the role of project managers' political skills in augmenting the effectiveness of quality management practices, subsequently impacting the success of inter-organizational construction projects in Pakistan. This aim emerges from a recognized gap in existing literature, where the specific influence of project managers' political acumen on project outcomes, particularly in the Pakistani construction industry, remains underexplored. In order to address this gap, the research adopts a comprehensive survey-based approach, targeting a wide spectrum of professionals involved in various construction projects across Pakistan. This strategy involves the development and distribution of a structured questionnaire designed to capture insights into the participants' perceptions of the role of political skills in project management. The questionnaire will be meticulously developed to include a range of questions that cover various aspects of political skills and quality management practices. These may include items on conflict resolution, stakeholder engagement, negotiation tactics, and decision-making processes. The questionnaire will also incorporate questions on quality management practices, focusing on areas such as process standardization, compliance with industry standards, and continuous improvement initiatives. The selection of participants will be a critical step in this research. The aim is to include a diverse group of professionals, such as project managers, architects, engineers, contractors, and clients involved in the construction industry. This diverse participant pool ensures a comprehensive understanding of the role of political skills from multiple perspectives within the industry. Upon collecting the survey responses, the data will be analyzed using advanced statistical methods. Techniques such as regression analysis, factor analysis, and correlation analysis will be employed to identify patterns and relationships between political skills, quality management practices, and project outcomes. Python, with its powerful libraries for data analysis, will be used to handle and analyze the data, facilitating an efficient and accurate assessment of the findings. Furthermore, to complement the quantitative data from the survey, the research may also involve qualitative methods such

as interviews or focus groups with select participants. This qualitative component can provide deeper insights into how political skills are applied in practice and how they interact with quality management in real-world scenarios. The integration of qualitative data will add depth to the findings, offering a more holistic view of the research subject. The final stage of the research will involve synthesizing the quantitative and qualitative findings to draw comprehensive conclusions. This synthesis will help in understanding the multifaceted role of political skills in construction project management and their interplay with quality management practices. The findings will be presented in a clear and structured manner, with the potential inclusion of charts, graphs, and other visual aids to enhance comprehension and dissemination. To ensure the research's contribution to both academic and professional fields, the results and insights gained will be prepared for publication in relevant academic journals and presented at industry conferences. Additionally, practical recommendations for project managers and construction firms will be developed, aimed at enhancing the application of political skills in project management.

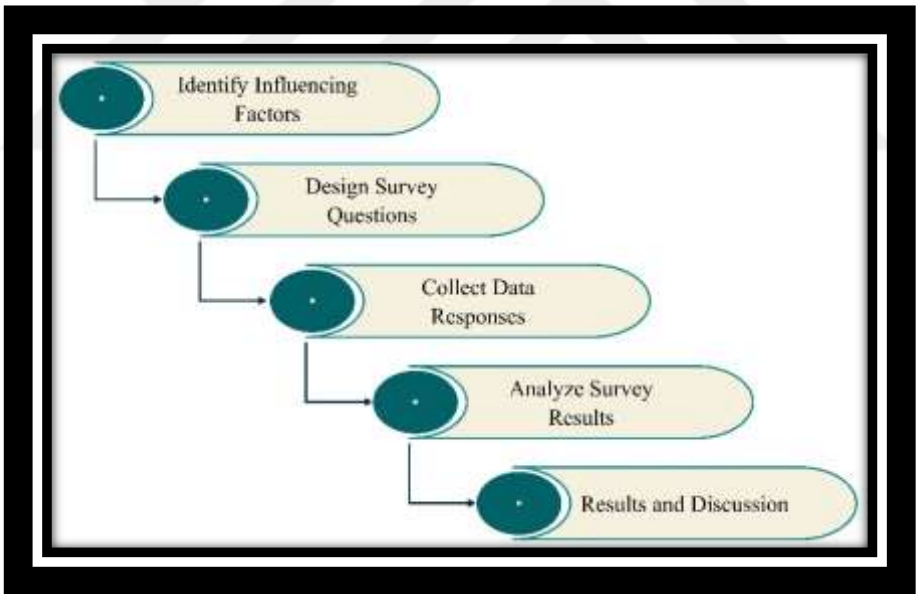

Figure 3.1: Research Methodology Flowchart

3.2 RATIONALE FOR SELECTING A SURVEY METHOD

The decision to utilize a survey method in this research is grounded in a comprehensive rationale that aligns with the study's objectives to explore the intricate dynamics of political skills of project managers in Pakistan's construction industry. Surveys, as a research tool, offer several advantages that make them particularly suited for this study. One of the primary

reasons for choosing a survey method is its ability to reach a broad and diverse participant base across various regions and sectors within the construction industry. This wide coverage is crucial in capturing a representative sample of opinions and experiences, enabling the research to encompass a range of perspectives that reflect the multifaceted nature of the construction sector in Pakistan. The ability to engage participants from different geographical locations, project types, and managerial levels ensures that the findings are not limited to a narrow scope but rather provide a holistic view of the industry. Another key advantage of surveys is their structured format, which allows for the collection of quantitative data that is both reliable and consistent. This structured mechanism ensures that each participant responds to the same set of questions, facilitating comparability and consistency in the data collected. Such standardization is essential in a study like this, where the aim is to understand patterns and trends across various dimensions of project management, including the role of political skills in influencing project outcomes. Furthermore, the survey method is particularly effective in exploring the relationship between quality management practices and project success, as influenced by managerial political skills. By employing a set of carefully designed questions, the survey can delve into specific areas such as conflict resolution, stakeholder management, and strategic planning, providing insights into how these skills are perceived and applied in the context of the Pakistani construction industry. This focus on specific competencies allows for a more detailed and nuanced understanding of the skills that are most critical for project success. Additionally, the flexibility and scalability of surveys make them an ideal choice for this research. Surveys can be easily adapted to cater to different respondent groups and can be scaled to include a large number of participants. This flexibility is particularly beneficial in a dynamic industry like construction, where professionals may have varying levels of experience and expertise. The ability to tailor the survey to different groups ensures that the research captures a comprehensive range of insights, encompassing the views of both seasoned professionals and those newer to the field. Moreover, the survey method allows for the analysis of patterns and correlations across different project settings and managerial roles. By collecting data on various aspects of project management and political skills, the survey can identify trends and relationships that might not be apparent through other research methods. For example, the survey can reveal how the importance of certain political skills may vary depending on project size, complexity, or the nature of stakeholder relationships.

Thus, the survey method offers a systematic and efficient way to gather valuable data that can inform the development of strategies and best practices in the construction industry. Its ability to provide detailed insights into the perceptions and experiences of a wide range of industry professionals makes it an invaluable tool in this research, enabling a deeper understanding of the critical role that political skills play in the management and success of construction projects in Pakistan.

3.3 TARGET AUDIENCE

The survey was distributed to a wide range of professionals within Pakistan's construction industry, aiming to capture a wide range of perspectives and experiences. In total, 228 individuals participated, providing a robust dataset for analysis. These participants represented a spectrum of roles, from on-site project managers and engineers to senior executives and quality assurance specialists, encompassing various levels of experience and responsibility. This demographic diversity ensured that the insights gained were reflective of the industry's multifaceted nature. The respondents varied in their tenure, with some having just a few years of experience, while others possessed many years of expertise, offering a rich understanding of the industry's evolution and current practices. Additionally, the survey captured data from professionals working on different types of construction projects, including residential, commercial, and infrastructure developments, further enriching the dataset. This strategic selection of the target audience was crucial in providing a comprehensive understanding of the connection between project managers' political skills, quality management practices, and project success in Pakistan's construction industry. Expanding further, the inclusion of a variety of professional roles in the survey was deliberate. The objective was to gather a holistic view of the construction process from inception to completion. By incorporating opinions from project initiation specialists, architects, and contractors, along with project managers and quality assurance experts, the survey aimed to understand how political skills impact each stage of a construction project. The choice to involve professionals with differing tenure in the industry was also significant. It allowed for the collection of data that reflects both historical and current industry trends, providing insights into how the role of political skills in project management may have evolved over time. This aspect of the research is particularly valuable in identifying long-term patterns and shifts in the industry. Moreover, the inclusion of participants from various types of construction projects was essential to ensure the generalizability of the research

findings. Different project types, such as residential, commercial, and infrastructure, come with their unique challenges and stakeholder dynamics. Understanding how political skills are applied and valued across these varied project contexts provides a more comprehensive picture of their significance in the industry. Furthermore, the survey targeted professionals from diverse geographical regions within Pakistan. This approach was aimed at capturing regional differences in construction practices, regulatory environments, and market dynamics. The insights from these varied regional perspectives are crucial for a nuanced understanding of the national construction landscape. The dataset's richness, resulting from this strategically diverse target audience, offers a comprehensive view of the interplay between political skills and quality management practices in the Pakistani construction industry. This diversity not only strengthens the reliability of the research findings but also enhances the applicability of the recommendations derived from the study.

3.4 SELECTED SURVEY QUESTIONS

The survey deployed in this research was meticulously designed to capture an all-encompassing understanding of the role of project managers' political skills in the construction industry. The questionnaire was formulated to delve into a wide array of themes pivotal to project management, with each question tailored to probe different facets of managerial competencies and their influence on the success of construction projects. The survey emphasized key areas such as communication skills, stakeholder management, and conflict resolution, reflecting the critical nature of interpersonal dynamics in effective project management. Questions related to these areas were intended to uncover the extent to which project managers are proficient in conveying project goals, balancing and understanding diverse stakeholder expectations, and resolving internal team conflicts. In addition to these core areas, the survey also addressed the integration of technology in project management. Questions were included to assess project managers' familiarity and competence with modern technologies like Building Information Modeling (BIM), digital communication platforms, and project management software. This focus aimed to understand how the integration of technology influences project outcomes and the role of political skills in facilitating or hindering this integration. Another significant aspect covered in the survey was the approach to sustainability and ethical practices in construction projects. Participants were asked about their strategies for implementing sustainable construction practices, adherence to ethical standards, and management of environmental impacts. This

line of questioning was crucial to gauge the importance placed on sustainability and ethics in the Pakistani construction industry and the role of project managers in upholding these values. The survey also delved into the impact of cultural and regional nuances on project management. Given the diverse cultural landscape of Pakistan, it was essential to understand how regional differences affect project management practices. Questions were designed to explore how project managers adapt their strategies to cater to different cultural contexts and regional requirements, and how these adaptations influence project success. Furthermore, the survey included questions on budgeting and quality management, probing into the project managers' capability to maintain high-quality standards amidst financial constraints. The survey sought to understand the balance between cost control and quality assurance, which is a critical aspect of successful project management. Additionally, the survey probed into the softer aspects of project management, such as team collaboration, leadership, and motivation. It assessed how project managers cultivate teamwork, inspire and motivate their teams, and lead by example. Strategic planning, resource management, and risk management abilities were also key areas explored. Questions in these areas aimed to ascertain how project managers anticipate future challenges, allocate resources efficiently, and mitigate risks proactively. Finally, the survey was structured to provide a panoramic view of the project manager's role in the construction industry, encompassing both hard and soft skills. It was strategically designed to generate insightful data on how these varied competencies, particularly political skills, impact the overall success of construction projects. By probing into these diverse areas, the survey offered a thorough investigation into the intricate workings of project management within the construction industry. This comprehensive approach to survey design ensured that the research captured a holistic picture of the project manager's role. It was not just about understanding the technical aspects of project management but also about exploring the human element, which plays a significant role in the success of construction projects. The survey aimed to shed light on the complex interplay between various managerial skills and how they collectively contribute to project outcomes. This understanding is vital for developing effective strategies and interventions to enhance project management practices in the construction industry, particularly in the context of Pakistan's unique operational and cultural landscape. Hence, the survey was a crucial instrument in this study, designed to explore a range of competencies and skills that are essential for effective project management in the construction industry. Its comprehensive

nature allowed for an in-depth analysis of the role of project managers, providing valuable insights into the factors that contribute to the success of construction projects. The findings from the survey are expected to have significant implications for both theory and practice in the field of construction project management.

4. SURVEY ANALYSIS

4.1 RELIABILITY ASSESSMENT

The evaluation of data reliability is a critical aspect of this research, as addressed in this section through the computation of Cronbach's alpha. This statistic, illustrated in Figure 1, serves as an essential tool for determining the internal consistency and reliability of the survey responses. By implementing Cronbach's alpha, the study ensures the robustness and dependability of its findings, anchoring them in statistically verified grounds. Cronbach's alpha, widely recognized as a fundamental measure of scale reliability, yielded a notable high value of 0.947 for the combined factors. This value is significant as it indicates a robust level of internal consistency among the survey responses. It reveals that the different aspects and dimensions assessed in the survey are not only interconnected but also cohesively contribute to the broader constructs and themes explored in this study. Such coherence is crucial for validating the survey instrument, as it affirms that the various items are appropriately measuring the intended constructs without significant discrepancies or inconsistencies. The high Cronbach's alpha score underscores the reliability of each survey item and collectively strengthens the integrity of the entire questionnaire. It suggests that the responses across different items are consistently aligned, providing a reliable basis for analyzing the underlying patterns and relationships. The implications of this high Cronbach's alpha value are substantial. It underpins the reliability of the survey instrument, suggesting that the survey questions are well-designed and effectively capture the nuances of the subjects under investigation. This, in turn, lends considerable credibility to the subsequent analyses and conclusions drawn from the data. A high internal consistency as indicated by this value suggests that the survey responses are reliable and can be confidently used to make informed conclusions about the phenomena being studied. This level of reliability is essential in empirical research, as it ensures that the study's findings are based on a solid and trustworthy foundation, thereby enhancing the overall validity and impact of the research.

Figure 4.1. Visualization Of Cronbach's Alpha For The Collected Data

Furthermore, the high Cronbach's alpha value is indicative of the meticulous design and execution of the survey. It reflects the careful consideration that went into crafting each survey question and structuring the questionnaire in a way that maximizes coherence and clarity. This attention to detail in survey design not only improves the quality of the data collected but also enhances the respondents' understanding and engagement with the survey, potentially leading to more accurate and thoughtful responses. In addition, the robust internal consistency signaled by the Cronbach's alpha value supports the potential generalizability of the study's findings. While specific to the Pakistani construction industry, the high degree of reliability suggests that the insights derived could have broader applications or stimulate further research in similar contexts globally.

4.2 STATISTICAL OVERVIEW

The comprehensive statistical analysis of the survey results, as depicted in Figures 2 to 4, provides an in-depth view of the current state of managerial skills and practices in the Pakistani construction industry. This section offers a detailed interpretation of these figures, emphasizing their implications for the study's objectives. Figure 2 presents the mean scores for each factor, offering valuable insights into the collective perceptions of industry professionals. Factors like Communication Skills, Stakeholder Management, and Conflict Resolution exhibit relatively high mean scores, suggesting a general consensus on their significance in project success. This indicates that professionals within the industry recognize the critical importance of these skills in managing construction projects effectively. The high scores in these areas reflect an awareness of the complexities involved in project management and the need for robust communication channels, effective stakeholder engagement, and efficient conflict resolution mechanisms. Conversely, areas like Adaptability and Time Management show slightly lower mean scores, suggesting a potential gap in these skills among project managers. This finding is crucial as it points to areas where project managers may require further training and development. The ability to adapt to changing project environments and effectively manage time are essential skills in the dynamic and often unpredictable landscape of construction projects. These lower scores may indicate a need for more focused attention on developing these competencies within the industry. Figure 3, featuring a heatmap showing the frequency of chosen factors, provides an intuitive visual representation of areas where consensus is strongest among respondents. Darker shades in the heatmap indicate factors that are more uniformly agreed upon across

participants. This visualization is particularly helpful in quickly identifying key areas of focus in the construction industry. For example, if Stakeholder Management consistently appears in darker shades, it underscores its perceived importance across a wide range of respondents, reinforcing the need for project managers to be skilled in this area. Figure 4, which presents the response distribution for individual factors, adds another layer of depth to our understanding. This figure breaks down the responses for each factor, revealing not only the mean scores but also the distribution of opinions among the participants. For instance, a factor like Navigating Organizational Politics might have a moderate mean score, but the distribution of responses could indicate a polarized view among respondents. Such insights are crucial for comprehending the nuances in perceptions and the varying degrees of emphasis placed on different managerial skills. To further enhance the understanding provided by these statistical figures, additional analyses could be conducted. These may include cross-tabulation to explore relationships between different factors, such as how communication skills correlate with conflict resolution abilities, or regression analysis to predict how different skills contribute to overall project success. Furthermore, a geographical breakdown of responses could offer insights into regional differences in skill sets and management practices within Pakistan. This could highlight specific areas or regions where certain skills are more developed or in need of enhancement, providing targeted information for regional development programs or training initiatives. Additionally, considering the dynamic nature of the construction industry, a longitudinal approach could be beneficial for future research. Tracking the development of these skills and practices over time would allow for the assessment of trends and the effectiveness of implemented training programs or policy changes. The findings from this survey are instrumental in informing the development of a set of best practices for project managers in the construction industry, particularly in the context of Pakistan. By understanding the current state of skills and practices and identifying areas that need improvement, this research contributes valuable insights into the role of human factors in project management.

Figure 4.2. Mean Scores For Each Factor

The aim is to provide actionable strategies for enhancing project success through improved managerial competencies, with a particular focus on the unique challenges and cultural aspects of the Pakistani construction industry. Moreover, the data underscores the need for continuous professional development and training for project managers. It highlights the dynamic nature of the construction industry, where ongoing learning and adaptation are essential for keeping pace with evolving project requirements and stakeholder expectations. The study's findings can be used to tailor training programs and professional development initiatives that address the specific needs and challenges identified in the survey. Accordingly, the statistical overview presented in Figures 2 to 4 offers a rich and nuanced understanding of the current landscape of managerial skills and practices in the Pakistani construction industry. The insights gleaned from this analysis are critical for shaping future strategies and interventions aimed at enhancing the effectiveness and success of construction projects. By delving into the specifics of these results, this research paves the way for a more informed and targeted approach to improving project management practices in Pakistan's construction sector.

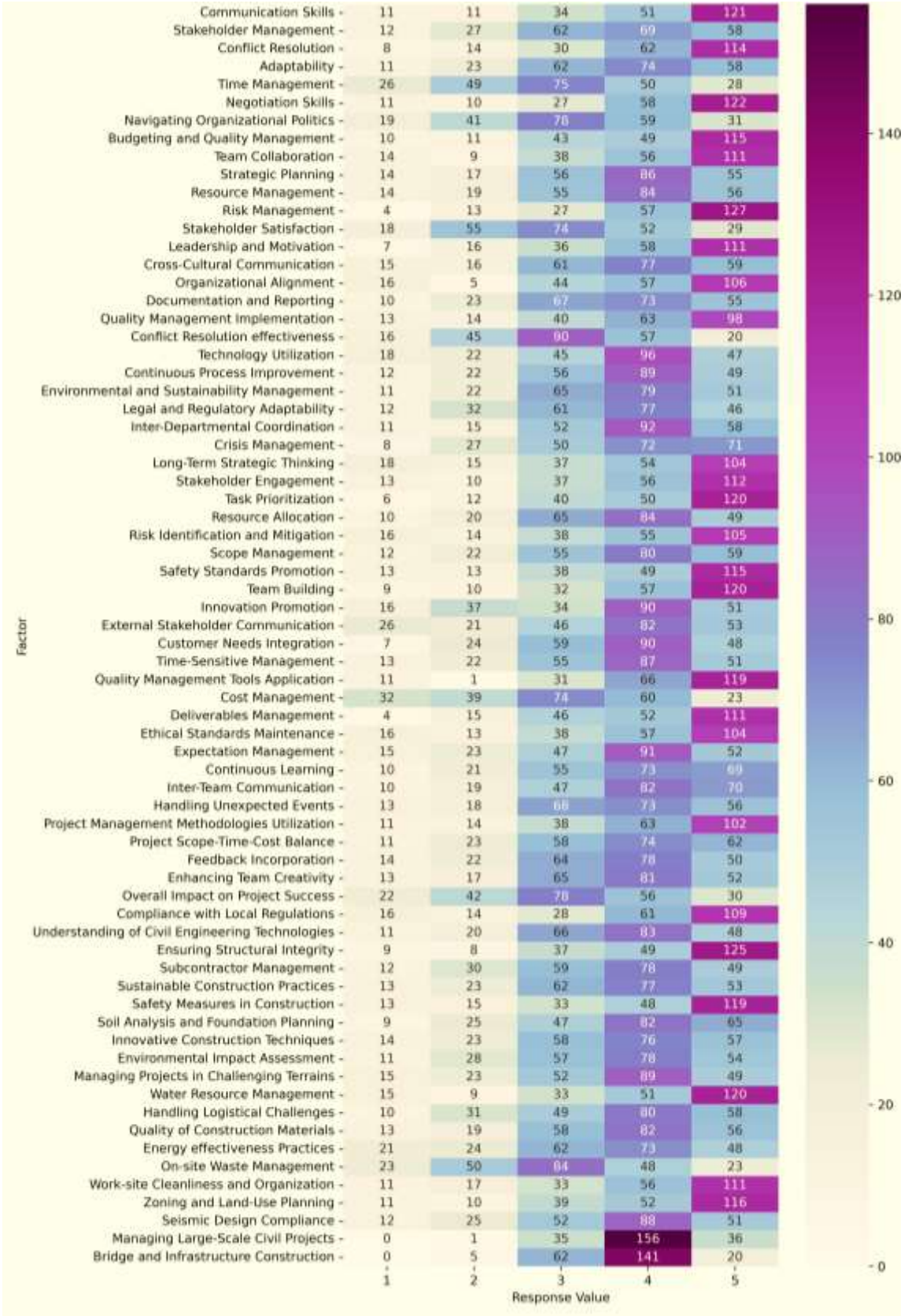

Figure 2.3 Heatmap Showing Frequency Of The Chosen Factors

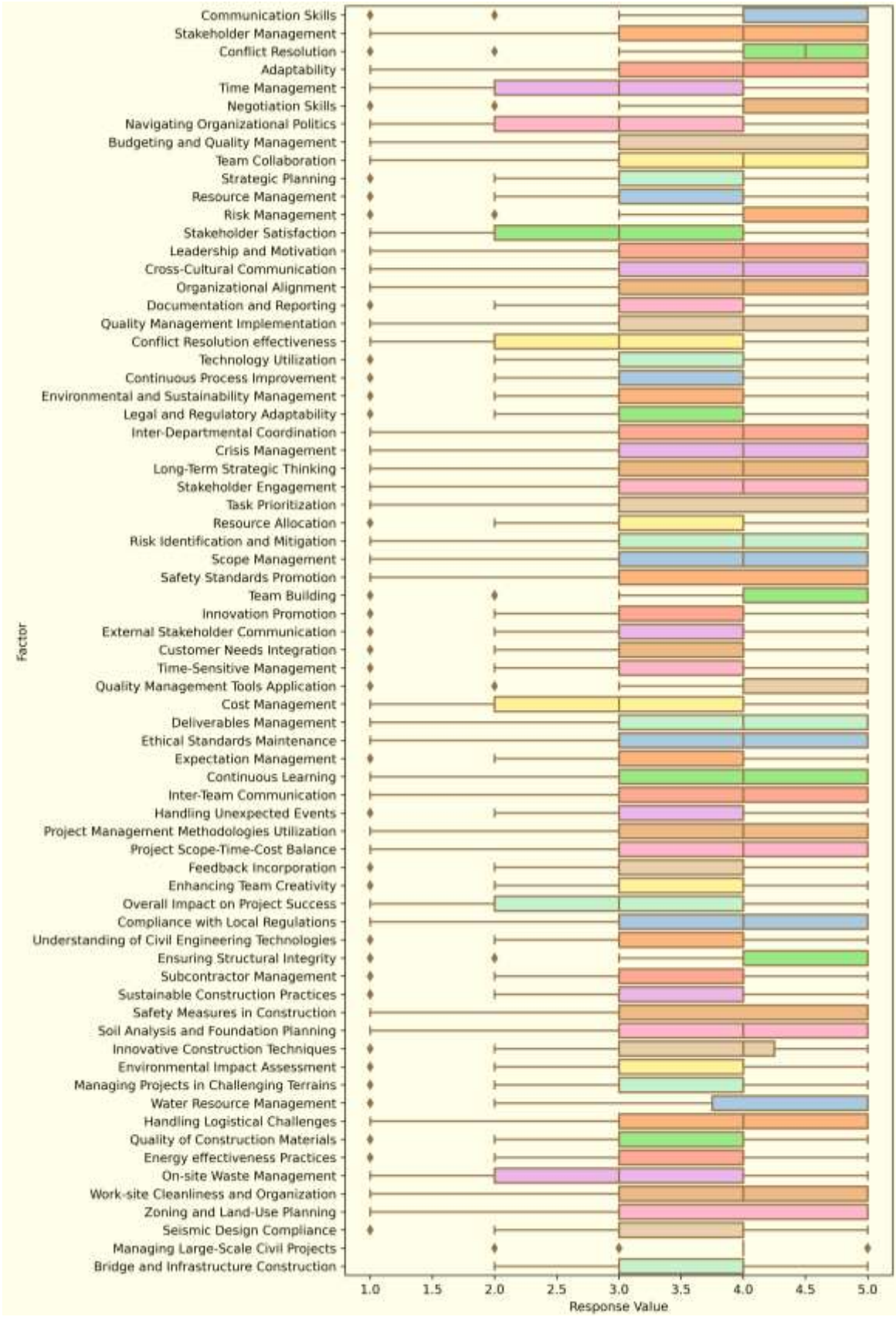

Figure 4.4. Response Distribution For Individual Factor

4.3 KRUSKAL-WALLIS TEST

The Kruskal-Wallis test was applied in this study to discern whether the differences in responses across various factors are statistically significant. This is crucial in identifying which factors hold consistent perceptions across different demographic or professional groups within the survey population and which factors exhibit significant variances in opinion. The heatmap displayed in Figure 5 illustrates the p-values from the Kruskal-Wallis test comparisons. In this heatmap, each cell represents the p-value for the comparison of a particular factor across different groups. A lower p-value (typically less than 0.05) suggests that there is a statistically significant difference in the way different groups perceive or prioritize that factor. This is crucial in understanding how different aspects of project management and quality management practices are valued differently by various segments of professionals. For example, factors with low p-values imply that there is a significant difference in how these groups rate this factor. This could be indicative of differing priorities or varying levels of expertise in these areas among different groups of professionals. Conversely, factors with high p-values suggest that there is a consensus across different groups regarding that factor. This is equally important as it highlights the areas where there is uniformity in understanding or valuing certain aspects of project management, regardless of the respondents' demographic or professional background. To further expand on this, the Kruskal-Wallis test's application in this study also allows for a deeper dive into the subtleties of the construction industry's managerial ecosystem. For instance, by examining the p-values associated with specific factors like stakeholder management or adaptability, the test provides insights into whether these skills are perceived uniformly or differently across various experience levels, job roles, or project types. This kind of analysis can reveal, for example, if more experienced project managers place greater emphasis on stakeholder management compared to those newer to the field, or if the importance of adaptability is rated higher by professionals working in certain types of construction projects. Additionally, the results of the Kruskal-Wallis test can guide targeted interventions or training programs. If significant differences are noted in the perception of certain skills or practices, it may indicate the need for specialized training programs that address these discrepancies. For instance, if younger professionals or those working in specific sectors show lower ratings in conflict resolution, tailored workshops or training modules can be developed to bridge this gap. Furthermore, the analysis can inform policy development within organizations or

industry-wide. Understanding the diverse viewpoints and priorities among professionals can help in formulating policies that are inclusive and considerate of these differences, ultimately leading to more effective and harmonious project management environments. The results from the Kruskal-Wallis test provide an additional layer of insight into the data collected. By understanding not only what the predominant views are but also how these views differ across various groups, it is possible to gain a better understanding of the dynamics at play in Pakistan's construction industry. This is particularly relevant in the context of your study, as it seeks to uncover the nuanced ways in which project managers' political skills can influence the effectiveness of quality management practices. The test's findings can thus play a pivotal role in shaping the future direction of training, policy-making, and managerial strategy development in the construction industry, both within Pakistan and potentially in similar contexts globally.

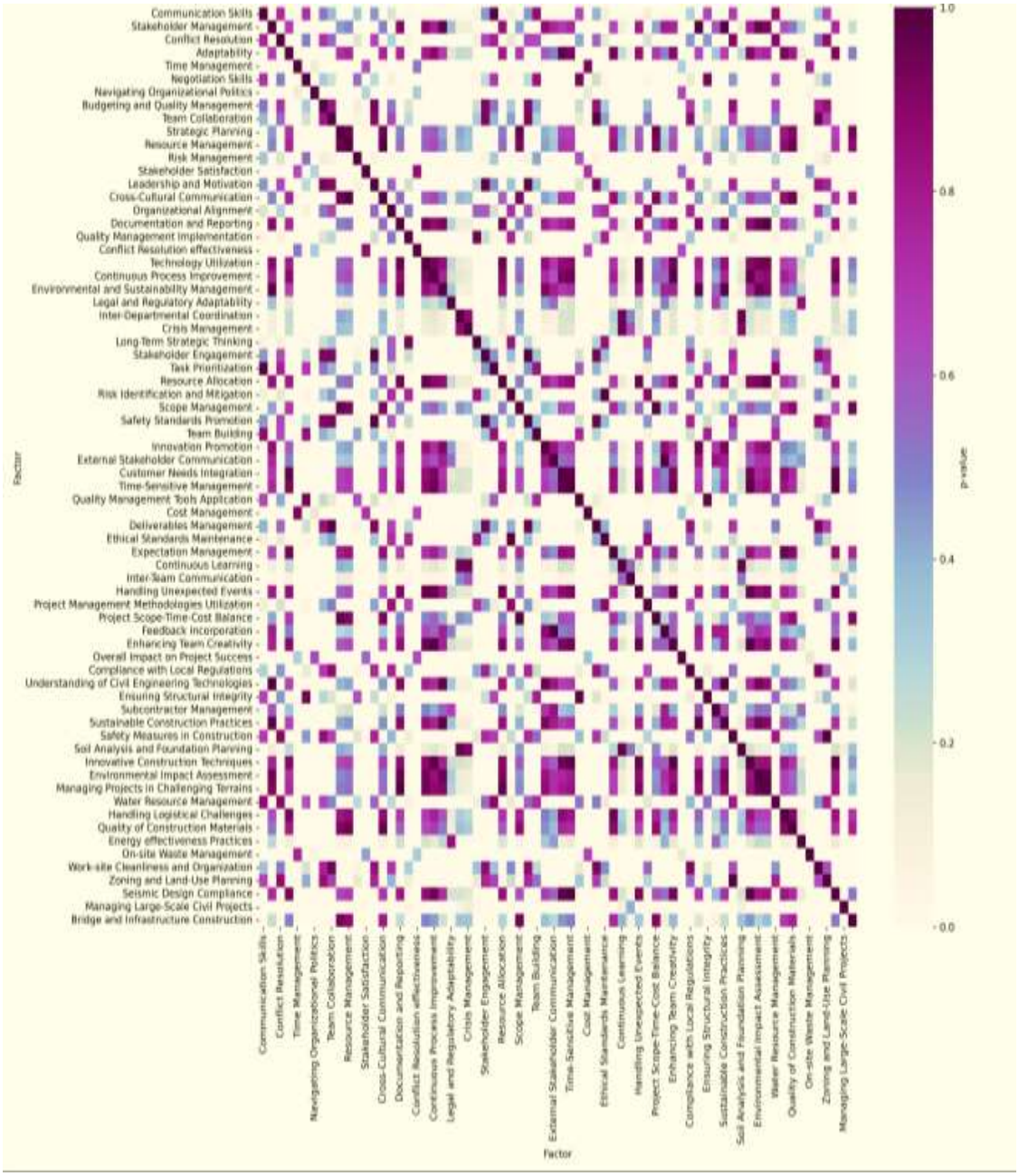

Figure 4.5. Heatmap Displaying P-Values From Kruskal-Wallis Test Comparisons

4.4 CORRELATION ANALYSIS

The analysis in this section reveals intricate relationships between the survey's various factors. This analysis is pivotal in understanding the interconnections and independent natures of managerial and technical skills in the construction industry. For instance, the correlation between Conflict Resolution and Navigating Organizational Politics indicates a relatively significant positive relationship, suggesting that individuals proficient in conflict resolution are also likely to be adept at navigating organizational politics. Similarly, a notable positive correlation exists between "Team Collaboration" and "Negotiation Skills", illustrating that effective team collaboration often coincides with strong negotiation skills. On the other hand, some skills show a lower degree of correlation with others, such as Adaptability and Budgeting and Quality Management, indicating that these skill sets may operate independently within the professional sphere. Furthermore, the correlation between Stakeholder Management and Seismic Design Compliance implies that those who excel in stakeholder management also tend to prioritize seismic design compliance. These insights, visualized in Figure 6 as a comprehensive cross-comparison of responses, are instrumental in identifying the key skills that are interrelated and those that are distinct. Expanding on this, the correlation analysis sheds light on how certain skill sets complement each other, enhancing overall project management effectiveness. For example, the relationship between communication skills and stakeholder management suggests that excellent communicators are often more effective in managing stakeholder expectations and concerns, which is crucial in complex projects with multiple vested interests. Additionally, the analysis explores the relationship between technical competencies and managerial skills. Understanding whether and how these two dimensions correlate can inform training and development efforts, ensuring that project managers are not only technically proficient but also skilled in managing teams and navigating complex project environments. The correlation analysis also offers insights into potential skill gaps within the industry. For instance, if critical skills like risk management show low correlations with other managerial competencies, it might indicate a need for more integrated training programs that cover a broader spectrum of skills. Moreover, the analysis helps in identifying potential areas for innovation in project management. By examining the interplay between traditional managerial skills and emerging trends like digital project management or sustainable practices, the study can suggest new

areas for development and focus within the industry. Understanding these relationships is crucial for developing effective training programs for project managers, particularly in the context of the Pakistani construction industry. By focusing on enhancing interrelated skills, project managers can be better equipped to handle the complexities of inter-organizational construction projects. The correlation analysis thus contributes significantly to the overarching goal of the study, offering empirical evidence to support the development of targeted strategies to enhance project outcomes through improved managerial competencies. This understanding is not only beneficial for individual project managers but also for construction firms and industry stakeholders, who can use these insights to foster a workforce that is versatile, adaptable, and equipped to handle the multifaceted challenges of modern construction projects.

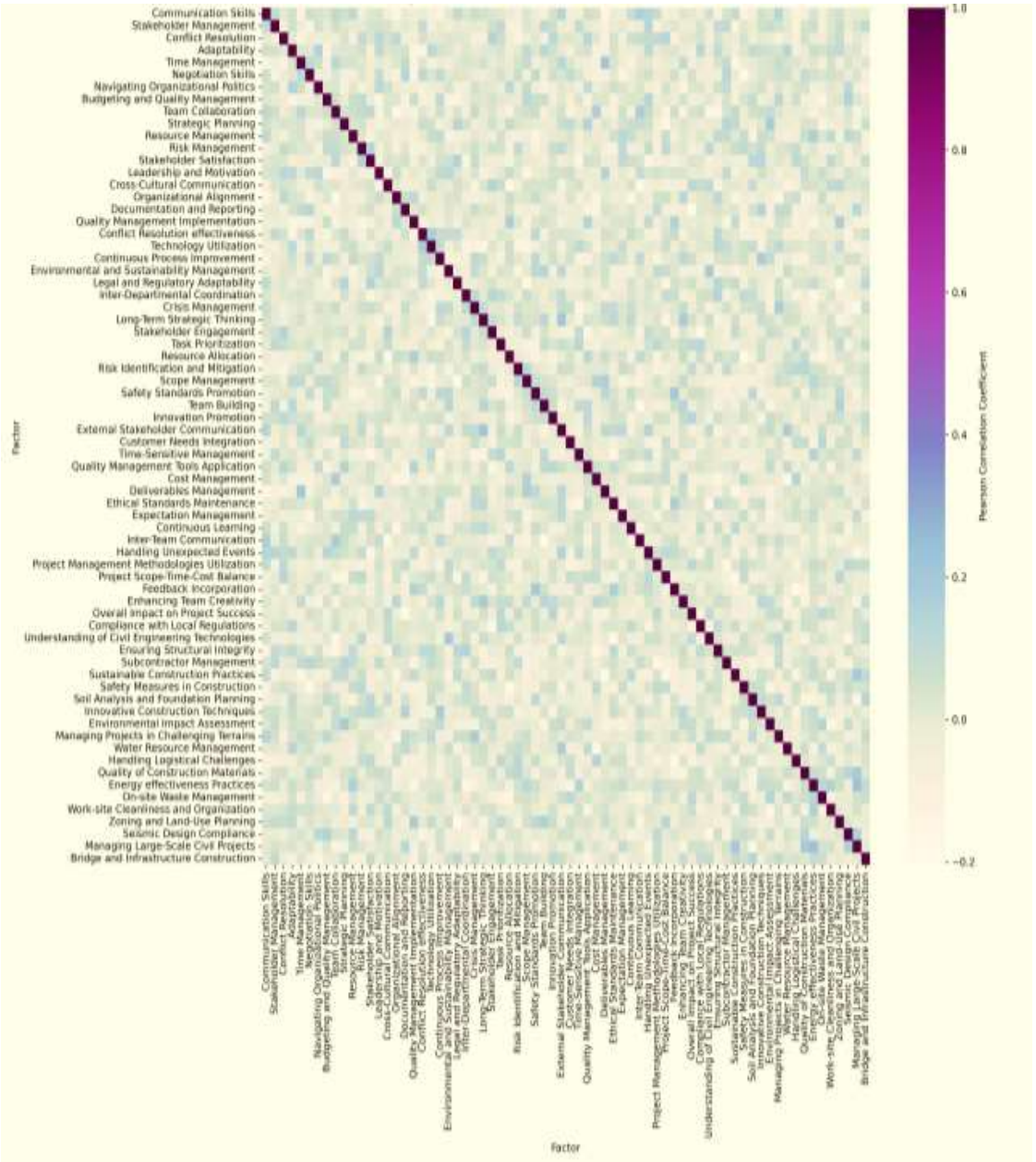

Figure 4.6. Cross-Comparisons Of The Responses For The Investigated Factors

5. INFLUENTIAL FACTORS

This section explores the use of principal component analysis (PCA) and median absolute deviation (MAD) methods to identify and analyze the most significant factors influencing the success of inter-organizational construction projects in Pakistan. These advanced statistical techniques offer a nuanced understanding of the multifaceted dynamics that drive project management in the construction industry. The PCA method is a sophisticated statistical technique that emphasizes variation and captures strong patterns in a dataset. By reducing the dimensionality of the data, PCA brings forth the most influential factors that account for the largest variance within the dataset. In this study, PCA identified ten pivotal factors: Conflict Resolution, Time Management, Team Collaboration, Technology Utilization, Crisis Management, Long-Term Strategic Thinking, External Stakeholder Communication, Time-Sensitive Management, Project Scope-Time-Cost Balance, and Zoning and Land Use Planning. Each of these factors plays a crucial role in encapsulating the variances within the dataset and highlights their critical role in project management. For example, Conflict Resolution and Time Management are essential in managing disputes effectively and allocating time resources efficiently. Efficient conflict resolution ensures smooth project progression, while adept time management is key to meeting project deadlines and maintaining project momentum. Similarly, Crisis Management and External Stakeholder Communication are imperative for handling unexpected challenges and maintaining robust communication channels with various stakeholders, including clients, contractors, and government entities. The inclusion of Technology Utilization and Long-Term Strategic Thinking underscores the growing significance of integrating modern technologies and forward-looking strategies in construction project management. Embracing new technologies can lead to more efficient processes and innovative solutions, while strategic thinking ensures projects align with long-term objectives and market trends. Expanding further, the factor of Team Collaboration highlights the importance of cohesive team dynamics in project management. This factor suggests that the ability to foster a collaborative and supportive team environment is crucial for the efficient execution of construction projects. Team collaboration not only enhances productivity but also encourages knowledge sharing and problem-solving. The Project Scope-Time-Cost Balance

factor brings attention to the critical project management skill of balancing these three key aspects. This factor reflects the necessity of managing project scope to prevent scope creep, maintaining the project timeline, and controlling costs to ensure the project's financial viability. Additionally, the Zoning and Land Use Planning factor points to the importance of compliance with local regulations and effective use of land resources. This factor is especially relevant in the context of the Pakistani construction industry, where urban development and infrastructure projects must navigate complex regulatory environments. Moreover, the MAD method complements the PCA by identifying outliers and variations that are not explained by the main factors. This approach helps in understanding the less obvious, yet impactful, elements in project management. It can highlight unique challenges or innovative practices that might be specific to certain projects or regions within Pakistan. Together, PCA and MAD methods provide a comprehensive view of the influential factors in construction project management. By highlighting these key areas, the study offers valuable insights into where project managers and construction firms should focus their efforts for improving project outcomes.

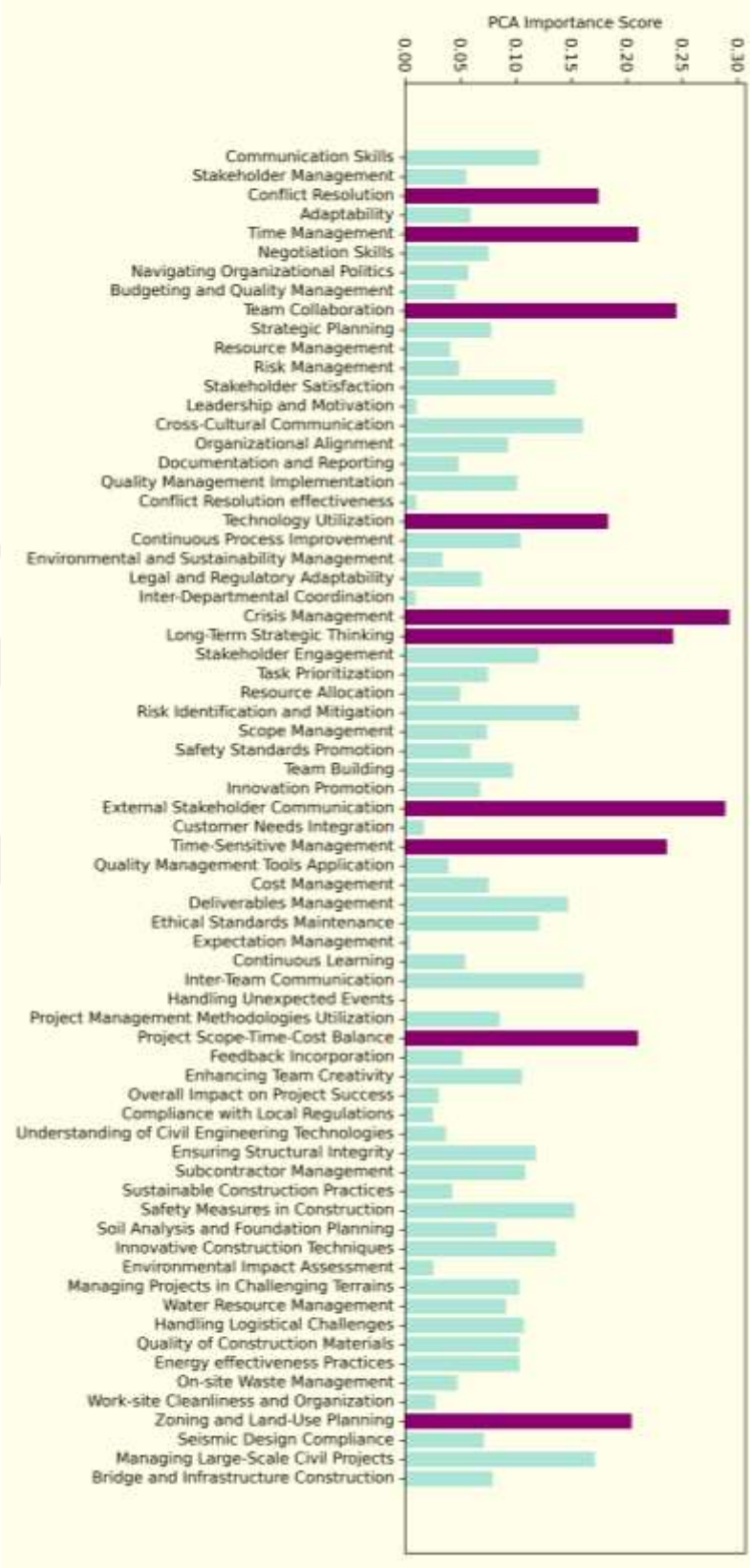

Figure 5.1 Ranking Of Factors In This Research Using The PCA Method With The 10 Most Significant Factors Being Highlighted

On the other hand, the MAD method focuses on variability and dispersion in the dataset, highlighting a distinct set of top factors. These include Stakeholder Management, Long-Term Strategic Thinking, Risk Identification and Mitigation, Safety Standard Promotion, Innovation Promotion, External Stakeholder Communication, Ethical Standard Maintenance, Safety Measures in Construction, Innovative Construction Techniques, and Energy Effectiveness Practices. This unique set of factors emphasizes the importance of managing stakeholder relationships effectively and promoting safety and innovation in the construction field. Stakeholder Management and Ethical Standard Maintenance, for instance, highlight the necessity of maintaining strong ethical standards and relationships with all stakeholders. This is crucial in a sector where multiple parties are involved, and trust and transparency are key to project success. Innovation Promotion and Innovative Construction Techniques reflect the industry's growing need to adopt new methods and technologies. These innovations not only enhance efficiency and sustainability but also position companies to be competitive in a rapidly evolving market. To expand on this, the MAD analysis sheds light on the emerging priorities in the Pakistani construction industry. The emphasis on Risk Identification and Mitigation, for example, underscores the increasing awareness of potential risks in construction projects and the importance of proactive measures to address them. This factor indicates a growing shift towards more risk-aware project management practices. Similarly, the focus on Safety Standard Promotion and Safety Measures in Construction points to an elevated concern for worker safety and adherence to safety regulations. This focus is essential in an industry often characterized by high-risk environments, indicating a progressive move towards a more safety-conscious work culture. The inclusion of Energy Effectiveness Practices in the top factors identified by MAD highlights the construction industry's increasing focus on sustainability and energy efficiency. This factor suggests a growing recognition of the environmental impact of construction activities and the need for more sustainable practices. Furthermore, the results from both PCA and MAD methods, as illustrated in Figures 7 and 8, reveal the multifaceted and dynamic nature of project management in the construction industry. The interplay of technical skills, such as Innovative Construction Techniques and Energy Effectiveness Practices, with managerial and interpersonal skills, such as Stakeholder Management and External Stakeholder Communication, epitomizes the complex landscape of project management. This complexity is further accentuated by the need to balance project scope,

time, and cost effectively, alongside navigating zoning and land use planning regulations. Understanding the significance of these factors is crucial for developing targeted strategies to enhance project outcomes. This is particularly relevant in the Pakistani construction industry, where specific cultural and organizational dynamics come into play. The industry's unique challenges, such as navigating local regulations, understanding cultural nuances, and dealing with diverse stakeholder groups, require a specialized approach to project management. The insights provided by the MAD method, in conjunction with PCA findings, offer a comprehensive understanding of the skills and practices that are crucial for the success of construction projects in this context. These findings have significant implications for training and development programs, policy formulation, and strategic decision-making within the construction industry. By identifying and understanding these influential factors, construction firms and professionals can tailor their approaches to better meet the demands of modern project management, thereby enhancing overall project performance and success in Pakistan's construction industry. This comprehensive analysis significantly contributes to identifying and prioritizing the skills and practices most impactful in achieving inter-organizational project success. It provides valuable insights for project managers, policymakers, and industry stakeholders, enabling them to focus their efforts on developing and enhancing these key areas. By aligning managerial practices with these identified factors, the construction industry in Pakistan can improve project success rates, enhance efficiency, and foster sustainable growth. Expanding on this, the study’s findings have practical implications for the design of professional development and training programs in the construction industry. Given the highlighted importance of skills like stakeholder management, risk mitigation, and innovation, tailored training programs can be developed to specifically address these areas. This approach ensures that construction professionals are equipped with the skills necessary to navigate the complexities of modern construction projects effectively.

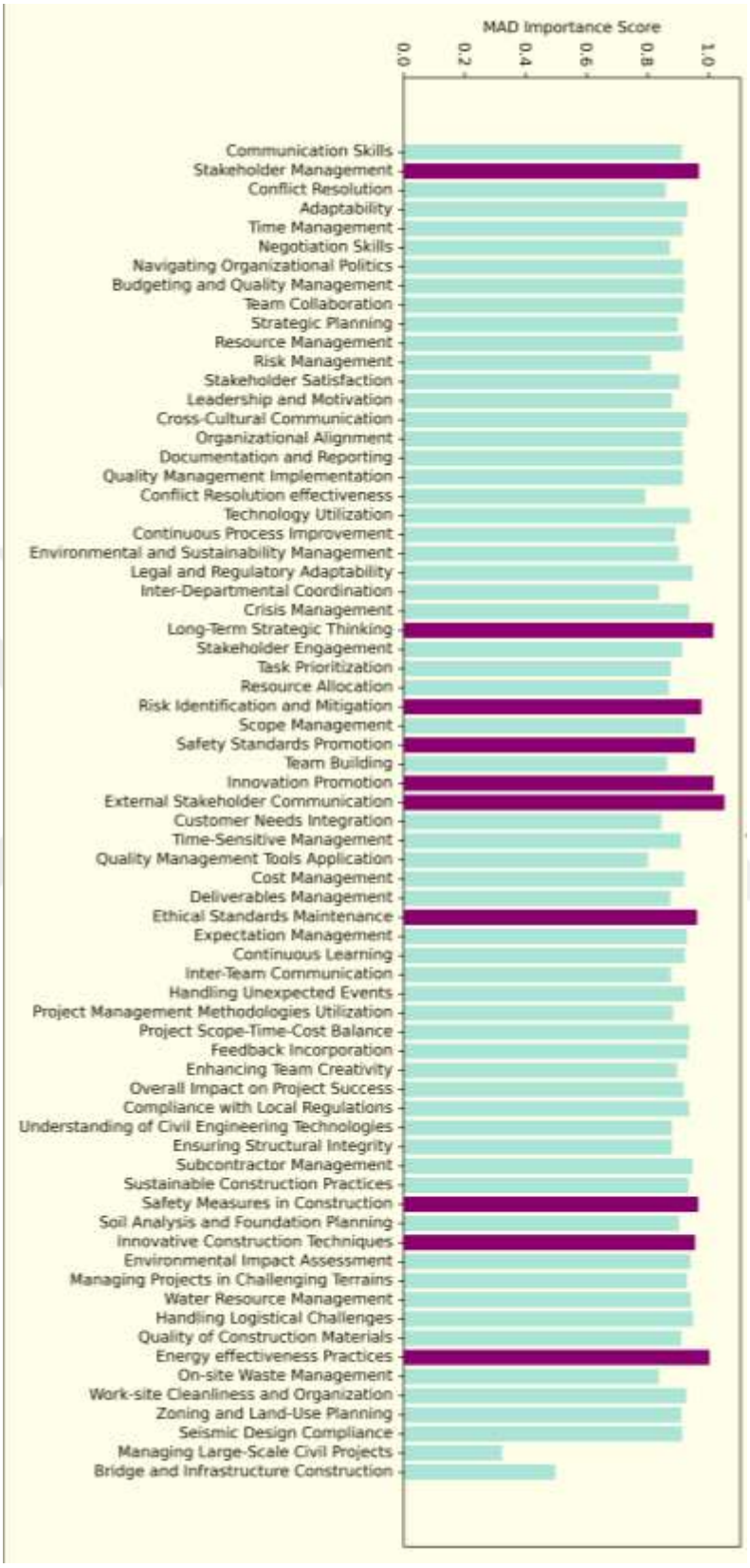

Figure 5.2. Ranking Of Factors In This Research Using The MAD Method Approach With The 10 Most Significant Factors Being Highlighted

Furthermore, the research underscores the need for policy frameworks that support and encourage the development of these key competencies. Policymakers can use these insights to craft regulations and guidelines that promote best practices in areas like safety standards, ethical conduct, and sustainable construction methods. Such policies not only enhance project outcomes but also contribute to the overall improvement of industry standards. Additionally, this research offers a foundation for future studies to build upon, encouraging a deeper exploration of how these factors can be optimized in different construction contexts. It also opens avenues for comparative studies across different regions and construction environments, fostering a global understanding of effective construction project management practices. The potential for international comparative studies is particularly significant. By comparing the influential factors identified in Pakistan's construction industry with those in other countries, researchers can identify universal best practices as well as region-specific strategies that address local challenges and market conditions. Moreover, this analysis could inspire similar studies in other sectors beyond construction. Understanding the critical factors for project success in diverse industries can lead to a more holistic view of effective project management and organizational success strategies. In conclusion, this section's in-depth analysis not only enriches the academic discourse in construction project management but also provides practical guidance for industry practitioners, contributing to the advancement of the field. The insights gained from this study have the potential to shape the future of construction project management, not only in Pakistan but also in a global context, by informing the strategies, policies, and training programs that drive industry progress and success.

6. GROUPING OF FACTORS USING K-MEANS CLUSTERING

This section groups the survey factors to uncover underlying themes within the context of project management in the construction industry. In this context, it integrates the results of K-means clustering, optimized through the elbow method, to identify five distinct clusters, each representing a unique thematic grouping of factors. In general, K-means clustering is a method used for partitioning a dataset into K distinct, non-overlapping subgroups where each data point belongs to only one group. In this regard, the elbow method, visualized in Figure 9, helped determine the optimal number of clusters, which was found to be five. This method involves plotting the explained variance against the number of clusters, and the 'elbow' represents the point after which the addition of another cluster does not give much better modeling of the data. The application of K-means clustering to the dataset allows for a more structured and insightful analysis. By grouping similar factors together, this method helps identify patterns and themes that might not be immediately obvious. These clusters provide a clearer understanding of how different skills and practices are perceived in relation to each other within the industry. For instance, one cluster may group together factors related to technical competencies, such as Technology Utilization and Innovative Construction Techniques, while another cluster might focus on interpersonal and managerial skills, like Stakeholder Management and Conflict Resolution. This distinction can highlight areas where technical and soft skills intersect and where they diverge, offering valuable insights into the holistic skill set required in construction project management. Furthermore, the clusters can also reveal how broader themes, such as sustainability, innovation, or risk management, are interconnected within the field of project management. For example, a cluster that includes factors like Risk Identification and Mitigation, Safety Standard Promotion, and Ethical Standard Maintenance could indicate a thematic focus on risk and safety management. The results of this analysis, as given in Figure 10 and Table 2 are as follows:

a. Cluster 1: labeled as "Project Management," encompasses a comprehensive range of factors such as Conflict Resolution, Time Management, Budgeting and Quality Management, Strategic Planning, and various others like Innovative Construction

Techniques and Managing Large-Scale Civil Projects. This cluster highlights the multifaceted nature of project management, emphasizing not only traditional aspects like budgeting and scheduling but also more dynamic elements such as innovation and sustainability. The inclusion of factors like External Stakeholder Communication and Subcontractor Management indicates the importance of external relations in project management, while Safety Standards Promotion and Sustainable Construction Practices underscore the growing focus on sustainable and safe construction practices. Expanding further, this cluster's comprehensive nature reflects the evolving landscape of project management, where technical skills and managerial acumen must be complemented by advanced communication strategies and sustainable approaches. The juxtaposition of factors such as Innovative Construction Techniques alongside Budgeting and Quality Management highlights the progressive shift in the construction industry towards embracing new technologies and methods while maintaining a strong foundation in fundamental project management principles. The presence of Managing Large-Scale Civil Projects within this cluster indicates the scale and complexity of projects within the Pakistani construction sector. It underscores the need for project managers to be adept at handling intricate projects that require meticulous planning, extensive coordination, and robust risk management strategies. Additionally, the emphasis on Safety Standards Promotion and Sustainable Construction Practices within this cluster signifies a shift in industry priorities. It reflects an increasing awareness and commitment towards environmental stewardship and the well-being of workers. This aspect is particularly pertinent in the context of global trends towards greener building practices and the imperative to ensure worker safety in often high-risk construction environments. Moreover, the inclusion of factors like Subcontractor Management and External Stakeholder Communication points to the critical role of collaboration and effective communication in successful project execution. These elements are vital in maintaining harmonious working relationships with various parties involved, from subcontractors to suppliers and regulatory bodies, ensuring smooth project progress and timely completion.

b. Cluster 2, themed "Interpersonal Skills," includes Adaptability, Negotiation Skills, Team Collaboration, and Risk Management, among others. This cluster underscores the significance of soft skills in the construction industry. The ability to adapt,

collaborate effectively, and negotiate is crucial in navigating the complex interpersonal dynamics of construction projects. Risk Identification and Mitigation and Understanding of Civil Engineering Technologies in this cluster indicate that technical knowledge is also vital for effective interpersonal interactions. Delving deeper, the presence of Adaptability in this cluster reflects the dynamic and often unpredictable nature of construction projects. It highlights the need for project managers and team members to be flexible and responsive to changing circumstances, whether due to external factors like market shifts or internal project developments. Negotiation Skills being part of this cluster emphasizes the importance of effective communication and bargaining abilities in achieving project objectives. These skills are critical in resolving disputes, securing resources, and establishing beneficial agreements with stakeholders, subcontractors, and suppliers. Team Collaboration, another key component of this cluster, speaks to the collaborative nature of construction projects. It underscores the importance of building cohesive teams capable of working effectively towards common goals. This skill is particularly important in large-scale projects where coordination among various teams and departments is paramount. Risk Management's inclusion in this cluster suggests that the ability to identify, assess, and mitigate risks is not only a technical necessity but also an interpersonal one. It requires communication and collaboration to ensure that risk-related information is accurately conveyed and understood by all stakeholders. Furthermore, Understanding of Civil Engineering Technologies in this cluster bridges the gap between technical expertise and soft skills. It implies that a deep understanding of the technologies used in construction is crucial for effective communication and decision-making in a team setting. This cluster, therefore, represents a blend of soft and hard skills. It highlights the need for project managers and team members in the construction industry to possess a well-rounded skill set that combines interpersonal competencies with technical knowledge. This holistic approach is crucial for managing the various aspects of construction projects, from team dynamics to technical challenges. The recognition of Interpersonal Skills as a distinct cluster reinforces the idea that successful project management in the construction industry is not solely about technical proficiency. Instead, it requires a balanced approach that incorporates the human element, acknowledging the importance of communication, collaboration, and adaptability.

c. Cluster 3, "Leadership and Strategy," comprises Stakeholder Management, Resource Management, Leadership and Motivation, and several other factors. This cluster underscores the strategic aspect of project management, highlighting the need for strong leadership and resource management. The inclusion of factors like Crisis Management and Long-Term Strategic Thinking suggests the importance of foresight and the ability to handle unforeseen challenges. Ethical Standards Maintenance and Continuous Learning indicate a focus on ethical conduct and the importance of ongoing development in leadership roles. To delve deeper, the presence of Stakeholder Management in this cluster reflects the crucial role of effectively managing diverse stakeholder interests and expectations. This skill is particularly vital in the construction industry where projects typically involve a variety of stakeholders, including clients, contractors, government entities, and local communities. Effective stakeholder management ensures smoother project progression and can significantly enhance project reputation and success. Resource Management being part of this cluster emphasizes the importance of efficiently utilizing and allocating resources, including manpower, materials, and capital. This is especially critical in construction projects where resource mismanagement can lead to cost overruns, delays, and reduced quality of output. Leadership and Motivation are also central to this cluster, signifying the impact of effective leadership in inspiring and guiding teams towards achieving project objectives. Strong leadership skills are essential for maintaining team morale, fostering a positive work environment, and ensuring high productivity levels. The inclusion of Crisis Management indicates the need for leaders in the construction industry to be prepared for unexpected situations and adept at navigating through them. This ability is crucial for minimizing the impact of crises on project timelines and budgets. Long-Term Strategic Thinking in this cluster points to the necessity of forward-looking approaches in project management. This involves not only planning for immediate project needs but also considering the long-term implications and sustainability of project decisions. Ethical Standards Maintenance highlights the growing emphasis on ethical practices in the construction industry. This factor underlines the importance of upholding high ethical standards in all project dealings, which is fundamental for building trust and credibility. Continuous Learning reflects the dynamic nature of the construction industry and the need for ongoing professional development. This factor

suggests that successful leaders are those who continually seek to enhance their skills and stay abreast of industry trends and advancements.

d. Cluster 4, "Communication and Quality Control," is composed of Communication Skills, Cross-Cultural Communication, Quality Management Tools Application, and others. This cluster emphasizes the role of communication in quality control and project management. The integration of factors like Conflict Resolution Effectiveness and Stakeholder Engagement points towards the crucial role communication plays in managing stakeholder relationships and ensuring project quality. Expanding on this, the presence of Communication Skills in this cluster underscores the foundational role of clear and effective communication in the construction industry. It highlights how essential it is for project managers to convey information accurately and efficiently, both internally within project teams and externally with stakeholders. Effective communication is key to avoiding misunderstandings and ensuring that all parties are aligned with project goals and expectations. Cross-Cultural Communication, included in this cluster, reflects the diverse nature of modern construction projects, which often involve a multicultural workforce and international stakeholders. This factor emphasizes the need for project managers to be adept at navigating cultural differences and effectively communicating in diverse environments. It is crucial for maintaining harmony on-site and fostering inclusive and respectful interactions among all project participants. Quality Management Tools Application signifies the importance of utilizing specific tools and methodologies to ensure that project outcomes meet the predetermined quality standards. This integration of communication skills with quality management tools application suggests that effective communication is integral to the successful implementation of these tools and methodologies. Conflict Resolution Effectiveness being a part of this cluster indicates that effective communication is vital in resolving disputes and maintaining a cohesive project environment. The ability to resolve conflicts through effective communication is crucial in preventing delays and ensuring the smooth progression of construction projects. Stakeholder Engagement in this cluster highlights the importance of actively involving stakeholders in the project process. This factor suggests that effective communication is key to understanding stakeholder needs and expectations, and in turn, integrating their input into the project

management process in a way that enhances project quality and stakeholder satisfaction.

e. Cluster 5, "Resource and Environmental Management," includes Navigating Organizational Politics, Technology Utilization, Environmental Impact Assessment, and other factors. This cluster illustrates the increasing importance of environmental considerations and resource management in construction projects. Factors like Energy Effectiveness Practices and On-site Waste Management highlight the industry's growing emphasis on sustainable practices. Delving deeper, the inclusion of Navigating Organizational Politics in this cluster suggests that managing internal organizational dynamics is crucial for effective resource and environmental management. It points to the need for project managers to be skillful in maneuvering through complex organizational structures and influence decision-making processes, especially when it comes to advocating for resource-efficient and environmentally friendly practices. Technology Utilization being part of this cluster underscores the role of modern technology in enhancing resource management and minimizing environmental impact. The use of advanced tools and software can lead to more precise planning, better resource allocation, and more effective management of construction processes, which in turn can reduce waste and improve sustainability. Environmental Impact Assessment in this cluster reflects the increasing focus on assessing and mitigating the environmental effects of construction activities. This factor highlights the necessity for project managers to have a thorough understanding of environmental concerns and the skills to conduct comprehensive environmental assessments. The presence of Energy Effectiveness Practices points towards the growing awareness and implementation of energy-efficient measures in the construction industry. This factor is indicative of a shift towards more sustainable construction practices, emphasizing the need to reduce energy consumption and promote renewable energy use in construction projects. On-site Waste Management is another critical factor in this cluster, highlighting the industry's efforts to minimize waste production and promote recycling and reusing materials. Effective waste management practices are essential for reducing the environmental footprint of construction projects and contributing to overall sustainability goals.

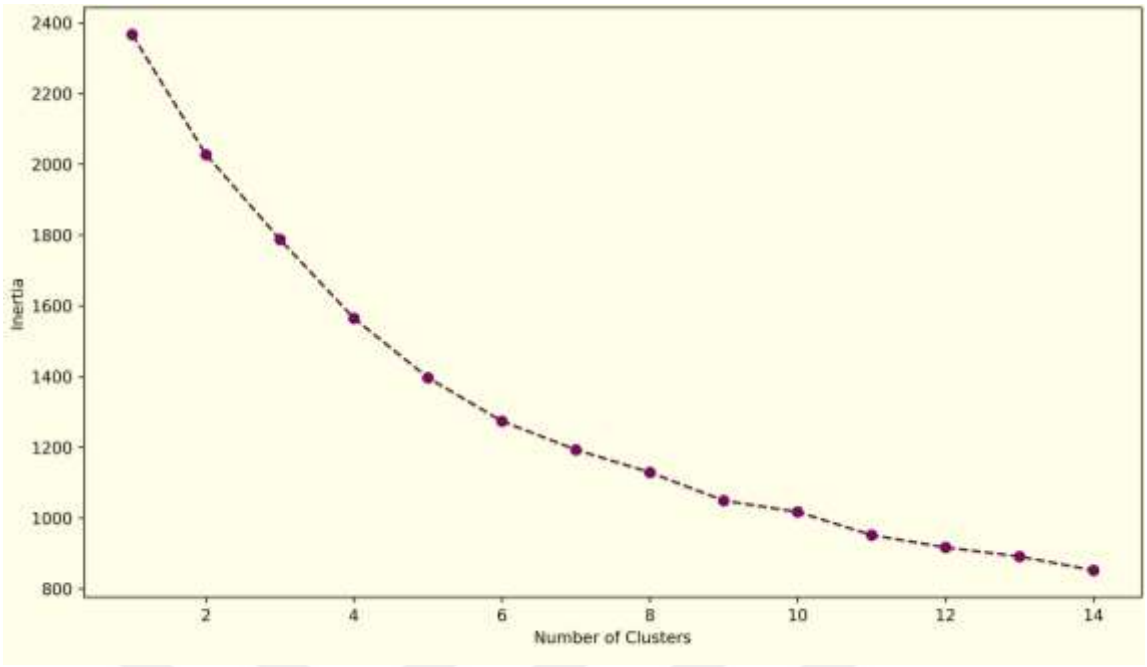

Figure 6.1: Elbow Method For Determining The Optimal Number Of Clusters

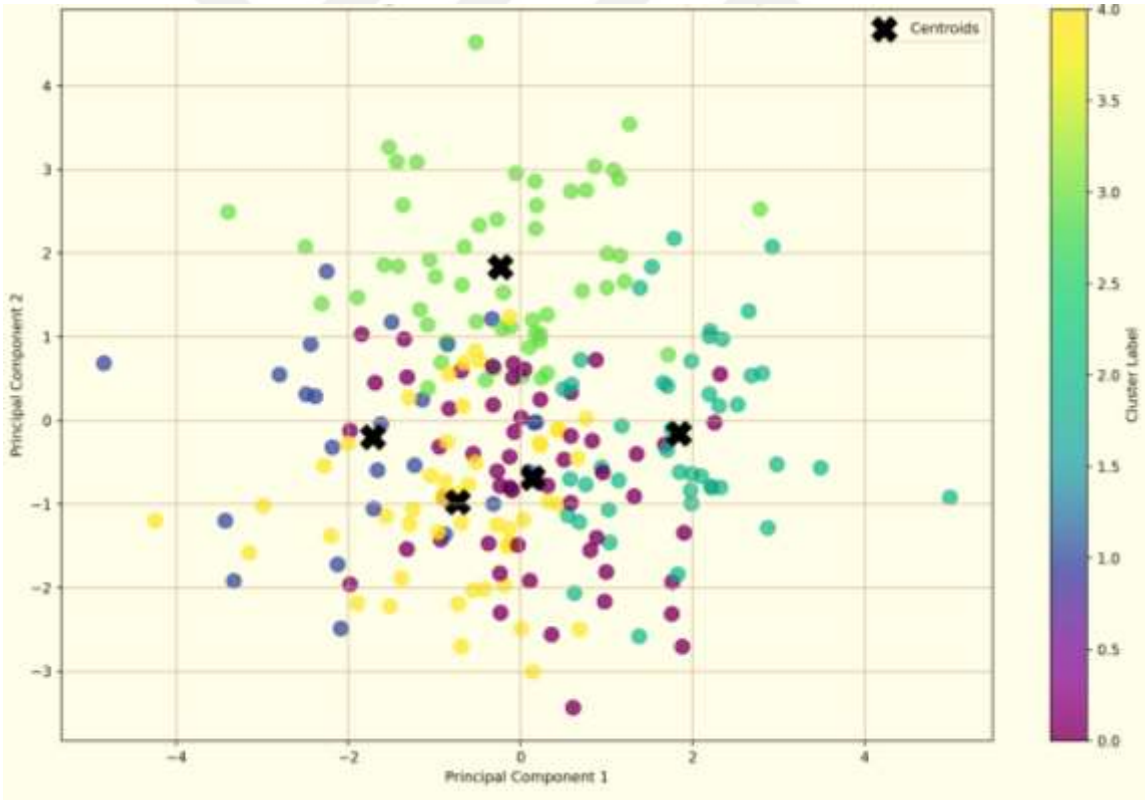

Figure 6.2: K-Means Clustering Of Examined Factors Using PCA, With Centroids Marked

Table 6.1: Grouping of Factors Based on the K-means Clustering Results.

Cluster Number	Dominating Theme	Factors Included
1	Project Management	Conflict Resolution, Time Management, Budgeting and Quality Management, Strategic Planning, Documentation and Reporting, Environmental and Sustainability Management, Legal and Regulatory Adaptability, Inter-Departmental Coordination, Task Prioritization, Safety Standards Promotion, Innovation Promotion, External Stakeholder Communication, Customer Needs Integration, Time-Sensitive Management, Inter-Team Communication, Feedback Incorporation, Compliance with Local Regulations, Subcontractor Management, Sustainable Construction Practices, Innovative Construction Techniques, Managing Large-Scale Civil Projects
2	Interpersonal Skills	Adaptability, Negotiation Skills, Team Collaboration, Risk Management, Stakeholder Satisfaction, Risk Identification and Mitigation, Deliverables Management, Understanding of Civil Engineering Technologies
3	Leadership and Strategy	Stakeholder Management, Resource Management, Leadership and Motivation, Quality Management Implementation, Continuous Process Improvement, Crisis Management, Long-Term Strategic Thinking, Scope Management, Team Building, Ethical Standards Maintenance, Continuous Learning, Project Scope-Time-Cost Balance, Ensuring Structural Integrity, Safety Measures in Construction, Handling Logistical Challenges, Zoning and Land-Use Planning, Seismic Design Compliance

Table 6.1: Grouping of Factors Based on the K-means Clustering Results. "Table Continued"

4	Communication and Quality Control	Communication Skills, Cross-Cultural Communication, Organizational Alignment, Conflict Resolution Effectiveness, Stakeholder Engagement, Quality Management Tools Application, Cost Management, Project Management Methodologies Utilization, Overall Impact on Project Success, Soil Analysis and Foundation Planning, Managing Projects in Challenging Terrains, Work-site Cleanliness and Organization
5	Resource and Environmental Management	Navigating Organizational Politics, Technology Utilization, Resource Allocation, Expectation Management, Handling Unexpected Events, Enhancing Team Creativity, Environmental Impact Assessment, Water Resource Management, Quality of Construction Materials, Energy Effectiveness Practices, On-site Waste Management, Bridge and Infrastructure Construction

Indeed, the clustering of these factors into distinct themes provides a structured way to understand the complex interplay of skills and practices in the construction industry. Each cluster represents a different facet of project management, from the concrete aspects of planning and execution (Project Management) to the more abstract elements of leadership and strategy. The grouping also highlights the evolving nature of the construction industry, where traditional skills are being augmented by new priorities such as sustainability and innovation. The factors within each cluster are not isolated; they interact and influence each other. For instance, effective Communication Skills in Communication and Quality Control are essential for Leadership and Strategy, just as Resource and Environmental Management is crucial for effective Project Management. These interdependencies are key to understanding the holistic nature of project management in the construction industry. The inclusion of diverse factors such as Resource Management, Crisis Management, and Innovative Construction Techniques in various clusters indicates the breadth of skills required in modern project management. It suggests that successful project management goes beyond the basics of planning and execution, encompassing a broad spectrum of skills

from strategic foresight to creative problem-solving. Additionally, this clustering approach can be pivotal in identifying training and development needs within the industry. By understanding which clusters represent areas of strength and which represent potential areas for growth, industry leaders can tailor training programs to address specific gaps. For example, if a cluster like Leadership and Strategy is underrepresented among professionals, focused leadership development programs could be implemented. Moreover, the relationship between clusters also sheds light on potential career pathways within the construction industry. Understanding how different clusters of skills and practices are interconnected can guide professionals in navigating their career development, identifying areas for upskilling, or transitioning into different roles within the sector. The identification of these clusters through K-means clustering offers a novel perspective on the multifaceted nature of project management. It provides valuable insights into which areas are seen as crucial by professionals in the industry and how these areas interconnect. This understanding is essential for developing comprehensive strategies to enhance project outcomes, especially in the Pakistani construction industry, where unique cultural, organizational, and environmental factors influence the dynamics of project management. The insights gleaned from this clustering analysis are instrumental in shaping a more responsive and forward-looking construction industry, one that is well-equipped to meet the challenges of modern construction projects and capitalize on emerging opportunities.

7. FINDINGS AND DISCUSSIONS

The high Cronbach's alpha value obtained in this study, indicating strong internal consistency among survey responses, significantly bolsters the credibility of the nuanced findings obtained from the statistical overview and advanced analytical techniques like the Kruskal-Wallis test and correlation analysis. These methods have been instrumental in uncovering a broad acknowledgment of essential managerial skills, particularly emphasizing areas like stakeholder management, conflict resolution, and navigating organizational politics. Such skills are not only indispensable for the success of construction projects but also mirror the unique challenges and cultural nuances specific to the Pakistani construction industry. The survey's results, particularly the mean scores and heatmap analysis, have been pivotal in revealing areas where there is a consensus among professionals and highlighting where there are gaps. For example, the lower mean scores in adaptability and time management suggest these are potential areas for professional development. The varying responses and the significance of different skills across various professional groups, as indicated by the Kruskal-Wallis test, underscore the diversity in professional perspectives and experiences. These insights are crucial for customizing training programs and development initiatives to bolster the competencies of project managers. On the other hand, the correlation analysis offers valuable insights into how different skills and managerial aspects are interrelated. Positive correlations between factors like conflict resolution and navigating organizational politics, or team collaboration and negotiation skills, highlight the interconnected nature of these competencies in successful project management. Understanding these relationships is critical for devising holistic training programs and strategies that focus on augmenting interrelated skills, thereby enhancing overall managerial efficacy. The PCA and MAD methods have underscored the most significant factors impacting project success. PCA has highlighted the critical role of elements like crisis management and long-term strategic thinking. In contrast, MAD has brought to light the importance of maintaining ethical standards and promoting innovation. These findings suggest a dynamic landscape of project management where traditional skills are complemented by a focus on innovation, ethics, and forward-thinking strategies. Furthermore, the K-means clustering, optimized through the elbow method, has categorized

the survey factors into five distinct clusters, each representing unique thematic groupings. These clusters, project management, interpersonal skills, leadership and strategy, communication and quality control, and resource and environmental management, each highlight a different facet of project management. They underscore the evolving nature of the construction industry, where traditional skills are increasingly augmented by new priorities such as sustainability and technological innovation. The identified clusters and their constituent factors provide a comprehensive roadmap for focusing on key areas that can drive project success. For instance, the project management cluster emphasizes balancing traditional project management skills with innovative practices. The leadership and strategy cluster stresses the importance of strong leadership, ethical conduct, and strategic foresight. Similarly, the communication and quality control cluster signifies the pivotal role of effective communication in managing stakeholder relationships and ensuring project quality. In terms of future directions, developing strategies to address the challenges identified in the Pakistani construction industry is imperative. This strategy should include targeted training programs aimed at enhancing essential skills like adaptability, time management, and conflict resolution. There's also a need to foster a culture of continuous professional development within organizations, emphasizing the importance of interpersonal skills and the ability to navigate complex organizational politics. Additionally, integrating modern technologies and sustainable practices in construction projects should be prioritized to stay abreast of global trends and standards. Collaborations between industry and academia could be crucial in aligning educational curricula with the evolving needs of the industry. Advocating for policy changes that support innovative and environmentally sustainable construction practices will not only address the current skill gaps but also pave the way for a more efficient, responsible, and forward-thinking construction industry in Pakistan. The findings of this study open numerous avenues for future research and practical applications. There is a clear need for targeted training programs that address the identified skill gaps, particularly in areas such as adaptability and time management. Further research could delve into the specific challenges and opportunities associated with integrating innovative practices and sustainability considerations into the Pakistani construction industry. Additionally, understanding the cultural and organizational dynamics at play can aid in developing more effective strategies for stakeholder engagement and conflict resolution. Research in these areas will be instrumental in enhancing the efficiency, sustainability, and

overall success of construction projects in Pakistan and potentially in similar emerging markets. The study's insights into the interplay of various skills and practices pave the way for more nuanced and effective approaches to project management, contributing significantly to the advancement of the field both in theory and practice.

8. CONCLUSIONS

The study aims to investigate the critical role of project managers' political skills in enhancing the effectiveness of quality management practices in Pakistan's construction industry. Employing a survey-based methodology that targeted professionals across various construction projects in Pakistan, the research seeks to understand the impact of project managers' political acumen on project outcomes, identify challenges to project success and propose actionable strategies for skill enhancement. The significant findings of this study are as follows:

a. The high Cronbach's alpha value indicated a robust level of internal consistency among the responses, lending credibility to the survey's conclusions.
b. The survey highlighted the importance of managerial skills such as communication, stakeholder management, and conflict resolution, with professionals generally agreeing on their significance in project success.
c. The study found notable positive correlations between certain skills, such as conflict resolution and navigating organizational politics, and between team collaboration and negotiation skills, underscoring the interconnected nature of these competencies.
d. Both PCA and MAD methods identified key factors impacting project success, including crisis management, long-term strategic thinking, stakeholder management, and innovation promotion.
e. The clustering of survey factors into five distinct themes provided insights into the multifaceted nature of project management.

The study’s findings further emphasize the evolving requirements of the construction industry in Pakistan. The importance placed on political skills and their interplay with other managerial competencies highlights the need for a holistic approach to project management education and training. This could involve integrating courses on political and interpersonal skills into existing construction management education programs, or developing specialized workshops for professionals already in the field. Moreover, the results underline the importance of adaptability and continuous learning in the construction industry. The fast-paced and ever-changing nature of construction projects demands a workforce that is not

only skilled but also adaptable and open to ongoing learning and development. In light of the findings, there is also a need for organizational and policy-level changes. Construction firms in Pakistan could benefit from adopting policies that prioritize continuous professional development, ethical practices, and innovative approaches to project management. These policies could foster an environment where skills such as stakeholder management, conflict resolution, and strategic planning are nurtured and valued. Finally, this study makes a significant contribution to the field of construction project management, especially in the context of Pakistan. By highlighting the pivotal role of project managers' political skills and the importance of various managerial and technical competencies, it offers a comprehensive overview of the factors that influence the success of inter-organizational construction projects. The findings not only shed light on the current state of skills and practices in the industry but also provide a foundation for developing targeted strategies to enhance project outcomes. Future research directions could further explore the implementation of these strategies and their impact on the industry, ensuring continuous improvement and success in Pakistan's construction sector. Subsequent studies could focus on the long-term effects of training programs designed based on this research, or on the comparative analysis of project outcomes before and after the implementation of recommended strategies. This continued research will play a crucial role in refining the practices and approaches in construction project management, contributing to the sustainable growth and success of the construction industry in Pakistan and potentially in similar markets globally.

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APPENDIX A

This section provides the survey questions that were adopted in this study as given below in Table A.1.

Table A.1: Survey Questions and Their Associated Factors.

No.	Factors Considered	Question
1	Communication Skills	How effectively do project managers communicate project goals to the team?
2	Stakeholder Management	Rate the ability of project managers to understand and manage stakeholder expectations.
3	Conflict Resolution	Evaluate the project managers' skill in resolving conflicts within the team.
4	Adaptability	How well do project managers adapt to changes in project scope or environment?
5	Time Management	Assess the influence of project managers' political skills on project timeline adherence.
6	Negotiation Skills	Rate the effectiveness of project managers in negotiating with suppliers and contractors.
7	Navigating Organizational Politics	Evaluate how project managers deal with bureaucratic challenges in the organization.
8	Budgeting and Quality Management	How effective are project managers in maintaining quality standards under budget constraints?
9	Team Collaboration	Assess the project managers' ability to foster a collaborative team environment.
10	Strategic Planning	Rate the project managers' competence in strategic planning and foresight.
11	Resource Management	Evaluate the project managers' skills in leveraging resources for project success.

Table A.1: Survey Questions and Their Associated Factors “Table Continued”.

12	Risk Management	How effectively do project managers manage risks and uncertainties in projects?
13	Stakeholder Satisfaction	Assess the influence of project managers' political skills on stakeholder satisfaction.
14	Leadership and Motivation	Rate the ability of project managers to inspire and motivate the project team.
15	Cross-Cultural Communication	Evaluate the project managers' effectiveness in cross-cultural communication within the team.
16	Organizational Alignment	How well do project managers align project objectives with organizational goals?
17	Documentation and Reporting	Assess the project managers' proficiency in managing project documentation and reporting.
18	Quality Management Implementation	Rate the project managers' ability to implement and adhere to quality management practices.
19	Conflict Resolution effectiveness	Evaluate the impact of project managers' political skills on conflict resolution effectiveness.
20	Technology Utilization	How effectively do project managers utilize technology for project management?
21	Continuous Process Improvement	Assess the project managers' capability in continuous improvement of processes.
22	Environmental and Sustainability Management	Rate the project managers' skills in managing environmental and sustainability issues.
23	Legal and Regulatory Adaptability	Evaluate the adaptability of project managers to changing legal and regulatory environments.

Table A.1: Survey Questions and Their Associated Factors “Table Continued”.

24	Inter-Departmental Coordination	How well do project managers manage inter-departmental coordination for project success?
25	Crisis Management	Assess the project managers' effectiveness in crisis management.
26	Long-Term Strategic Thinking	Rate the project managers' ability in long-term strategic thinking and planning.
27	Stakeholder Engagement	Evaluate the project managers' skills in stakeholder engagement and communication.
28	Task Prioritization	How well do project managers prioritize and manage project tasks and deliverables?
29	Resource Allocation	Assess the project managers' ability to manage and allocate project resources efficiently.
30	Risk Identification and Mitigation	Rate the project managers' skills in identifying and mitigating project risks.
31	Scope Management	Evaluate the project managers' effectiveness in managing project scope and changes.
32	Safety Standards Promotion	How effectively do project managers promote and maintain safety standards on project sites?
33	Team Building	Assess the project managers' ability in building effective teams and promoting teamwork.
34	Innovation Promotion	Rate the project managers' skills in fostering innovation within the project team.
35	External Stakeholder Communication	Evaluate the project managers' effectiveness in communicating with external stakeholders.

Table A.1: Survey Questions and Their Associated Factors “Table Continued”.

36	Customer Needs Integration	How well do project managers understand and integrate customer needs into the project?
37	Time-Sensitive Management	Assess the project managers' capability in managing time-sensitive project aspects.
38	Quality Management Tools Application	Rate the project managers' effectiveness in applying quality management tools and techniques.
39	Cost Management	Evaluate the impact of project managers' political skills on project cost management.
40	Deliverables Management	How effectively do project managers manage project deliverables against set objectives?
41	Ethical Standards Maintenance	Assess the project managers' skills in maintaining ethical standards in project execution.
42	Expectation Management	Rate the project managers' ability to manage expectations and deliver project outcomes.
43	Continuous Learning	Evaluate the project managers' effectiveness in continuous learning and development.
44	Inter-Team Communication	How well do project managers facilitate communication between different project teams?
45	Handling Unexpected Events	Assess the project managers' capability in handling unexpected events and setbacks.
46	Project Management Methodologies Utilization	Rate the project managers' proficiency in utilizing project management methodologies.

Table A.1: Survey Questions and Their Associated Factors "Table Continued".

47	Project Scope-Time-Cost Balance	Evaluate the project managers' effectiveness in balancing project scope, time, and cost.
48	Feedback Incorporation	How effectively do project managers incorporate feedback into project processes?
49	Enhancing Team Creativity	Assess the project managers' role in enhancing team creativity and problem-solving.
50	Overall Impact on Project Success	Rate the overall impact of project managers' political skills on the success of inter-organizational projects.
51	Compliance with Local Regulations	Evaluate the effectiveness of project managers in overseeing compliance with local construction codes and regulations.
52	Understanding of Civil Engineering Technologies	Rate the project managers' understanding of modern civil engineering technologies relevant to construction.
53	Ensuring Structural Integrity	Assess the role of project managers in ensuring the structural integrity of construction projects.
54	Subcontractor Management	How effectively do project managers manage subcontractor selection and oversight?
55	Sustainable Construction Practices	Evaluate the project managers' ability to apply sustainable construction practices.
56	Safety Measures in Construction	Rate the adequacy of safety measures implemented in construction projects under the managers' supervision.

Table A.1: Survey Questions and Their Associated Factors "Table Continued".

57	Soil Analysis and Foundation Planning	Assess the project managers' competency in soil analysis and foundation planning.
58	Innovative Construction Techniques	Evaluate the effectiveness of project managers in implementing innovative construction techniques.
59	Environmental Impact Assessment	How well do project managers integrate environmental impact assessments into their planning?
60	Managing Projects in Challenging Terrains	Rate the project managers' ability to manage construction projects in challenging terrains or conditions.
61	Water Resource Management	Assess the project managers' proficiency in water resource management in construction projects.
62	Handling Logistical Challenges	Evaluate how project managers deal with logistical challenges in construction sites.
63	Quality of Construction Materials	Rate the project managers' capability in overseeing the quality of construction materials used.
64	Energy effectiveness Practices	How effectively do project managers incorporate energy-efficient practices in construction projects?
65	On-site Waste Management	Assess the project managers' role in facilitating effective on-site waste management.
66	Work-site Cleanliness and Organization	Evaluate the project managers' approach to maintaining work-site cleanliness and organization.

Table A.1: Survey Questions and Their Associated Factors “Table Continued”.

67	Zoning and Land-Use Planning	Rate the project managers' effectiveness in handling zoning and land-use planning issues.
68	Seismic Design Compliance	How well do project managers ensure compliance with seismic design requirements in construction?
69	Managing Large-Scale Civil Projects	Assess the project managers' capability in managing large-scale civil engineering projects.
70	Bridge and Infrastructure Construction	Evaluate the project managers' expertise in bridge and infrastructure construction and management.