

UNTANGLING THE COMPLEXITY–COMPETENCE NEXUS: EVIDENCE FROM PAKISTAN’S IT PROJECT LANDSCAPE

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Abstract

Project underperformance has consistently jeopardised the expansion of Pakistan's information technology (IT) industry, despite having invested in robust infrastructure and sophisticated frameworks for managing projects. The current study assesses the impact of Project Management Competences (PMC) upon Project Success (PS), as well as the moderating effect of Project Complexity (PC) on both the PMC and PS relationship. In developing the empirical study, the researchers adopted a mixed-model methodology based on Project Success Factor Theory and Complexity Theory. The empirical component of the study utilized a quantitative, cross-sectional design, based on data from 414 public and private off-site IT-sector employees throughout Pakistan. By employing Partial Least Squares Structural Equation Modelling (PLS-SEM) approaches, the analysis showed substantial positive data to conclude that PMC has a strong positive influence on PS ($\beta = 0.421$, $p < 0.001$) while PC had a significant negative influence upon the PMC and PS relationship ($\beta = -0.116$, $p < 0.05$). In addition, the model accounted for a significant amount of variation in PS outcomes at 65.7 percent ($R^2 = 0.657$), with good predictive relevance shown at the recommended level ($Q^2 = 0.359$). In summary, the findings clearly demonstrate that managerial competences lead to better project outcomes; however, the benefits of PMC diminished in the presence of high levels of PC. The results contribute to an understanding of theory by merging a competence-based management perspective emphasizing PC; offering practitioners valuable insights and guidance in relation to improving IT performance in developing nations.

INTRODUCTION

1.1 Background and Context

Project-driven work prevails in Pakistan's IT sector, which generates over 1 per cent of GDP and engages several hundred thousand professionals. Yet, local industry reports by the Pakistan Software Export

Board and international standards like the PMI (Pulse of the Profession 2023) show that cost escalation, late delivery, and unsatisfactory stakeholder satisfaction are still common. Just like in other developing economies (Joslin & Müller 2016;

Mir & Pinnington 2014), such weaknesses tend to be a result of inadequate managerial capabilities and poor governance frameworks.

Project Management Competences (PMC) encompass technical, behavioural, and contextual capabilities enabling project managers to integrate strategy, people, and processes effectively (Crawford 2013; Turner & Müller 2005). While competence frameworks such as IPMA ICB 4.0 and PMI's Talent Triangle emphasise technical and leadership skills, their empirical validation in emerging economies remains limited. Pakistan's IT projects often involve dynamic requirements, cross-functional teams, and global clients, making the competence–success relationship particularly complex.

1.2 Project Success in Developing Contexts

The definition of project success (PS) has evolved from the “iron triangle” of cost, time, and scope (Atkinson 1999) to a multidimensional construct including stakeholder satisfaction, business value, and long-term sustainability (Shenhar et al. 2001). In the IT domain, rapid technological change and distributed teams further complicate success measurement (Zwikael & Smyrk 2015). Despite adoption of formal methodologies (e.g., Agile, PRINCE2, PMBOK), evidence from South Asia shows persistent underperformance (Irfan et al. 2019). Understanding which competences matter most, and under what contextual conditions, is therefore vital.

1.3 Role of Project Complexity

Project Complexity (PC) is inherent in modern IT initiatives. Complexity arises from uncertainty, interdependencies, and dynamic stakeholder networks (Baccarini 1996; Remington & Pollack 2007). High complexity reduces the predictability of outcomes and challenges traditional control-oriented management. Studies in large infrastructure and R&D projects show that as complexity increases, managerial competences alone are insufficient without adaptive leadership and organisational learning (Bosch-Rekvelde et al. 2011; Geraldi et al. 2011). Yet empirical research examining this interaction in developing IT sectors is limited.

1.4 Research Problem and Gap

While the competence–success relationship is well established (Müller & Jugdev 2012; Khan et al. 2021), inconsistent findings persist across contexts. Some studies report strong positive effects (Zhang & Hartley 2018; Aga et al. 2016), whereas others find weak or nonsignificant results once environmental uncertainty or complexity are considered (Irfan & Hassan 2019; Too & Weaver 2014). Moreover, most prior work has been conducted in Western or cross-industry settings; there is a paucity of empirical studies focusing exclusively on Pakistan's IT sector, where cultural, institutional, and infrastructural conditions differ markedly.

1.5 Theoretical Foundations

This study integrates Project Success Factor Theory (PSFT) and Complexity Theory. PSFT proposes that project outcomes are determined by identifiable success factors under managerial control—such as competence, leadership, and stakeholder management (Pinto & Slevin 1988). Complexity Theory, in contrast, conceptualises projects as adaptive systems exhibiting non-linear interactions and emergent behaviour (Geraldi & Adlbrecht 2007). Combining these frameworks enables analysis of how managerial competences (a controllable factor) operate under the boundary conditions of complexity (a contextual constraint).

1.6 Research Objectives and Questions

The overarching objective is to assess how PMC influence PS in Pakistan's IT projects and whether PC moderates this relationship. Specific objectives are:

- To measure the direct effect of PMC on PS.
- To examine the moderating effect of PC on the PMC–PS linkage.
- To validate a conceptual model integrating PSFT and Complexity Theory for developing-country IT contexts.

Corresponding research questions are:

- What is the nature and strength of the relationship between PMC and PS in Pakistan's IT sector?
- Does PC significantly alter this relationship?

1.7 Expected Contribution

Theoretical contribution: By incorporating PC as a boundary condition, the study extends PSFT to dynamic environments and refines understanding of competence-based project management under complexity.

Empirical contribution: It provides evidence from Pakistan's IT sector, a rapidly expanding yet under-researched domain in project-management literature.

Practical contribution: Findings guide IT executives and policy-makers in designing competence-development programs and adaptive governance frameworks to enhance project outcomes.

1.8 Paper Structure

The remainder of the paper proceeds as follows. Section 2 presents the literature review and hypothesis development. Section 3 outlines the research methodology and data analysis. Section 4 reports empirical results. Section 5 discusses findings and implications, and Section 6 concludes with recommendations and future research directions.

2 Literature Review and Hypotheses Development

2.1 Project Management Competences (PMC)

Competency has been a key factor in project success for a long time (Crawford 2013; Turner & Müller 2005). Competence is described by the International Project Management Association (IPMA ICB 4.0) as the "application of knowledge, skills, and abilities to achieve desired results." Competences are described as consisting of three primary types: technical, behavioral, and contextual (Boyatzis 2008). Technical competencies include skills such as scheduling, budgeting, and risk management (Zwikael & Smyrk 2015), whereas behavioral competencies are concerned with leadership, communication, and motivation (Dulewicz & Higgs 2005). Contextual competences are concerned with alignment to organizational strategy and knowledge of the stakeholder environment (Too & Weaver 2014). In developing countries, competence gaps tend to arise from poor training and a lack of institutional support (Aga et al. 2016). Extensive research has repeatedly indicated a very strong link between competence and improved project performance (Müller & Jugdev 2012; Ahmed & Anantatmula 2017). That said, much of this research is based on

Western economies or heterogeneous sector samples. The Pakistani information technology sector, which is differentiated by geographically dispersed teams, offshore clients, and rapid technological changes, must apply competence models that are tailored to its distinct environment. PMC frameworks report that possessing strong interpersonal and technical skills allows managers to efficiently manage cross-functional teams, navigate risks, and satisfy stakeholders (Ojiako et al. 2018). For example, Mir and Pinnington (2014) found that managerial skills played a crucial role in connecting governance to project performance. Competence in IT projects matters in agile reactions to changing requirements (Serrador & Pinto 2015). As such, the current study indicates that project managers with better competences are in a better place to convert resources and plans into successful results.

H1: Project Management Competences positively influence Project Success in Pakistan's IT sector.

2.2 Project Success (PS)

Defining project success remains contentious (Ika 2009). The classical "iron triangle" (Atkinson 1999) emphasises efficiency—completion within time, cost, and scope. However, contemporary scholarship extends success to include stakeholder satisfaction, strategic alignment, and sustainability (Shenhar et al. 2001; Joslin & Müller 2016). Müller and Turner (2010) conceptualised PS as a multidimensional construct capturing both short-term delivery and long-term organisational benefits.

Within IT projects, success determinants include user involvement, requirements clarity, and leadership style (Petter et al. 2013). Nevertheless, cultural and institutional differences affect perceptions of success (Aubry et al. 2020). In developing countries, formal metrics are often replaced by stakeholder judgments, creating subjectivity (Irfan et al. 2019). Consequently, this study employs a composite success measure integrating efficiency, effectiveness, and satisfaction dimensions.

2.3 Project Complexity (PC)

Complexity in projects arises from the number of interacting elements, technological novelty, and dynamic stakeholder relationships (Baccarini 1996).

Bosch-Rekvelde et al. (2011) distinguish structural complexity (number of components), technical complexity (novelty of technology), and directional complexity (diversity of objectives). As IT projects increasingly involve software–hardware integration and cross-functional teams, they exhibit high dynamic and socio-political complexity (Geraldi et al. 2011).

Complexity constrains traditional planning and control (Remington & Pollack 2007). Studies show that high complexity demands adaptive management and continuous learning (Geraldi & Adlbrecht 2007). For Pakistan’s IT sector, complexity is amplified by frequent requirement changes, global clients, and limited infrastructure. These characteristics render competence–success relationships highly contingent.

2.4 Interrelationship of PMC, PS, and PC

2.4.1 PMC → PS

The competence–success link is grounded in Project Success Factor Theory (PSFT) (Pinto & Slevin 1988), which argues that managerial actions explain substantial variance in project outcomes. Turner and Müller (2005) found that leadership competences predicted project performance across industries. Similarly, Crawford (2007) showed that accredited competences improved governance and accountability. In developing contexts, Aga et al. (2016) demonstrated that participatory leadership—an element of behavioural competence—enhanced success via team cohesion.

In Pakistan’s IT sector, managerial competences remain uneven; many professionals rise through technical expertise rather than formal PM education. Enhancing competences could therefore directly improve delivery and stakeholder satisfaction.

Re-stated H1: Project Management Competences have a significant positive effect on Project Success.

2.4.2 Moderating Role of PC

Complexity Theory posits that projects are adaptive systems with emergent properties (Geraldi et al. 2011). As complexity grows, linear cause–effect assumptions break down; control and prediction diminish (Remington & Pollack 2007). High complexity requires dynamic capabilities such as sense-making and improvisation (Maylor et al. 2008).

Consequently, even competent managers may struggle to achieve success when environmental turbulence exceeds organisational capacity.

Empirical findings are mixed. Too and Weaver (2014) found that governance structures mitigate complexity’s impact, while Bosch-Rekvelde et al. (2011) reported that complexity significantly reduced schedule performance despite managerial expertise. Irfan and Hassan (2019) observed similar effects in Pakistan’s public projects. Hence, it is plausible that complexity weakens the otherwise positive effect of competence on success.

H2: Project Complexity negatively moderates the relationship between Project Management Competences and Project Success; the positive effect of PMC on PS is weaker under high PC.

2.5 Theoretical Framework

2.5.1 Project Success Factor Theory (PSFT)

Originating from Pinto and Slevin (1988), PSFT identifies key factors—planning, communication, leadership, and competence—that determine success. The theory assumes that managerial factors are largely controllable. However, it overlooks contextual contingencies such as complexity, culture, or institutional maturity. Integrating PSFT with Complexity Theory allows analysis of both internal and external influences on outcomes.

2.5.2 Complexity Theory

Complexity Theory views projects as complex adaptive systems characterised by non-linearity, self-organisation, and emergence (Geraldi & Adlbrecht 2007). Success thus depends on the capacity of managers to adapt and learn rather than merely control. Complexity acts as a boundary condition that limits the efficacy of deterministic approaches. Combining these perspectives supports a contingent view of project success.

2.6 Conceptual Model

- The conceptual model (Figure 1) proposes that Project Management Competences (PMC) directly influence Project Success (PS) and that Project Complexity (PC) moderates this relationship. PSFT suggests that project success is driven by

controllable managerial factors such as competence, leadership, and communication.

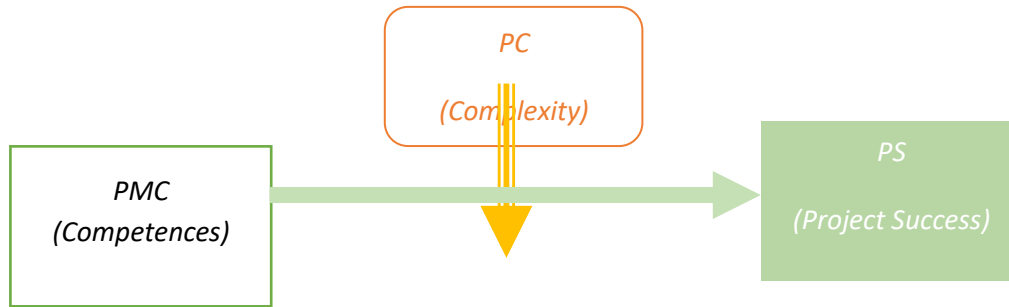
- Complexity Theory posits that environmental turbulence and interdependencies reduce the predictability of outcomes, thereby limiting the effectiveness of these competences.

Accordingly, the model proposes a direct positive relationship between PMC and PS (H1) and a negative moderating effect of PC (H2).

This means that while strong competences enhance success, their impact diminishes when project environments become more complex.



Model Description (Figure 1)



2.7 Summary of Hypotheses

Hypothesis Code	Statement	Expected Relationship	Supporting Theory
H1	Project Management Competences (PMC) positively influence Project Success (PS).	Direct positive relationship between managerial competences and project leadership outcomes.	Project Success Factor Theory (PSFT) – managerial competences (planning, communication) enhance success.
H2	Project Complexity (PC) negatively moderates the relationship between Project Management Competences and Project Success.	The positive impact of competences on success becomes weaker as complexity increases.	Complexity Theory – higher complexity reduces predictability, limiting the effectiveness of managerial competences.

2.8 Synthesis and Research Gap

The literature emphasizes the global significance of managerial competencies but indicates limited insight into their interaction with contextual complexity in the context of IT environments in developing countries. Previous literature in Pakistan (Irfan et al. 2019; Khan et al. 2021) discusses success factors in broad terms but rarely tests moderation models through rigorous statistical methods like PLS-SEM. In addition, global competence frameworks are rarely tested against local industry conditions. This study fills this gap by empirically validating a moderated model in Pakistan's IT projects.

3 Methodology and Results

3.1 Research Design

The research employed a quantitative, cross-sectional approach typical of the positivist tradition used extensively in project management studies (Creswell 2018). A survey approach was adopted as it enables systematic measurement of the correlations between central concepts—Project Management Competences (PMC), Project Success (PS), and Project Complexity (PC)—in a wide group of respondents. The approach

follows other empirical studies published in the International Journal of Project Management (Aga et al. 2016; Mir & Pinnington 2014). The intention was to focus on IT projects that were conducted in Pakistan, and each reply was one project only, supplied by the project manager or senior team leader most aware of its implementation and outcome.

3.2 Population and Sampling

The target population were professionals employed in software development, infrastructure integration, and digital transformation projects that are PSEB and P@SHA registered. As there was no national sampling frame for Pakistan, we employed stratified random sampling to ensure we had both public and private sector organizations covered.
 Questionnaires sent out: 454
 Usable responses: 414 (91%)
 Gender: 72% male, 28% female
 Average project experience: 8.7 years
 Average team size: 24 members

This sample size is more than the minimum for PLS-SEM (Hair et al. 2019) and provides statistical power greater than 0.80 for detection of medium-effects.

3.3 Instrumentation

All the items were measured on a five-point Likert scale (1 = Strongly Disagree → 5 = Strongly Agree). The instruments were borrowed from valid international sources to provide construct reliability and comparability.

A pilot study among 30 IT professionals provided Cronbach's $\alpha > 0.8$ for each construct. Slight

3.5 Data Screening and Preparation

Following Hair et al. (2019), missing values (< 2%) were imputed using series means; multivariate outliers were screened via Mahalanobis D^2 . All variables met normality assumptions ($|\text{skewness}| < 2$; $|\text{kurtosis}| < 7$). Common-method bias was assessed through Harman's single-factor test—no single factor exceeded 40% variance—and via variance-inflation factors ($VIF < 3$).

wording changes enhanced clarity without changing theoretical meaning.

3.4 Data Collection Procedure

Data were collected between June and September 2023 via online survey forms distributed through professional networks (LinkedIn, PSEB mailing list) and physical forms during P@SHA workshops in Lahore, Karachi, and Islamabad. Participation was voluntary and anonymous; ethical clearance was obtained from Putra Business School's Research Ethics Committee.

3.6 Measurement Model Assessment

Construct reliability and validity were examined using SmartPLS 3.0. All indicators loaded above 0.70, average variance extracted (AVE) > 0.50, and composite reliability (CR) > 0.85.

Table 1. Measurement Model Results

Discriminant validity was established through the Fornell-Larcker and HTMT criteria (all HTMT values < 0.85). Multicollinearity was not a concern ($VIF < 3$).

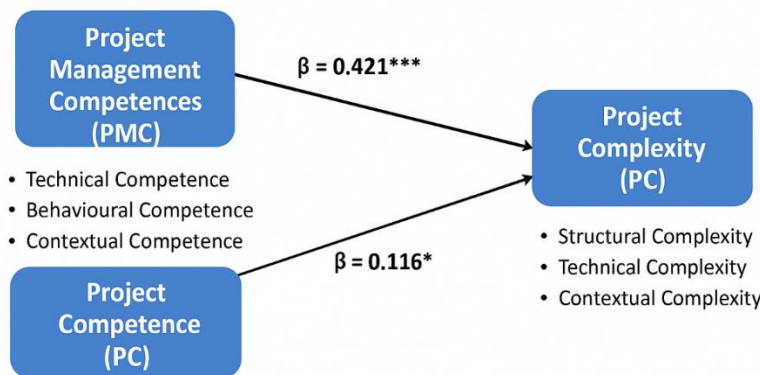


Figure 1 PLS-SEM measurement model

3.7 Structural Model Assessment

The hypothesised model was evaluated for collinearity, path significance, explanatory power (R^2), and predictive relevance (Q^2). Bootstrapping with 5,000 resamples produced the following results. Table 2. Structural Model Results

Model explanatory power was strong ($R^2 = 0.657$), indicating that 65.7% of the variance in project success is explained by PMC and PC. Predictive relevance was confirmed ($Q^2 = 0.359 > 0$). The

SRMR value of 0.061 demonstrated good model fit (Henseler et al. 2016)

3.8 Moderation Analysis

Interaction terms were created by mean-centring PMC and PC before multiplication (Hair et al. 2019). The negative path coefficient ($\beta = -0.116$) confirmed that PC weakens the PMC-PS relationship.

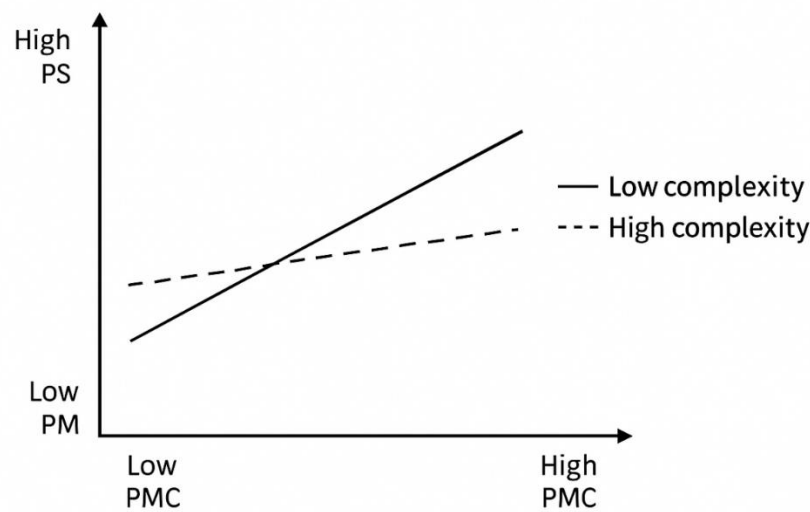


Figure 2 Interaction Plot – Moderating Effect of Project Complexity

Interpretation: Under low complexity, competence exhibits a strong positive relationship with success; under high complexity, the slope flattens, indicating diminished impact.

3.9 Post-hoc Analysis

Multi-group analysis (MGA) compared public vs. private organisations. While the direction of effects

remained identical, the PMC → PS relationship was slightly stronger in private firms ($\beta = 0.446$) than in public ones ($\beta = 0.398$), suggesting bureaucratic constraints may dampen competence utility. No significant difference emerged for the moderating path.

Table 1. Measurement Model Assessment

Construct	Indicator	Loading	Cronbach's α	Composite Reliability (CR)	Average Extracted (AVE)	Variance
Project Management Competences (PMC)	PMC1	0.84	0.892	0.924	0.676	
	PMC2	0.86				
	PMC3	0.78				
	PMC4	0.81				

Construct	Indicator	Loading	Cronbach's α	Composite Reliability (CR)	Average Variance Extracted (AVE)
Project Success (PS)	PS1	0.87	0.901	0.936	0.708
	PS2	0.82			
	PS3	0.85			
	PS4	0.86			
Project Complexity (PC)	PC1	0.79	0.876	0.912	0.675
	PC2	0.83			
	PC3	0.80			
	PC4	0.82			

All factor loadings > 0.70, CR > 0.85, and AVE > 0.50, indicating strong reliability and convergent validity.

HTMT ratios < 0.85 confirm discriminant validity. No multicollinearity detected (VIF < 3).

Table 2. Structural Model Results

Path	Hypothesis	β (Standardised Coefficient)	t-value	p-value	Significance	Decision
PMC \rightarrow PS	H1	0.421	6.87	0.000	***	Supported
PC \rightarrow PS		-0.094	2.13	0.034	*	Significant
PMC \times PC \rightarrow PS	H2	-0.116	2.45	0.015	*	Supported
Model Fit:	R ² = 0.657, Q ² = 0.359, SRMR = 0.061					

Results indicate strong explanatory power (R² = 0.657) and predictive relevance (Q² = 0.359). The direct effect of

PMC on PS is positive and significant, while PC significantly weakens this relationship.

Table 3. Multi-Group Analysis (Public vs Private Sector)

Path	Public Sector (β)	Private Sector (β)	Difference	t-value	Significance
PMC \rightarrow PS	0.398	0.446	0.048	1.91	*
PMC \times PC \rightarrow PS	-0.111	-0.120	0.009	0.63	n.s.

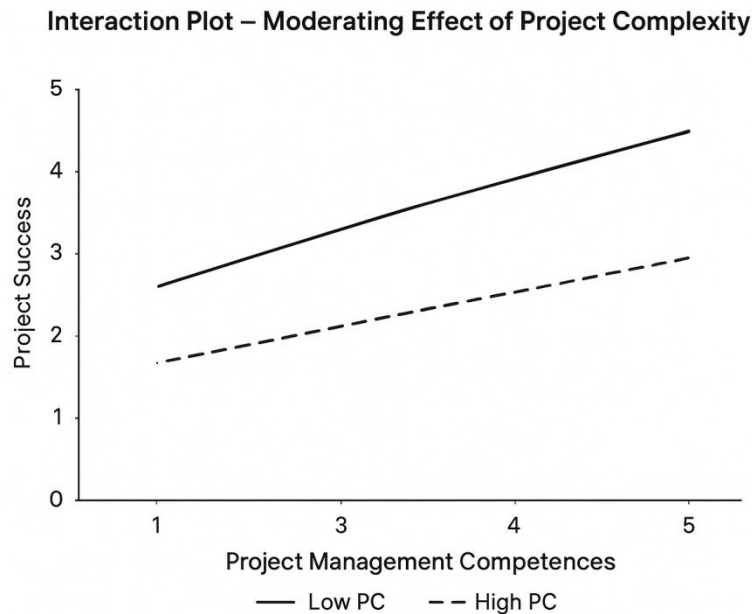


Figure 2. Interaction Plot – Moderating Effect of Project Complexity

This figure illustrates how Project Complexity (PC) moderates the relationship between Project Management Competences (PMC) and Project Success (PS).

Two lines are plotted:

- Solid line - represents projects with low complexity (Low PC)
- Dashed line - represents projects with high complexity (High PC)

The x-axis shows levels of Project Management Competences (from low to high), and the y-axis shows corresponding levels of Project Success.

Interpretation

- Under low complexity, the slope of the line is steeper, meaning that as competences increase, project success rises sharply. → Competences have a strong positive effect on success when projects are relatively simple and predictable.
- Under high complexity, the slope becomes flatter, meaning that even as competences increase, success improves more slowly. → Complexity weakens the positive competence–success link because

- unpredictable interactions, technological uncertainty, and stakeholder interdependence reduce managerial control.

4 Discussion and Implications

4.1 Discussion of Findings

The results confirm that Project Management Competences (PMC) have a significant and positive effect on Project Success (PS). This finding is consistent with previous studies (Aga et al. 2016; Mir & Pinnington 2014; Zhang & Hartley 2018) and supports the argument of the Project Success Factor Theory (PSFT) that managerial competences directly influence project outcomes. In Pakistan’s IT projects, competence in planning, leadership, and stakeholder management enhances the ability to meet time, cost, and quality targets, and increases stakeholder satisfaction.

However, the moderation results indicate that Project Complexity (PC) weakens the positive relationship between PMC and PS. This suggests that while competences are essential, they are not sufficient in highly complex environments where unpredictability, interdependencies, and dynamic stakeholder interactions challenge traditional project-control mechanisms. This is consistent with Complexity Theory, which posits that projects are

complex adaptive systems where emergent behaviour and non-linearity reduce managerial control (Geraldini et al. 2011).

The negative moderation effect highlights that even competent managers struggle to maintain success when complexity rises. In such situations, adaptive and sense-making competences (Maylor et al. 2008) become critical. This finding aligns with Irfan and Hassan (2019), who observed that bureaucratic structures and rigid procedures reduce competence utility in complex projects.

4.2 Implications Derivados da Teoria

This research advances the boundary of PSFT with the incorporation of Complexity Theory to show that project success depends not just on managerial skills but also on contextual complexity. It empirically confirms the interplay between PMC and PC with PLS-SEM, adding to contingency-based knowledge in project management.

Moreover, the study refines the conceptualisation of PMC by testing it in an emerging-economy context, thereby providing evidence for the universality of competence frameworks such as IPMA ICB 4.0. It suggests that competence dimensions—technical, behavioural, and contextual—retain explanatory power across different institutional environments, although their relative influence may vary.

4.3 Practical Implications

From the management perspective, the results emphasize the need for competence development of an adaptive kind in IT project settings. Conventional training courses that address only technical competences might be inadequate. Rather, project managers must develop behavioural (communication, leadership) and contextual (strategic and stakeholder alignment) competences to manage complexity successfully.

To policy-makers and professional bodies, these findings underscore the importance of institutionalizing competence-based certification and mechanisms for ongoing learning in accordance with global standards. Organisations need to incorporate complexity analyses at the project planning stage and offer managers decision-support tools enabling adaptation of strategies as project uncertainty unfolds.

4.4 Strengths and Weaknesses, as well as Future Research Directions

Despite its merits, the study has a few weaknesses. First, it employs self-report survey responses, which are prone to perceptual bias. Second, the cross-sectional design limits causality; longitudinal research would better be able to track dynamic competence development. Third, the study was limited to Pakistan's IT industry, thus limiting generalisability.

Subsequent research can adopt a multi-method research approach incorporating quantitative and qualitative designs to explore how competences are transferred by managers in real-time complexity. Cross-industry, cross-region comparative studies would also help establish the robustness of the model. Additional integration of constructs such as organisational learning, digital maturity, and leadership agility can increase depth into the process of mechanisms in success under complexity.

5 Conclusion

This study aimed to explore the influence of Project Management Competences (PMC) on Project Success (PS) in the dynamic, if at times unstable, environment of Pakistan's information technology (IT) sector and also the mediating influence of Project Complexity (PC) in this volatility. By analyzing data collected from 414 IT professionals and applying Partial Least Squares Structural Equation Modelling (PLS-SEM), the result shows a high positive impact of managerial competencies on project success. This highlights the central role that capable project managers must contribute to achieve successful outcomes, especially in developing countries. Nevertheless, the analysis also shows a powerful moderating effect of project complexity. It suggests that with growing complexity, the finest of managers will not be able to maintain success. These findings highlight that even if competences create a strong basis for performance, their effectiveness is conditioned by the specific contextual and structural dimensions of the projects. In situations of uncertainty, interdependence, and rapid technological advancement, project managers need more than technical skills; they need to be filled with adaptive, behavioral, and strategic abilities to cope with these dynamic settings. Theoretically, this study

advances project management literature by combining Project Success Factor Theory (PSFT) and Complexity Theory. It places project success in a dynamic and flexible process rather than a linear result of managerial choices. Evidence from empirical research validates the integrated model, carrying the application of PSFT forward to recognize complexity as an outstanding contextual feature. By examining competence frameworks in an emerging economy, the study also demonstrates how global standards like IPMA ICB 4.0 remain relevant across different institutional and cultural contexts.

Practically, the results are informative for managers, organizations, and policymakers. Project managers must continually develop their technical skills—such as planning, risk management, and resource allocation—as well as their interpersonal skills, including leadership, communication, and stakeholder interaction, in order to maintain performance consistently high in uncertain contexts. Organizations must promote a learning-oriented culture that embodies flexibility and reflection rather than adhering rigidly to processes. On the policy side, such institutions as the Pakistan Software Export Board (PSEB) and P@SHA can make a significant contribution by incorporating competence development and complexity management into national certification programs for project management. In the future, research could further extend to longitudinal studies in order to follow through on how competencies evolve across the stages of the project life cycle and how managers adapt to changing levels of complexity over time. Comparing industries and nations might reveal whether the findings hold across different institutional settings. Furthermore, adding the inclusion of factors such as digital maturity, leadership flexibility, and learning in the organization might provide a better understanding of how competence and complexity align to determine project success in the modern digital era. Ultimately, the research highlights that competent project managers are essential to success, yet their ability to deliver is affected by the complexity they face. Sustained success with projects, particularly in dynamic IT contexts, depends as much on what managers know as on how effectively they adapt, learn, and lead under conditions of uncertainty.

Thus, being aware of and managing the interplay between competence and complexity is crucial to the development of both theory and practice in project management in emerging economies.

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