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FROM COLLABORATION TO COMPLETION: HOW TEAMWORK QUALITY AND LEADERSHIP STYLE DRIVE IT PROJECT PERFORMANCE

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ABSTRACT

Information technology (IT) projects continue to experience cost overruns, delays, and performance deficiencies despite advances in project management methodologies. Prior research has identified teamwork quality (TWQ) as a critical factor influencing project success; however, empirical evidence from developing economies remains limited. This study examines the effect of teamwork quality on IT project success, focusing on key dimensions including communication, coordination, cohesion, mutual support, balanced member contribution, and collaboration. In addition, the study investigates the moderating role of project managers' leadership style in the relationship between TWQ and project success. A quantitative research design was adopted, supported by an extensive review of relevant literature to develop the research framework. Data were collected through a structured questionnaire administered electronically to software development team members and project managers working in IT organizations in Pakistan, all of whom possessed substantial professional experience in IT project environments. The study aims to provide empirical evidence on how enhanced teamwork quality contributes to improved project outcomes and how leadership style strengthens team effectiveness. By focusing on the Pakistani IT sector, this research addresses a contextual gap in the literature and offers practical implications for project managers and IT stakeholders seeking to improve project performance. The findings contribute to the growing body of knowledge on teamwork quality by integrating leadership as a key contextual mechanism in IT project success.

Keywords: *Teamwork Quality (TWQ), Project Success, Information Technology Projects, Leadership Style*

1. INTRODUCTION

Quality has long been a fundamental concern in management and operational research, especially in settings with repetitive, standardized processes. However, despite its acknowledged importance, quality

remains a relatively underexplored dimension in the context of information technology (IT) projects, which are inherently complex, dynamic, and knowledge intensive. The nature of IT and software development projects—marked by evolving requirements, high uncertainty, technological interdependence, and rapid change—makes successful project delivery particularly demanding. Unlike routine production systems, IT projects require ongoing coordination, adaptation, and problem solving under uncertain conditions, which traditional quality paradigms do not fully address (Taroun & Yang, 2021; Wang et al., 2024).

IT projects demand substantial financial, human, and technological investments, and organizations increasingly rely on these initiatives to support digital transformation, operational efficiency, and competitive advantage. Despite the widespread adoption of established project management standards and methodologies, such as PMBOK, Agile, DevOps, and maturity frameworks like CMMI, IT projects continue to exhibit significant cost overruns, schedule delays, and performance deficiencies. Project managers and development teams operate under intense pressures to meet expectations for speed, innovation, and quality, often resulting in compromised collaboration and weakened team dynamics. These pressures not only impact traditional project constraints but also profoundly shape interpersonal interactions within teams (Aldwairi et al., 2023; He et al., 2022).

Recent industry analyses and empirical studies continue to highlight the persistent gap between prescribed project practices and real-world outcomes. Longitudinal data from industry sources show that a substantial proportion of IT projects remains challenged or unsuccessful. Many projects are completed either late, over budget, or with diminished scope, resulting in suboptimal delivery of intended functionality. These findings indicate that technical tools and formal quality frameworks alone are inadequate to secure IT project success (Standish Group, 2023; IEEE Spectrum, 2022). There is growing recognition that the human and social dimensions of project work—particularly teamwork and leadership—play a central role in shaping project outcomes (Hossain et al., 2021; Noor et al., 2024).

Teamwork has therefore emerged as a critical focus area in contemporary project management research. Modern IT projects are rarely executed by isolated individuals; instead, they rely on cross functional, collaborative teams whose collective expertise and coordinated efforts exceed the capacity of any single member. As project complexity increases, so does the need for integrated team performance, shared understanding, and mutual accountability (Salas et al., 2021; Lee & Xia, 2023). In this context, teamwork is not merely a supportive factor but a core enabler of project success, enabling organizations to respond more effectively to change, mitigate risk, and innovate under uncertainty.

Within the broader teamwork literature, the concept of Teamwork Quality (TWQ) has gained prominence as a comprehensive construct for understanding how team processes influence project performance outcomes. Originally conceptualized by Hoegl and Gemuenden, TWQ encompasses multiple dimensions of team interaction, including open and effective communication, coordination of tasks, balanced contributions by members, mutual support, collective effort, and team cohesion (Hoegl & Parboteeah, 2003). These dimensions collectively reflect both task related and socio emotional aspects of how teams function, making TWQ particularly relevant in environments where collaboration and adaptive problem solving are critical.

Emerging empirical research underscores the importance of TWQ in IT and software development projects. High levels of teamwork quality have been linked to improved coordination, reduced conflict, faster problem resolution, and enhanced project outcomes, including delivery performance, customer satisfaction, and innovation (Moghaddam et al., 2023; Pandey et al., 2022). For instance, studies exploring Agile and hybrid project environments have found that teams with strong communication and mutual support exhibit greater resilience in the face of uncertainty and change (Singh & Sengupta, 2024; Zhao et al., 2023). Similarly, research in distributed and remote software teams highlights that cohesion and balanced contributions significantly influence collective efficacy and performance (Kim & Lee, 2022; Oliveira et al., 2024). These findings demonstrate that TWQ is not just a theoretical construct but a measurable and impactful predictor of IT project success.

Despite this progress, gaps remain in understanding the mechanisms through which TWQ affects project outcomes and how contextual factors moderate this relationship. One such factor that has received renewed attention is leadership style. Effective leadership is critical in guiding teams, shaping norms, and fostering an environment that enables high quality teamwork. Leadership behavior influences communication patterns, conflict resolution, decision making processes, and motivational

dynamics, all of which are essential in complex IT settings (Bakker et al., 2022; Chatterjee & Cheng, 2023). Recent studies indicate that leadership styles that emphasize empowerment, psychological safety, and shared decision making are particularly effective in enhancing team performance and adaptive capacity under uncertainty (Gonzalez & Turner, 2023; Martínez Ruiz et al., 2022).

In the IT project context, project managers serve as both technical coordinators and social catalysts. They are responsible for aligning individual efforts with project goals, mitigating conflicts, facilitating communication, and balancing diverse stakeholder demands. Leadership styles that promote collaboration and trust—such as transformational, servant, and inclusive leadership—have been shown to strengthen teamwork quality and, in turn, improve project outcomes (Nguyen et al., 2023; Singh & Reddy, 2021). Conversely, leadership approaches that rely on command and control or transactional exchanges may inhibit open communication, reduce psychological safety, and weaken collective engagement, leading to poorer project performance.

Yet, empirical evidence on how leadership style interacts with teamwork quality to influence IT project success remains limited, especially in emerging economy contexts. Pakistan's IT sector, for example, has experienced rapid growth in recent years, contributing significantly to national digital transformation efforts. However, like many other developing markets, this sector faces challenges related to talent retention, team dynamics, organizational culture, and project governance. Few studies have examined how teamwork quality and leadership styles jointly shape project outcomes in such environments, indicating a clear gap in both theory and practice (Khan & Saeed, 2024; Tariq et al., 2023).

This research addresses these gaps by establishing a comprehensive framework for understanding how Teamwork Quality affects IT project success and how project manager leadership style moderates this relationship. Specifically, this study highlights the importance of communication, cohesion, mutual support, balanced member contributions, and collaboration among team members rather than isolated task execution. By exploring these dynamics within the Pakistan IT sector, the study contributes novel empirical evidence to the literature on teamwork, leadership, and IT project performance in emerging economies. In doing so, it provides actionable insights for project managers, organizational leaders, and policymakers seeking to enhance project effectiveness through improved team processes and leadership practices.

2. LITERATURE REVIEW

2.1 Teamwork Quality (TWQ)

From the project's initiation to its completion, IT projects depend heavily on teamwork. Although collaboration is crucial in software development teams, little is known about how it influences IT software development teams. In this research the Hoegl and Gemuenden (2001) construct of teamwork quality, which solely addresses the caliber of interactions. This TWQ construct does not address task planning, resource allocation, or management by objectives. Neither do measures of the task process, task strategy, or the quality of the performance of the task activities carried out by the individual team members. The six subconstructs of communication, coordination, balance of member contribution, mutual support, effort, and cohesion cover performance-relevant measures of internal interaction in teams (Lindsjørn et al., 2016).

2.1 Communication

Effective communication constitutes a vital element of interprofessional teamwork (Paxino et al., 2022). The quality of communication within a team is assessed in terms of both frequency and formalization of information exchange. Frequency denotes the regularity of communication among team members and the time devoted to it. Formalization pertains to the level of spontaneity in communication. Formal communication involves planned interactions and includes written status reports, while informal communication encompasses spontaneous interactions, such as discussions in doorways or by screens (Lindsjørn et al., 2016). Project Managers encounter the challenge of structuring work to enable essential communication among teams and individuals. This involves a spectrum of decisions, spanning

the allocation of tasks across teams, the implementation of work processes and tools to coordinate tasks, and addressing softer issues, such as ensuring the effectiveness of teams.

2.2 Coordination

Successful IT Project teams hinge on effective coordination, relying on frequent interactions and mutual adjustments to manage dependencies between activities. Task execution heavily depends on coordination through feedback and mutual adjustments, especially during formal meetings and ad hoc conversations. Coordination is facilitated through various mechanisms, including frequent interactions and mutual adjustments. Virtual teams require tools that can alleviate the challenges posed by distance and diminished communication (Stray et al., 2022).

2.3 Balance of member contribution

In IT software teams comprising members with diverse expertise, achieving a balanced contribution is crucial. The integration of task-relevant knowledge and experience from all team members into the decision-making processes can significantly enhance overall team performance. However, if discussions are dominated by only a select few team members, it may lead to decreased motivation among others, consequently impeding the team's overall effectiveness (Lindsjørn et al., 2016).

2.3 Mutual Support

In a software team, collective responsibility for the end product is paramount, necessitating the development of shared mental models through negotiated understandings about both teamwork and the task at hand. Visibility and comprehension of project goals, system requirements, project plans, risks, individual responsibilities, and project status are imperative for all parties involved (Moe et al., 2010). Team members should receive support as needed and consider the contributions of their peers rather than striving to outperform one another. Certain agile development methods incorporate the concept of collective code ownership, fostering mutual support and collaboration(Lindsjørn et al., 2016).

2.4 Effort

Team members are encouraged to actively contribute to the team's tasks. As outlined by Hackman (1987), conditions supporting effort should be established, emphasizing that interaction among members should minimize social loafing and instead cultivate a shared commitment to the team and its objectives. The prioritization of team tasks over individual responsibilities serves as a meaningful indicator of the collective effort invested by team members in common objectives (Lindsjørn et al., 2016).

2.5 Cohesion

An examination of cohesiveness is deemed crucial for comprehending group dynamics within teams. Cohesiveness plays a vital role in social integration and the endurance of groups. Research indicates that cohesive groups exhibit improved coordination and demonstrate heightened altruistic behaviors. Team members within cohesive groups willingly provide assistance to others, actively engage in group activities, and align themselves with group objectives (Kakar, 2018). In a survey involving 31 software teams, team cohesion emerged as the predominant factor in examining the impact of team cohesion, team experience, and team capability on overall team performance (Lindsjørn et al., 2016).

2.6 Teamwork Quality in Software Development Projects

Teamwork quality is a pivotal aspect of software development projects, influencing the efficiency, creativity, and overall success of the IT project. Effective communication lies at the core of teamwork quality in software development. Team members must engage in open and transparent communication

to share ideas, progress, and challenges. Clear and concise communication ensures that everyone is on the same page, mitigates misunderstandings, and fosters a collaborative environment. Collaboration and coordination are key elements of teamwork quality. Software development projects often involve complex tasks that require the integration of diverse skills and expertise. A well-coordinated team can leverage the strengths of individual members, leading to more innovative solutions and efficient problem-solving. Ultimately, the success of software development projects hinges on the quality of teamwork. When communication is clear, collaboration is effective, trust is established, and adaptability is embraced, teams can overcome complexities, innovate, and deliver software solutions that meet or exceed stakeholder expectations (Hoegl & Parboteeah, 2003).

2.7 Project Manager Leadership Style

Leadership constitutes a pivotal determinant of success in endeavors characterized by collaborative efforts among groups of individuals (Liphadzi et al., 2015). The project manager occupies a central position in the project process, playing a vital role in overseeing both the project itself and the project team. Their ultimate responsibility lies in ensuring the project concludes successfully. A thorough analysis of essential leadership qualities and an understanding of their positive impact can prove advantageous for project managers across various industries, thereby fostering overall project success (Dubois et al., n.d.). Project manager's leadership style is viewed as the strongest predictors of teamwork. The project manager's leadership style assessed includes transactional and transformational leadership (Dubois et al., n.d.). The mediating variable in this research examined leadership in IT projects in terms of the particular style of leadership adopted by the project manager for teamwork Quality. According to (Clarke & Clarke, 2012) Numerous studies have investigated the correlation between team leader behaviors and their direct or indirect impact on project performance and success. One such study revealed that adhering to standardized project leadership practices, as delineated by the competencies outlined in the Project Management Body of Knowledge (PMBOK), which encompass planning, communication, interpersonal skills, and visionary leadership behaviors, demonstrated a positive association with project success.

Burns (1978) operationalized the theory of Transformational Leadership (TL) by delineating it into two distinct leadership styles—a dichotomy between transformational and transactional leadership. A transformational leader is characterized as someone who heightens followers' awareness of the significance and value of desired outcomes, along with the methods to achieve those outcomes. Such a leader persuades followers to transcend their individual self-interests for the collective benefit of the organization. Simultaneously, the transformational leader elevates followers' needs on Maslow's (1954) hierarchy, shifting their focus from lower-level concerns related to safety and security to higher-level needs centered on achievement and self-actualization(Mccleskey, 2014).

Transactional leadership centers on the exchanges that transpire between leaders and followers. These exchanges enable leaders to achieve their performance objectives, fulfill necessary tasks, uphold the existing organizational state, motivate followers through contractual agreements, guide followers' behavior towards the attainment of established goals, underscore extrinsic rewards, mitigate unnecessary risks, and prioritize the enhancement of organizational efficiency. Concurrently, transactional leadership enables followers to address their own self-interests, mitigate workplace anxiety, and focus on well-defined organizational objectives, including enhanced quality, customer service, cost reduction, and increased production (Mccleskey, 2014).

3. RESEARCH METHODOLOGY

The present study adopts a quantitative research approach, which ensures the reliability and authenticity of the data collected from the selected sample. Data were collected using a structured questionnaire, developed based on previously validated instruments and adapted from Lindsjørn et al. (2016) and Owusu-Manu et al. (2021). The study's conceptual framework comprises three primary variables: Teamwork Quality (TWQ), Project Manager Leadership Style (PMLS), and Project Performance (PP). All variables were measured using a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), consistent with previous studies in the project management context (Zhu et al., 2021).

The questionnaire items for TWQ specifically captured dimensions such as communication, coordination, balance of member contribution, mutual support, collective effort, and team cohesion, reflecting both task-related and social interactions within teams. The adoption of previously validated measures ensures content validity while allowing for comparability with prior research. This approach provides a robust mechanism for assessing the influence of teamwork quality and leadership style on project performance within IT project teams.

3.1 Data Collection and Sampling

Data for this study were collected using a structured online questionnaire. The target population comprised professionals working in the IT sector of Pakistan, including project managers and software development team members with varying levels of experience, ranging from junior to senior roles. Participants were selected from a database of IT professionals involved in projects of diverse scales and phases, ensuring a broad representation of perspectives on teamwork quality and project performance.

A **non-probability sampling technique** was employed, specifically convenience sampling, due to the voluntary nature of participation and accessibility constraints. Respondents were selected randomly based on their willingness to complete the questionnaire, without imposing specific quotas regarding organizational affiliation, role, or gender. A total of **110 responses** were collected and deemed suitable for analysis. This approach provided preliminary insights into perceptions of teamwork quality and the moderating role of leadership style within IT project teams in Pakistan, although it may limit the generalizability of the findings beyond the sampled population.

3.2 Conceptual Framework

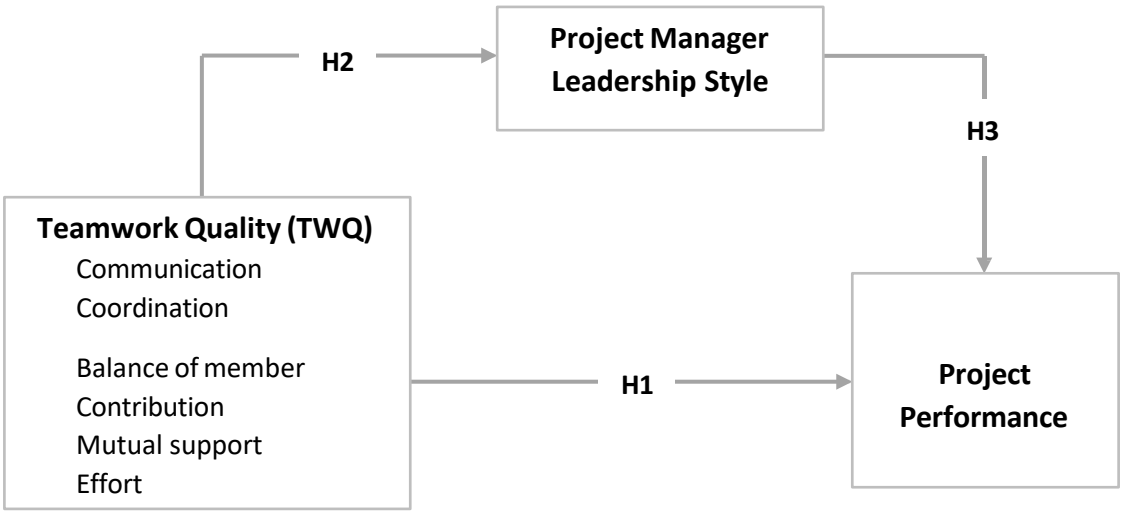

Fig 1: Conceptual Framework

3.3 HYPOTHESES

Numerous studies have investigated the impact of teamwork on the success of individual team members and overall team and project performance (Lindsjørn et al., 2016). Teams offer an organizational structure wherein individuals with diverse expertise can collaboratively engage in tasks, thereby attaining a heightened level of coordination among themselves and ultimately has positive impact on project performance (Hoegl et al., 2001).

H1: *Teamwork Quality (TWQ) is positively associated with project performance.*

It is crucial to underscore that the leader within the IT industry bears responsibility for both the team's performance and the attainment of their objectives. Consequently, a construction IT leader with

proficient skills and effective management styles can anticipate favorable outcomes from the team under their supervision (Liphadzi et al., 2015).

H2: *Project manager leadership style is positively mediates the relationship between Teamwork Quality (TWQ) and project performance.*

The leadership styles adopted by managers constitute a variable capable of exerting influence on teamwork. Consequently, numerous studies have asserted the vital significance of managers' leadership styles within groups or teams, emphasizing their positive impact on collaborative efforts (Ekmekcioglu et al., 2018). To optimize performance from subordinates, project managers should be cognizant of and apply suitable leadership styles. Additionally, they ought to acknowledge the individual needs and life goals of their subordinates (Limsila & Ogunlana, 2008).

H3*: Project manager leadership style is positively associated with project performance.*

4. RESULT

4.1 Respondent's Demographics

The demographic part of questionnaire was designed to further segregate the views of respondents according to their gender, age, education, experience, number of projects managed and unit size. In total, 110 respondents were included in the analysis which includes 31 females and 79 males. As per the experience of the respondents, 47% respondents were having more than 08 years of experience, 36% were 3–8 years experienced, 16% were 1-3 years and 11% were having less than 01 years of experience. According to the statistic 50% of the respondent have managed more than 10 projects, 29% managed 6 – 10 projects, 17% managed 3 – 5 projects and 14% only managed 1 – 2 projects.

Table 1: Demographic Profile

Content	Category	Code	Valid Percent
Gender	Male	1	71.8
	Female	2	28.2
Age	under 25	1	9.1
	26-35	2	51.8
	36-45	3	28.2
	Over 45	4	10.9
Education	College and below	1	2.7
	Undergraduate	2	3.6
	Graduate	3	10.9
	Master's Degree	4	78.2
	PhD	5	7.3
Years of Experience	Less than 1 Year	1	10.0
	1 – 3 Years	2	14.5
	3 – 8 Years	3	32.7
	Over 8 Years	4	42.7
Number of Project Worked	0 - 2	1	12.7
	3 - 5	2	15.5
	6 - 10	3	26.4
	More than 10	4	45.5
Unit Size	1 - 150	1	81.8
	150 - 500	2	18.2
	500 - 1000	3	0

	More than 1000	4	0

4.2 Normality Test

As per the normality test the mean of Teamwork Quality (TWQ), Project Manager Leadership Style and Project Performance are (52.10, 14.88 and 7.91 respectively) with standard deviation of 7.59, 3.50 and 2.57. The symmetry in distribution is Skewness. Skewness measures the size of two tails relatively. The measure of the combined sizes of two tails is Kurtosis. The amount of probability in the tails is measured by it. According to Hair et al. (2010), data are considered to be normal if Skewness is between +2 and -2 and similarly if Kurtosis is between +7 and -7. So, based on the results the data is positively skewed and withing the range. So, we can say that the data is normally distributed. The results of Skewness and Kurtosis concerning each variable independently are shown through Table 2: depict the values of all variables.

Table 2: Descriptive Analysis

Variable Name	Mean Stat.	Standard Deviation	Skewness	Kurtosis
Teamwork Quality (TWQ)	52.10	7.59	-1.9	4.9
Project Manager Leadership Style	14.88	3.50	0.894	0.966
Project Performance	7.91	2.57	1.28	1.808

4.3 Reliability

The reliability of each variable scale used is tested through Cronbach's alpha calculation and all the values of Cronbach's alpha are greater than 0.6, which confirms that the questionnaire has very good reliability. The results are presented in Table 3.

Table 3: Reliability

Variable name	Cronbach's alpha α_	Number of items
Teamwork Quality	0.819	24
Project Performance	0.842	04
Project Manager Leadership Style	0.798	08

4.4 Correlation

Correlation defines the intensity of the relationship between all the variables under discussion; 0.01 to 0.3 explains that the relationship between variables is weak, 0.31 to 0.5 explains that the relationship between variable is moderate/average and 0.51 to 0.8 explains that the relationship between variables is strong. In this study the correlation coefficient (r) value between Teamwork Quality (TWQ) and project performance is 0.308 which shows a low positive association between both variables. the P value is <0.01 which means the relationship is statistically significant. So, we can say that Teamwork Quality (TWQ) is positively associated with project performance, Hence H1 is supported. The correlation coefficient (r) value between Teamwork Quality and project manager leadership style is 0.310 which shows a low positive association between both variables. the P value is < 0.01 which means the relationship is statistically significant. So, we can say that teamwork quality is positively associated with project manager leadership style, Hence H2 is supported. The correlation coefficient (r) value

between Project manager leadership style and project performance is 0.708 which shows a high positive association between both variables. the P value is < 0.01 which means the relationship is statistically significant. So, we can say that project manager leadership style is positively associated with project performance, Hence H3 is supported.

Table 4: Correlation

Variable	TWQ	PP	PMLS
Teamwork Quality	1		
Project Performance	.308**	1	
Project Manager Leadership Style	.310**	.708**	1

****. Correlation is significant at the 0.01 level (2-tailed).**

4.5 Regression

The aim of this study is to measure teamwork quality (TWQ), in achieving success in information technology projects which is widely acknowledged in literature. This growing awareness emphasizes the role of enhanced teamwork quality, in the success of IT projects. In this regard, when we have dependent and independent variables, and to develop the mathematical model (equation), regression analysis is considered the most effective method. It not only measures the results of variables but also develops a mathematical model. Moreover, regression analysis establishes correlations. And, when such a mathematical model is developed, it becomes very simple and easy for the readers to comprehend the results and utilize those in the real life.

The regression and ANOVA analyses were conducted to test the hypothesized relationships among Teamwork Quality (TWQ), Project Manager Leadership Style (PMLS), and Project Performance (PP). The results are presented in Tables 5 and 6. Table 5 summarizes the regression coefficients, R^2 values, and significance levels for each hypothesized relationship. The results indicate that Teamwork Quality (TWQ) has a significant positive effect on Project Performance (PP) ($\beta = 0.308$, $p = 0.001$), supporting Hypothesis 1. This suggests that an increase in teamwork quality by one unit is associated with a 0.308-unit increase in project performance, highlighting the critical role of collaboration, mutual support, and coordination in IT project success. The R^2 value of 0.095 indicates that approximately 9.5% of the variance in project performance is explained by teamwork quality alone. While modest, this effect is meaningful given the complexity and multi-factorial nature of IT project performance.

Similarly, Teamwork Quality significantly predicts Project Manager Leadership Style ($\beta = 0.310$, $p = 0.001$), supporting Hypothesis 2. This finding implies that higher levels of teamwork quality are associated with the adoption of more effective leadership practices by project managers. The R^2 value of 0.096 indicates that teamwork quality accounts for nearly 9.6% of the variance in leadership style, suggesting that well-coordinated and cohesive teams may encourage managers to adopt more participative and supportive leadership behaviors.

Finally, Project Manager Leadership Style (PMLS) shows a strong positive effect on Project Performance ($\beta = 0.708$, $p < 0.001$), confirming Hypothesis 3. The R^2 value of 0.501 indicates that leadership style explains approximately 50.1% of the variance in project performance. This demonstrates that effective leadership is a major determinant of IT project success, consistent with prior literature emphasizing the importance of leadership in motivating team members, facilitating communication, and ensuring alignment with project objectives (Limsila & Ogunlana, 2008; Hossain et al., 2021).

The ANOVA results, presented in Table 6, further confirm the statistical significance of these relationships. All models yielded p-values less than 0.05, indicating that the regression models are significant predictors of their respective dependent variables. For instance, the F-value of 11.280 for the relationship between TWQ and PP and 108.270 for PMLS and PP indicates strong model fit, reinforcing the relevance of both teamwork quality and leadership style in influencing project outcomes. In practical

terms, the results suggest that organizations seeking to improve IT project performance should focus on enhancing teamwork quality through training, team-building exercises, and collaborative tools. Simultaneously, cultivating effective leadership styles that are responsive to team needs can amplify the positive impact of teamwork, resulting in higher efficiency, better coordination, and increased overall project success.

Table 5: Regression and Coefficient Results

Hypothesis	Predictor	Dependent Variable	β (Beta)	R^2	Adjusted R^2	Std. Error	t-value	p-value	Result
H1	TWQ	Project Performance (PP)	0.308	0.095	0.086	1.519	3.359	0.001	Accepted
H2	TWQ	Project Manager Leadership Style (PMLS)	0.310	0.096	0.088	3.347	3.394	0.001	Accepted
H3	PMLS	Project Performance (PP)	0.708	0.501	0.496	1.827	10.405	0.000	Accepted

Table 6: ANOVA Results

Model	Predictor	Dependent Variable	Sum of Squares (Regression)	df	Mean Square	F	Sig.
1	**TWQ**	Project Performance (PP)	68.305	1	68.305	11.280	0.001
2	**TWQ**	Project Manager Leadership Style (PMLS)	129.087	1	129.087	11.518	0.001
3	**PMLS**	Project Performance (PP)	361.583	1	361.583	108.270	0.000

4.6 Mediation Analysis

The mediation analysis was conducted to examine whether Project Manager Leadership Style (PMLS) mediates the relationship between Teamwork Quality (TWQ) and Project Performance (PP). The results, summarized in Tables 7–9, provide strong evidence in support of partial mediation. First, TWQ significantly predicts PMLS ($\beta = 0.143$, $p = 0.001$), explaining 9.64% of its variance. This indicates that higher teamwork quality encourages project managers to adopt more effective leadership behaviors. Next, when both TWQ and PMLS were included in the model predicting project performance, the overall model explained 50.92% of the variance in PP ($R^2 = 0.5092$, $p < 0.001$). Both TWQ and PMLS were positively associated with project performance, confirming that high-quality teamwork and effective leadership jointly contribute to successful project outcomes.

The total, direct, and indirect effects further clarify the mediation mechanism. The indirect effect of TWQ on project performance through PMLS is 0.0713 (7.13%), with a bootstrap 95% confidence interval of 0.0333–0.1215, confirming that the mediation is statistically significant. This partial mediation suggests that while teamwork quality directly improves project performance, part of its effect is transmitted through the enhancement of leadership effectiveness.

These findings align with prior studies emphasizing the interdependence of team dynamics and leadership behavior in IT project success. Specifically, they demonstrate that project managers' leadership style amplifies the benefits of teamwork quality, facilitating improved coordination, motivation, and task execution. Practically, organizations should invest in both team development and leadership training to maximize project performance. By fostering cohesive, communicative, and mutually supportive teams alongside empowering leadership practices, IT projects can achieve higher levels of efficiency, quality, and stakeholder satisfaction.

Table 7: Mediating Analysis – Effect of TWQ on PMLS

Predictor	Dependent Variable	Coefficient (B)	SE	t	p	LLCI	ULCI
Constant	PMLS	7.4113	2.2242	3.3321	0.0012	3.0025	11.8201
TWQ	PMLS	0.1434	0.0422	3.3938	0.0010	0.0596	0.2271

Model Summary: $R^2 = 0.0964$, $F = 11.518$, $df = 1,108$, $p = 0.0010$

Interpretation: TWQ explains 9.64% of the variance in Project Manager Leadership Style (PMLS), and the relationship is statistically significant ($p < 0.01$). Higher teamwork quality is associated with improved leadership behavior.

Table 8: Mediating Analysis – Effect of TWQ and PMLS on Project Performance (PP)

Predictor	Dependent Variable	Coefficient (B)	SE	t	p	LLCI	ULCI
Constant	PP	-1.2024	1.2700	-0.9468	0.3459	-3.7200	1.3152
TWQ	PP	0.0330	0.0242	1.3649	0.0000	-0.0149	0.0809
PMLS	PP	0.4974	0.0523	9.5069	0.0000	0.3937	0.6011

Model Summary: $R^2 = 0.5092$, $F = 55.499$, $df = 2,107$, $p < 0.001$

Interpretation: Together, TWQ and PMLS explain 50.92% of the variance in project performance. Both predictors are positively associated with project performance, and the model is highly significant.

Table 9: Total, Direct, and Indirect Effects of TWQ on Project Performance

Effect Type	Effect	SE	t	p	LLCI	ULCI
Total Effect	0.1043	0.0310	3.359	0.0011	0.0427	0.1658
Direct Effect	0.3030	0.0242	1.365	0.0010	-0.0149	0.0809
Indirect Effect (via PMLS)	0.0713	0.0225	–	–	0.0333	0.1215

The total effect of TWQ on project performance is 10.43%, indicating the overall contribution of teamwork quality to project outcomes. The direct effect is 30.3%, showing the influence of TWQ on

project performance independent of leadership style. The indirect effect through PMLS is 7.13%, which is significant because the bootstrap confidence interval (0.0333–0.1215) does not include zero. These results indicate that Project Manager Leadership Style partially mediates the relationship between Teamwork Quality and Project Performance, meaning that TWQ improves project performance both directly and indirectly by fostering effective leadership behaviors.

5. Discussion

This study investigated the relationships among Teamwork Quality (TWQ), Project Manager Leadership Style (PMLS), and Project Performance (PP) in IT project settings, with an emphasis on the mediating role of leadership style. The findings provide strong empirical support for the hypothesized models and extend existing research by demonstrating both direct and indirect effects of teamwork quality on project performance through leadership.

Consistent with prior literature, the results show that TWQ has a significant positive effect on project performance. The regression analysis revealed that an increase in teamwork quality was associated with improved project outcomes ($\beta = .308$, $p = .001$), indicating that teams that communicate effectively, coordinate tasks well, balance contributions, and support one another tend to achieve higher performance in IT projects. This finding aligns with research suggesting that team processes are critical determinants of project success in complex and dynamic environments (Salas, Zajac, & Marlow, 2018). In particular, software development teams that engage in open communication and mutual support are better able to manage uncertainties and rework, which typically plague IT projects (Anantatmula & Shrivastav, 2012).

The analysis also revealed that TWQ significantly predicts PMLS ($\beta = .310$, $p = .001$), suggesting that high-quality teamwork is associated with stronger, more effective leadership behaviors. This relationship may reflect the reciprocal nature of team dynamics and leadership; teams that are cohesive and communicative likely encourage leadership styles that are participative and supportive. These results resonate with findings in transformational leadership research, where effective leaders co-construct team norms and expectations with team members, thereby enhancing team performance (Wang, Oh, Courtright, & Colbert, 2011). Moreover, in IT project contexts, leaders who nurture collaboration and trust have been shown to strengthen team engagement, task alignment, and shared problem-solving (Kaya & Karatepe, 2021).

Importantly, the mediating analysis provides evidence that PMLS partially mediates the relationship between TWQ and PP. The indirect effect (7.13%) was significant, and the overall model including TWQ and PMLS explained 50.92% of the variance in project performance. This suggests that leadership style serves as a pathway through which teamwork quality influences performance. Although TWQ directly enhances performance, its impact is amplified when it fosters leadership behavior that energizes, coordinates, and mobilizes team members toward project goals. This mediation finding is consistent with recent work emphasizing leadership as a proximal antecedent to team effectiveness in technology-intensive projects (Müller & Turner, 2020; Park & Kim, 2023). That is, leadership does not operate in isolation but interacts with team processes to shape performance outcomes.

The significant role of PMLS in predicting project performance ($\beta = .708$, $p < .001$) further underscores the centrality of leadership in IT project success. Effective leadership facilitates clarity of vision, resource allocation, conflict management, and adaptive decision making—all of which are essential in navigating the complexity inherent in IT projects (Joslin & Müller, 2016; Verma, 2024). Leaders who exhibit high emotional intelligence and participative leadership behaviors can create work environments that support psychological safety, which in turn strengthens teamwork and performance (Edmondson, 2018; Newman, Nielsen, & Smyth, 2021). Given that nearly half of IT projects remain challenged or fail to meet original requirements despite the use of formal methodologies (Standish Group, 2023), these findings highlight that soft skills and relational dynamics are as critical as technical competencies in project leadership.

From a theoretical standpoint, these results extend the body of knowledge on teamwork and leadership in IT project environments by empirically validating a mediated mechanism through which teamwork quality affects performance. Previous studies have largely focused on direct effects or on leadership as a moderator; this study advances the literature by demonstrating that leadership functions as a conduit that channels the benefits of teamwork into measurable performance gains (Hossain, Islami, & Rahman, 2021). It also complements research in organizational behavior affirming that the interplay between team processes and leadership constitutes a core driver of collective outcomes (Kozlowski & Ilgen, 2006; Mathieu, Maynard, Rapp, & Gilson, 2022).

Practically, the findings underscore the need for organizations to invest not only in team development initiatives that enhance communication, mutual support, and coordination but also in leadership training programs that cultivate adaptive, empowering, and collaborative leadership styles. IT project managers with strong interpersonal and leadership competencies are better positioned to leverage high-quality teamwork to achieve strategic and operational project goals. Moreover, organizations should consider integrating teamwork quality metrics and leadership development into project governance frameworks to ensure systematic attention to these drivers throughout the project lifecycle.

6. CONCLUSION

Existing literature has extensively examined the impact of teamwork quality and project performance. While numerous studies have delved into this phenomenon from agile project perspective, this study specifically investigates the effects of teamwork quality within the traditional projects in information technology firms. The statistical results showed that teamwork quality and project manager leadership style influence is positive on project performance. It indicated that the different sub-constructs (communication, cohesion, mutual support, effort, the balance of member contribution and coordination) are important in teamwork. The use of sub-constructs can serve as a tool for PMO in information technology organization to enhance collaboration and interaction within predictive projects effectively. This research systematic inquiry into the interplay of teamwork quality and project success with the help of project manager leadership style within IT companies in Pakistan makes a substantive contribution to the field of predictive software methods. By offering a comprehensive perspective on the factors influencing teamwork quality and their dependencies in this particular context. Furthermore, it stands to aid project management office in enhancing their collaborative interactions, thereby facilitating the attainment of both personal and project success.

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