

TEAM COMMUNICATION AND PROJECT SUCCESS: BASED ON THE PERSPECTIVE OF INPUT-PROCESS-OUTPUT MODEL

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Abstract

Project success has been mirrored as a function of effective team dynamics in present day project oriented firms especially within the sphere of IT sector. However, it calls for teams to manage tasks, coordinate with themselves and take prompt action to cope with emerging confronts. To comprehend team dynamic-project success associations, the Input-Process-Output model is more suitable. Accordingly, this study is designed to address the core problem by examining how team performance mediates the relationship between team communication and project success within Pakistan's IT project teams based on Input-Process-Output model. The data were gathered from 347 team members. Through rigorous PLSSEM method, the results affirm that team communication significantly affect project success whereas, team performance mediated this relationship. This research offers a preliminary yet important step towards better understanding of the complex interaction between team dynamics and project outcomes.

INTRODUCTION

Project success (PS) has been mirrored as a function of effective team dynamics in present day project oriented firms (Shaukat et al., 2022). Owing to the technological advancement in the sphere of Information Technology (IT) sector, teams are becoming more discrete, inter-reliant and communication centered (Marlow et al., 2018). Accordingly PS calls for teams to manage tasks, coordinate with themselves and take prompt action to cope with emerging confronts. In order to comprehend team dynamic-PS associations, the Input-Process-Output (IPO) model is more suitable. For instance, prior knowledge found communication as team input, performance as team process and PS as outcome (Aga et al., 2016; Marks et al., 2001; Mathieu et al., 2017; Shaukat et al., 2025).

Based on IPO guidelines, team communication (TC) is an important input facilitating knowledge resource within firms. It lifts barriers of

misunderstanding and enhances coordination activities during PLC (Marlow et al., 2018). As a result, team performance (TP) a process based mechanism, through which TC translate creativity and higher productivity, altogether impacting PS a potential output (Pavez et al., 2022). In Pakistan's project management context, teams are facing resource constraint and other issues, these associations becomes much prominent. The comprehension of team based communication lead PS through team driven process, contribute to theory and practice. Although the literature highlights rationale into the relational effect of team dynamics, there are several areas which need attention within emerging nation context.

First, the literature support TC influences performance (e.g. Eslamdoust et al., 2022; Nawari & Abdullah, 2024), however majority of research pertains to western economies, lacking research on Asian context. Organizations in Pakistan have

diverse communication structure, calling context focused exploration (Shah & Khan, 2023). Second, prior knowledge have established affirmative effect of communication on PS (Latif et al., 2020; Siddiqui & Shaukat, 2024), very little focused on how this influence occurs. The arbitrating role of TP linking TC and project outcomes remains under-theorized, specifically by applying the IPO model (Pavez et al., 2022). Third, the wide research focuses on infrastructure and other sectors, the focus on rapidly change higher knowledge intensive IT projects entails more empirical investigation into how team-level determinants affect PS (Aga et al., 2016; Anantatmula & Rad, 2018; Kaur et al., 2024).

Fourth, the literature focused on TC and TP independently in various context, overlooking their sequential affiliation as conceptualized in IPO model (Mathieu et al., 2019). The absenteeism of integrated theory not only limits operationalization of communication processes but also make hurdle to improve tangible outcomes (Serrador & Pinto, 2015). Fifth, prior evidence-based reviews highlight the contextual reliance of team dynamics, highlighting that most work performed in Western context may not generalize to resource-constrained backgrounds like Pakistan (Khan, 2025; Siddiqui et al., 2023). For that reason, empirical mapping of the IPO model in Pakistan IT sector fills a significant cultural and terrestrial gap which need attention. Notwithstanding, TC is widely recognized as a cornerstone of PS, the roadmap through which it lifts outcomes remain less implicit. Similarly, the mediating process of TP has received limited empirical confirmation in IT projects with emerging nations. The organizations now investing in training and communication enhancement initiatives without fully understanding how these inputs translate into performance related outcomes. In addition, focusing on western region broadly, limiting generalizability in Asian region. Therefore, in this study, we addresses the core problem that the pathway linking TC to PS through team

Literature Review and Hypotheses Development

Based on Input-Process-Output model, the conceptual framework of the current study has been presented in the given figure.

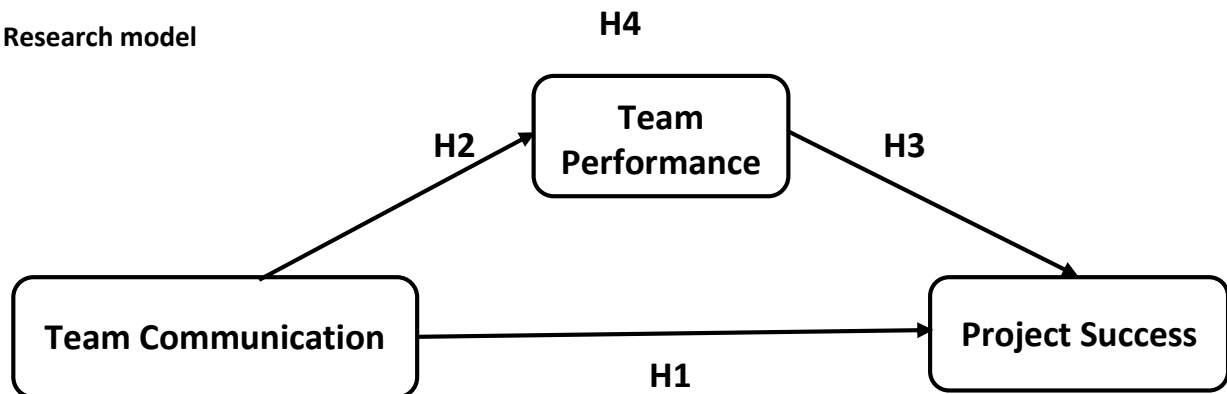
performance remains largely ignored within Pakistan's IT sector, restricting the firms' capability to design effective communication-based project management interventions. The objective of this study is to examine the mediating role of TP in the relationship between TC and project success within Pakistan's IT project teams, grounded in the Input-Process-Output model.

This study has following research questions:

1. To what extent does TC influence PS in IT teams?
2. How does TC impact team performance?
3. To what extent does team performance affect PS?
4. Does TP mediate the relationship between TC and PS?

The study covered theoretical, empirical and practical contributions to the field of project management. By integrating the concept of IPO model, we extends team theory within project-based settings. Additionally, we advances understanding of how TC inputs transform into potential outcomes through underexplored mechanism of TP (Mathieu et al., 2019; Pavez et al., 2022). The findings evidence from an eastern context Pakistan, where firms structures, resource limitations, and cultural values vary from western project management context (Shah & Khan, 2023). This contribution adds existing knowledge, responds to scholarly calls for more research in developing nations and expands the generalizability (Siddiqui & Shaukat et al., 2023). For decision makers of IT firms, the study deal actionable insights on increasing PS through improved communication pathways and performance processes. By understanding how TC impacts performance and PS, organizations are able to craft leader strategies, develop more efficient team structures and conducive atmosphere for technological transformation. This study will also add to the progression of IT Project performance as IT sector of Pakistan striving to achieve economic growth and innovation (PSEB, 2024).

Figure 1: Research model



The conceptual lenses of IPO model has been applied in management sciences for studying team dynamics (Marks et al., 2001; Mathieu et al., 2017). This model suggested that input (in our study i.e. team communication) influences processes (i.e. TP) within turn affect outputs (i.e. PS). IT projects have been characterized by uncertainty, swift change, dependability on each other, effective communication play a positive input facilitating coordinated activities, task clarification and help in improving prompt decisions (Shrivastava et al., 2016; Marlow et al., 2018). On the other hand TP captures the features of timeliness, integration and shared efforts which transform communicative inputs into actionable outputs i.e. PS (Griffith & Sawyer, 2010; Salas et al., 2008; Siddiqui et al., 2023). The guiding lens of IPO model provide a clear, test driven design for examining the mediating role of TP connecting TC with PS.

Effective communication is a fundamental source to performance improvement and augmenting superior project outcomes. Extensive research evident that communication effectiveness positively predicts TP and project related outcomes (Čulo & Skendrović, 2010; Bubshait et al., 2015). Communication also facilitate swift problem solutions, stakeholder need fulfilment and aligned expectation desired in project settings, together leads to improve PS criteria (Serrador & validated that TC improve TP in project based settings. Therefore, it is argued that well-structured

Pinto, 2015). In addition Klitmøller & Luring (2013) stated that communication practices like regular meetings, clear reporting channels and knowledge interchange in hi-tech oriented projects are proportionate to stakeholder satisfaction and higher productivity level. Based on the guidance of IPO model, communication is a source to reduce ambiguity and supporting decision making and also considered as an input that transform into output i.e. PS. These insight support the development of hypothesis 1, i.e. TC has a positive effect on PS.

Similarly, TP can be achieved through coordinated activities, quality work and collective problem solving initiatives. It can be better achieved through effective communication, as according to IPO model communication is a unique input shaping superior project performance. Extensive literature on this relations exerted that the structure and content of the communication determine how well project team perform, coordinate with each other, exchange information and become a source to contribute performance improvement (González-Romá, & Hernández, 2014; Marlow et al., 2018). The study of Brewer and Holmes (2016) reflected that communication fosters mutual respect, teamwork, shared responsibilities and situation awareness, which ultimately impact superior TP. Similarly, Gramchev et al. (2023) empirically

communication will improve TP in IT projects. Hence we developed H2. TC has a positive effect on TP.

TP constitutes the process through which inputs transformed into outputs. TP covers task proficiency, reliability and quality work through which PS can be better achieved. The recent study of Siddiqui et al. (2025) validated that IT projects build skillful teams, integrate Hi-Tech alignment and coordinate activities, together impacting PS. Latif et al. (2020) argued that teams that perform better on process indications, achieve better success. Abejide (2024) found that TP positively boosts PS across various sectors. Moreover, in the IT project, deliverables rely on various features including integration of technical expertise, knowledge, skills and prompt solutions. To better implement these practices higher TP reduces schedule misalignments, avoiding defect and improve deliverables quality (Nawari & Abdullah, 2024). Through the motivation of IPO model, TP conceptualized as a process linking outputs. When team perform efficiently, project will meet their objectives effectively. Hence, we formed H3: TP has a positive effect on PS.

By assimilating all above hypotheses, the Input-Process-Output model predicted that communication influences TC established problem solving and knowledge integration mechanisms which help project managers and teams to translate into tangible outcomes (Fan et al., 2022). PS through the pathway of team processes especially TP. The prior literature highlighted that communication influences project outcomes through indirect mechanism, routed through superior coordination, teamwork and collective team performance (Pavez et al., 2022; Shah & Khan, 2023). TP has also been function as a mediator in various studies. For example Latif et al (2020) examined mediating role of team dynamics between CSR and firm performance, and found significant mediation. Similarly, Siddiqui et al (2025) analyzed various leadership style and their impact on PS. They incorporate TP as potential mediator and found positive mediation of TP in the relationship between leadership and PS. Hence, we proposed that TP is a process based gateway that enable

influence of TC on PS efficiently. H4: TP mediates the relationship between TC and PS.

Methods

We focused on a **quantitative, cross-sectional approach** to examine the causal relationships between TC (input), TP (process) and PS (output) in IT sector of Pakistan. This design is consistent with prior research in project management that seek to validate theoretical associations through statistical measures (Creswell & Creswell, 2017). Quantitative designs assist to examine the cause-effect associations amid latent constructs, especially when analyzing mediating function. On the other hand, **cross-sectional** design suitable for assessing behavioral perceptions like communication effectiveness, team performance, and PS (Podsakoff et al., 2012). It is reflected as a leading strategy in contemporary project-based team research due to its feasibility and analytical precision. Based in the IPO model, the research design sights communication as an antecedent influencing team performance, which resultantly predicts PS. This design has been widely applied in social sciences research especially while analyzing team intents in IT project based settings (Fan et al., 2022).

The research population is based on **employees working in IT firms** located across major cities of Pakistan. The IT sector is appropriate owing to its nature and reliance on intensive teamwork and communication (Siddiqui et al., 2023). According to Pakistan Software Export Board (2024), the IT firms contributing significantly to national GDP and represents one of the country's fastest growing knowledge sector. Data were collected through purposive sampling technique from individual involved in various roles including project leads, developers and team members. This technique assists the researchers to approach respondents that are most relevant to the research objectives (Campbell et al., 2020), thus deemed logical for the current study. Data were obtained through **self-administered questionnaire** distributed among IT professionals. Participants were informed regarding the purpose of the research, and their voluntary participation, aligned with research ethics (Bougie & Sekaran, 2019). The

347 questionnaire were carried for analysis after screening for its rigor and completeness. This sample size is sufficient for hypotheses testing and validations (Hair et al., 2021).

The questionnaire items for each construct were measured using established scales drawn from **extant literature** and slightly aligned with project perspective. Responses were logged on a three **point Likert scale**, consistent with PLS-SEM research in project management (Hair et al., 2021). TC was measured through (Roberts et al., 2004). TP was measured through 4 items adapted from (Marrone et al., 2007) and PS was measured through 14 items adapted from (Aga et al., 2016). The constructs reliability and validity matrix had been consistent with prior knowledge. Slight linguistic changes were made for better understandings of the items. Pilot study was also performed to ensure the content validity of the adapted scale.

During this study, research ethics were followed strictly. The participation was entirely volunteer respondents were asked to provide information on the study's key constructs. Based on IPO model, this study conceptualized team communication as an input, TP as a process and PS as an output. By focusing on IT projects, this study contribute to both project management literature and team dynamics in developing economies.

Results

The research aim to evaluate mediation effect and latent constructs. Therefore, **Partial Least Squares Structural Equation Modelling (PLS-SEM)** was adopted through **SmartPLS**. This approach is particularly relevant to those studies where cause and effect relationship and hypothesized testing were evaluated (Hair et al., 2021). This technique followed a two-stage process including measurement model assessment and structural model assessment. In measurement model assessment data reliability and convergent validity are typically assessed through different approaches, whereas, structural model assessment mainly consisting on bootstrapping, path coefficient and hypotheses testing (Hayes & Preacher, 2013).

Measurement model has been assessed via distinctive methods. Beginning with outer loadings, alpha, and composite reliability (CR) measurements. The value of loadings if $>.50$, it become satisfactory as stated by (Gefen & Straub, 2005). Similarly, if alpha values of the constructs are greater than or equal to $.70$, it will become satisfactory. Likewise, if CR values of the constructs are also greater than or equal to $.70$, it will become satisfactory. Overall, the outcomes of the study demonstrating all prerequisite of data reliability are in accordance with threshold limits. Similarly, convenient validity has been established through AVE. The all constructs of the study found satisfactory by meeting the criteria of $>.50$ (e.g. Shaukat & Alam, 2023).

On the other hand, discriminant validity for the present research has also been obtained through two fundamental approaches including HTMT ratio and criteria of Fornell-Larcker. These two are considered widely applicable approaches in available literature establishing validity of the collected data. Fornell-Larcker criteria asserted that every construct need to reflect more variation with its own indicators and the AVE's square roots need to be greater than its highest correlation with any other construct (Hair et al., 2021). Similarly, scholars like Henseler et al. (2015) stated that the acceptable limit of HTMT ratio is $<.90$ in order to satisfy the validity of the collected data. Therefore, we assessed and the outcomes fulfill the given criteria of acceptance. The findings are presented in the tables independently (Table 2 and Table 3). The predictive assessment of the conceptual framework was performed employing PLS-SEM, an approach suitable to examine causative associations. In the next step variables relationships have been examined. H1 suggested that TC influences PS, and the results showed that p-values and t-values sits within supportable boundary, validating H1. H2 suggested that TC influences TP, and the results showed that p-values and t-values sits within supportable boundary, validating H2. H3 suggested that TP influences PS, and the results showed that p-values and t-values sits within supportable boundary, validating H3. Finally, the mediation analysis has been performed to analyze the influence of TC on PS

through team performance. The results stated that indirect influence of TC through TP remain positive, total effect also positive and with the hypotheses results.

presence of TP, the effect remain reasonable, validating H4. Table 4 and table 5 presented the overall

Table 1: Reliability/validity statistics

	<i>Loadings</i>	<i>Alpha</i>	<i>CR</i>	<i>AVE</i>
PS1	0.751	0.941	0.942	0.567
PS2	0.749			
PS3	0.684			
PS4	0.715			
PS5	0.779			
PS6	0.768			
PS7	0.728			
PS8	0.739			
PS9	0.677			
PS10	0.757			
PS11	0.815			
PS12	0.771			
PS13	0.81			
PS14	0.785			
TC1	0.75	0.843	0.848	0.614
TC2	0.745			
TC3	0.818			
TC4	0.776			
TC5	0.826			
TP1	0.819			
TP2	0.825			
TP3	0.835			
TP4	0.82			

Table 2: Fornell-Larcker criteria

	<i>PS</i>	<i>TC</i>	<i>TP</i>
PS	0.753		
TC	0.651	0.78	
TP	0.725	0.69	0.83

Table 3: HTMT ratio

	<i>PS</i>	<i>TC</i>	<i>TP</i>
PS			
TC	0.726		
TP	0.812	0.811	

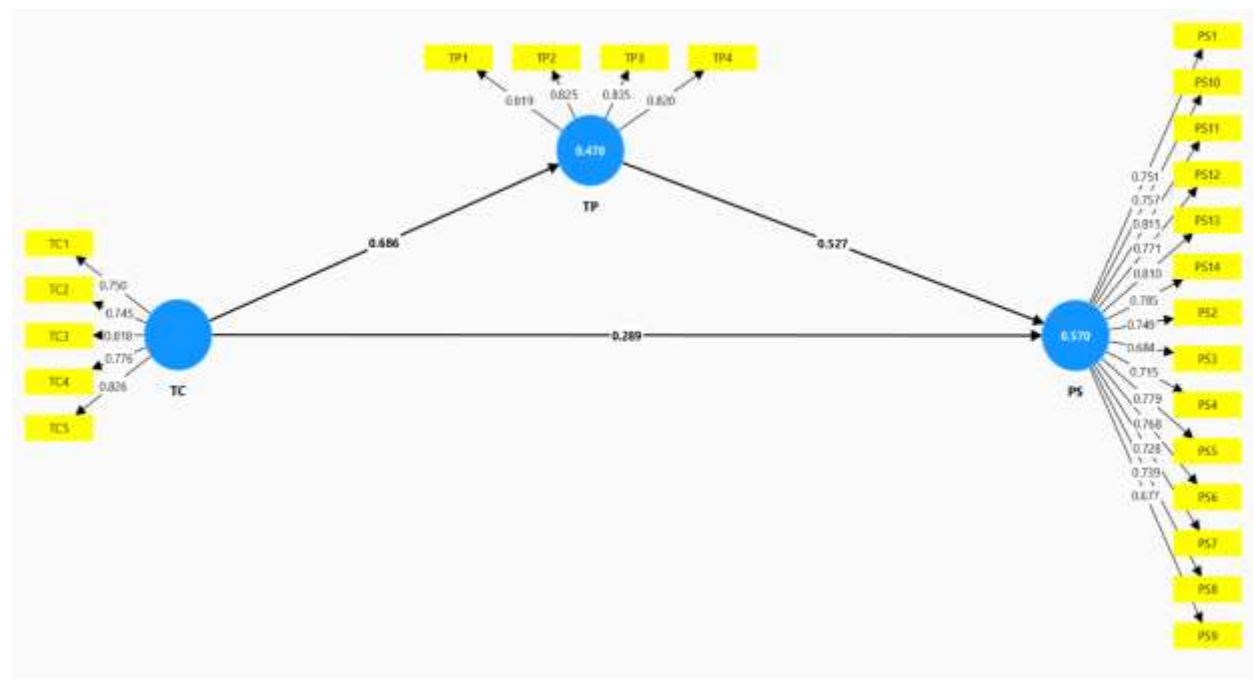
Table 4: Direct effect

	<i>B</i>	<i>SD</i>	<i>T</i>	<i>P</i>	<i>Decision</i>
H1	0.289	0.055	5.271	0.00	Supported

H2	0.686	0.036	19.116	0.00	Supported
H3	0.527	0.048	10.909	0.00	Supported

Table 5: Indirect effect

	Total effect			Direct effect			Indirect effect		
	B	T	P	B	T	P	B	T	P
H4	0.651	15.805	0.00	0.686	19.116	0.00	0.361	9.905	0.00

Figure 2: Measurement model

The outcomes highlighted the importance of team dynamic mechanisms in translating TC into project success within the IT sector of Pakistan. Primarily, the mediating part of TP highlighted the relevance of Input-Process-Output (IPO) model, underlining the importance of team dynamics. Nonetheless, the mediating part of TP has been less explored in IT sector. The outcomes further highlighted that project success can be better achieved through effective communication and performance. confirmed the hypothesized link between TC, TP and project success.

The findings extend the literature by empirically validating the influence of team dynamics on PS in Asian context, while most of the prior research focused on Western perspectives (e.g. Shahid et al., 2024). This research addressed the core problem that lies in the absence of empirical evidence on the association amid communication-performance-success mechanism, providing a roadmap to managers in managing project activities efficiently. The chosen PLS-SEM technique

TP function a significant mediating part, thus providing potential support for Input-Process-Output model with the IT sector of Pakistan.

The study offers contribution to the field. Theoretically, it extends the empirical application

of the IPO model in IT sector. Although prior research applied the IPO model in manufacturing, health, infrastructure sectors, this research specifically focused on knowledge-intensive and fast-changing environments. The mediating role of team performance suggests the necessity to consider both direct and indirect effects in communication research. TP captures the process dimensions crucial for consistent PS. The findings suggested that though the mechanics of the IPO model remain intact however cultural factors may influence how communication inputs are perceived and translated into performance outcomes. Therefore, upcoming theoretical models should integrate cultural moderators to explain variations.

Practically, they study offers actionable implications. For instance, findings suggested that TC becomes more impactful when coupled with performance interventions, establishing responsiveness and collectivism between teams. By validity the achievement of PS through TC and

TP, the study offer a gateway for managers. Therefore, managers should cultivate better communication skills to develop and facilitate skillful team. This research also offer methodological contributions by applying PLS-SEM technique.

Future Research Direction

This research applied cross-sectional design, appropriate to scrutinize team dynamics, however, longitudinal research should also encouraged to evaluate causal effects of the study conceptual framework. Team building is a process of fostering collaboration, teamwork and trust among teams and considered as a key enabler of PS (Shaukat et al., 2022). Team building should be incorporated as mediating variable in upcoming research. Similarly, communication behaviors are often influenced by cultural parameters. Therefore, future research should consider cultural moderators (e.g. knowledge center culture) to better interpret team and performance dynamics.

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