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An Investigation of the Implementation Status of Team Communication in the Pakistani Software Industry

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Abstract

This study explores the current state of team communication implementation in the Pakistani software industry. By examining communication strategies such as direction, frequency, content, and modality, the research aims to comprehensively analyze the existing dynamics among team members and their leaders. Data were collected via separate questionnaires administered to team members and managers in various software firms, resulting in 100 responses. The findings indicate a positive trajectory in the implementation of team communication, emphasizing the crucial role of strategic approaches in fostering effective communication practices. While acknowledging limitations, including sample size and the study's cross-sectional nature, the research suggests potential avenues for future exploration, including longitudinal studies and assessing the impact of team communication on project success. Overall, this investigation contributes valuable insights into the current landscape of team communication within the Pakistani software industry.

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1 Introduction

The term communication comes from the Latin word "communicate," which means "to do together," and in communication, a common understanding arises. Researchers [1] define communication as "the transmission of meaning from one person to another or several people, whether verbal or non-verbal." The most critical factor for the success of a project is the communication skills of senior and junior team members. Moreover, effective and efficient communication in a team result in successful and timely project completion. Among the various essential aspects of communication, generation, distribution, storage, and collection of information at the right time and for the right people are crucial for a successful communication process [2].

The effectiveness of team communication in software designing houses is becoming increasingly important due to software projects' increasing technical and organizational complexity. The development

and use of information and communication technologies are considered to improve the performance of software design and development teams [3]. It is also increasingly recognized that for communication to be effective, it is necessary to understand the needs of people and the way they communicate within project teams [4]. Individuals also have different levels of understanding, opinions, abilities, acceptance rates of available communication tools, and preferences for particular communication tools [5].

The effectiveness of team communication seems to depend mainly on two interconnected factors. Among them are team members' communication activities, their preferences for using specific means of communication, and access to user-friendly tools. Second is team leaders' ability to support, encourage, and motivate their members to communicate effectively as a team. The project colleagues must ensure their message is free from bias, social affectivity, or racial bias. As the size of the project group increases, so does the complexity and appropriate channels for the task. Therefore, it is the duty and responsibility of the team leader to effectively manage team communication, encourage the participation of team members, and educate them about the importance and necessity of effective communication [6].

Communicating too little or too much can seriously hamper project work and employee performance, eventually decreasing the chances of project success. Effective communication is required to maintain membership and ownership of project decisions and milestones [7], as it keeps everyone informed of the latest project developments, especially in the software industry [8]. To ensure the success of a project, a great deal of information, including expectations, goals, needs, resources, progress reports, budgets, and purchase requisitions, must be regularly communicated to all key stakeholders [9].

Project managers are responsible for creating a communication management plan that suits the project's needs. Projects are unique, and hence, they require a relevant communications plan to be tailored to meet the project's specific needs. The project communications plan must be prepared in advance, and the relevant stakeholders must be educated on its implementation. The project team has to come together to gather, collate, share, integrate, and collaborate information repeatedly during a project [10].

The software industry is among the growing and underdeveloped sectors in Pakistan. However, it has the power to uplift the economy of a country [8] as it has been adding superior value to the gross domestic product (GDP) of many developed nations [11]. However, the role of the software industry in Pakistan's economy is missing. Besides suggestions from many researchers, the problem is yet to be answered in future research [12].

Furthermore, it should be noted that communication among team members is the lifeblood of projects in software houses; however, no study has explored the current status of team communication in companies working as software houses in Pakistan [13]. Moreover, companies use different software industry tools and strategies to engage their employees and customers for long-term survival and growth. However, no such study has empirically proved the communication strategies used by software houses in Pakistan [14] [15].

2 Literature Review

2.1 Information Technology Industry of Pakistan

The rapid growth of the Information Technology industry in developing countries, particularly in Pakistan, can be attributed to the availability of cost-effective labour [16], making it an attractive destination for outsourced projects from advanced nations [17]. Pakistan has demonstrated its capability to produce high-quality software, and there is substantial potential for exponential growth in the future [18].

However, despite the promising trajectory, the current status of the IT industry in Pakistan is hindered by several critical challenges, as identified by researchers. These challenges have contributed to the industry falling behind its neighbouring countries. Notable issues include a lack of government support, slow or weak communication among team members,

management challenges, and, to some extent, a shortage of specialized skills [19]. Addressing these issues is crucial for unlocking the full potential of the IT industry in Pakistan and ensuring sustained growth in the competitive global landscape.

In the fiscal year 2021 (July 2020 to June 2021), telecommunications, computing, and information services exports increased to USD 2.1 billion from USD 1.4 billion in the fiscal year 2020, a growth rate of 47 per cent of the PSEB. Furthermore, PSEB data shows that ICT exports to the United States, Pakistan's largest market, grew by 55 per cent, from USD 847 million to USD 1.3 billion in fiscal year 2021. Authorities expect the exports to reach USD 3.5 billion in FY2022 and USD 5 billion in FY2023. Despite its impressive growth during the pandemic, Pakistan's ICT sector contributes only about 1 per cent of GDP (about USD 3.5 billion in fiscal year 2021) [20]. According to the Pakistan State Bank (SBP), Pakistan's software exports currently amount to a staggering USD 700 million. However, the country's own-account workers earn an additional USD 1.2 billion thanks to exports. Furthermore, an additional USD 600 million in exports comes from companies that do not bring their revenue to Pakistan [21].

2.2 Software segment of the IT industry

According to local industry sources, the total size of the software industry is around USD 3.0 billion. It should grow despite challenges posed by post-pandemic global business practices and volatile national macro and microeconomics. Pakistan's ICT sector consists mainly of IT Software and Services Development (ITE) for data centres, help desks/call centres, and telecommunication services. In addition, 60 per cent of ITES clients come from the international market. Much of the growth is driven by the work of freelancers who have received below-average certifications from local institutions and support specialized areas in the local market [19].

The Government of Pakistan, both at the federal and provincial levels, prioritizes the IT industry's development, including the software development sector. According to the Pakistan Software Export Board (PSEB), the government has taken several measures to encourage local and foreign companies to invest in Pakistan [20]. However, a lack of practical standards from government bodies and the required skill set in Pakistani software houses has not yet lifted the industry to new heights, which many local and international agencies and trade unions predicted.

2.3 Communication

Effective communication is pivotal, particularly in outsourcing scenarios where projects and teams are dispersed across various cultures, languages, and geographical distances [24]. This underscores the significance of communication as a critical tool capable of enhancing IT or software product development. Without proper communication among team members, the likelihood of project success diminishes. The communication channels between superiors and teams are integral to completing and delivering software projects, underscoring the vital role communication plays in the project lifecycle. Therefore, software houses should work on collective communication to increase team dynamics and the adequate flow of information.

Collaborative communication in teams depends on the willingness of all team members to act and react, to listen and share, and to develop their skills to use contact effectively. Therefore, designing team communication is most effective when all members contribute equally and are agreed upon at the project's start, using available communication materials. Design managers need the tools and skills to drive design team communication in a way that allows them to work effectively [25].

Leading and stimulating effective communication is a difficult task. First, the number of electronic tools used by design teams to communicate is increasing, and therefore, users and administrators need to develop specific skills for everyday use [24]. Second, differences between the use of electronic information systems by the parent organization of the participants and the variety of communication practices can lead to compatibility problems. Third, there are differences in opinion and understanding at the individual level, including differences in using specific electronic media for team communication and the lack of a collective

framework of meaning [26].

The range of errors that can be made in communication is limitless. Therefore, we need to draw attention when communication occurs in activities related to the project. Too often, project communication failures are caused by the project team's emphasis on communicating status updates and expectations to project participants in a one-way manner. This type of communication does not give the project team or stakeholders a full understanding of the issues and challenges within a project. Project challenges and issues are unlikely to be discovered without a comprehensive feedback mechanism and can lead to unexpected and unmanageable complications. It would be impossible to describe and describe all kinds of misunderstandings or errors that a project team might encounter during the execution of a project [24].

2.4 Strategies for improving project communication

The effectiveness of project communication hinges on the collective proficiency of the entire project team. While the project manager serves as the central conduit for communication flow, individual team members also play a crucial role in their stakeholder interactions. Achieving this requires a comprehensive understanding of the project's goals, objectives, outcomes, and benefits for the entire team. The project's vision must be communicated within the team and externally [27]. This ensures a cohesive and well-informed approach to project communication, fostering success in internal and external interactions.

2.4.1 Storytelling in Communication

Technologists typically prioritize details and precision, preferring straightforward facts. While this approach suits their field, it may not be as persuasive to those outside it. Engaging stories, on the other hand, have the power to captivate a broader audience and drive them to action, a crucial element for project success. Compelling stories are concise, weaving essential information into a compelling plot that comfortably contextualizes facts. To resonate with a general audience, project communications should emphasize the "big picture," using non-text media such as charts, graphs, images, and tables to convey information. This multimedia approach ensures diverse engagement. These can be provided separately for specific groups requiring nuanced details, but for the majority, a focus on the overarching narrative is vital [27].

2.4.2 Communicate as per defined patterns

Effective project teams establish structured mechanisms for sharing project information with relevant stakeholders. These mechanisms should be deliberate and not left to chance. Establishing communication patterns ensures consistent and effective communication among all project groups. Regular meetings serve as a common mechanism to facilitate this communication. These meetings provide a compatible platform to keep all parties informed regardless of duration or frequency. However, discussions must focus on actionable items or decisions rather than mundane status reports, which can be distributed beforehand. This approach allows meetings to concentrate on exceptions and issues hindering or advancing project progress. The most productive meetings centre their discussions on exceptional points, defining actions and responsibilities accordingly [27].

2.5 Communication strategies in Organizations

The facets of communication are combined into communication strategies. We use the term "communication strategy" to describe a specific combination of aspects of communication. A possible communication strategy could consist, for example, of a higher frequency of contact with more two-way processes, informal forms, and indirect content [28]. Therefore, communication strategy combines different facets to retain effective communication within groups or teams. Communication and organizational theories suggest focusing on different facets of communication, including frequency, direction, modality, and content. Furthermore, empirical researchers have extensively studied these four facets of organizational communication. Communication strategy is a helpful tool for organizations, especially project-based firms, to manage communication between team

members and team leaders effectively and efficiently [29]. Furthermore, there are four significant facets of communication strategy and details of each aspect are given below:

2.5.1 Frequency:

Communication volume, defined by the frequency and duration of contact among organizational members, is critical [30]. While a minimum reference level is necessary for effective coordination, excessive communication can overwhelm members and result in dysfunction [31]. Therefore, when assessing communication frequency, weighing the actual number of contacts against the number required to conclude a deal is essential.

2.5.2 Direction:

Management involves vertical and horizontal communication flows within the organizational hierarchy. In examining directed communication patterns within an organizational context, emphasis is typically placed on interactions between superiors and subordinates. These relationships delineate clear lines of authority and status. The literature often refers to this dynamic as "top-down" communication, signifying the flow of communication from the most potent member to the weakest [30].

2.5.3 Modality:

Communication modality pertains to the information transmission method, which has been operationalized in diverse ways. One approach involves categorizing modalities as in-person, in writing, by phone, or other means. Another categorization method is based on a mode's capacity to convey "rich" information, encompassing various signals like feedback, facial cues, language diversity, and personalization. As noted in the literature, "any medium is not only a source of information but also a complex channel for the transmission of information" [32].

2.5.4 Content:

Communication content pertains to the conveyed or spoken message. Analyzing communicative interactions involves categorization either through predefined categories or by seeking participants' perceptions of the content type. Like modalities, content can be categorized in various ways. Two prevalent categorizations include classification based on the kind of information exchanged and the embedded influence strategy within the exchanged information [33].

3 Purposed Methodology

The author employed various research techniques and approaches to accomplish the present thesis project. Additionally, exploratory research was conducted using convenience sampling techniques, focusing on software houses in major cities of Pakistan for data collection. The collected data was analyzed using graphs and tables in MS Excel.

The figure above indicates the author's systematic approach to addressing the research problem within the software industry of Pakistan. Initially, the author identified the problem, conducted a comprehensive literature review to assess its status, developed two close-ended questionnaires based on previous research, collected data from the targeted sample, and concluded the paper by providing insights into the industry problem.

The population for this study is the employees working in software houses across Pakistan regardless of the type of project, i.e., insource and outsourced projects[35]. However, to limit the population of this study, the author has included only those software houses working in major cities of Pakistan. Furthermore, software houses were targeted in Islamabad, Rawalpindi, Peshawar, Karachi, Multan, Lahore, Faisalabad, and Mardan. Moreover, convenience sampling resulted in approximately 60 responses each from team members and supervisors/managers of software projects. Following a basic inspection, 50 answers from team members and supervisors were deemed suitable as the study's sample [34].

4 Results

As previously mentioned, data was gathered from two groups separately [36]. The rationale for dividing the questionnaire into these groups was to assess the existing communication dynamics among team

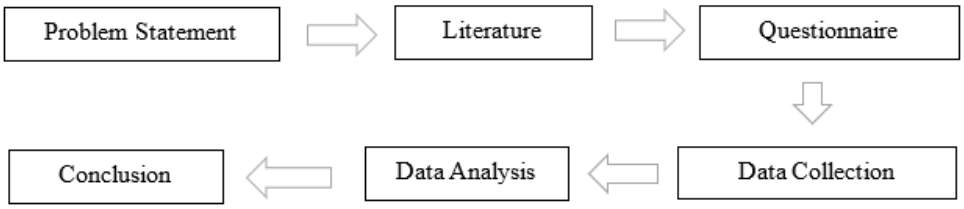

Figure 1. Research Methodology

members and between teams and project managers. Additionally, the study aimed to examine the communication strategies and tools utilized by software houses in Pakistan. Since the data was collected separately from each group, the analysis will be conducted independently for each in this study.

4.1 Correlation analysis

Table 1. The discussion on in-source and outsourced projects

	Team Members (1)	Project Managers (2)
1	1	0.194
2	0.194	1

The correlation analysis between team members and project managers suggests a correlation between the team and members (0.194). This means that managers and team members agree that their company has allowed them to be aware of in-source and outsource projects undertaken by the company.

Table 2. Daily feedback on tasks

	Feedback by leaders (1)	Feedback from team (2)
1	1	0.213
2	0.213	1

The correlation observed between feedback from managers and team members indicates a positive relationship between the two groups (0.213). This suggests a consensus between team members and leaders regarding daily communication about assigned tasks.

Table 3. Teams and managers on team communication

	Managers (1)	Team (2)
Managers	1	0.169
Team	0.169	1

The correlation analysis suggests a correlation exists between the team and its members (0.169). This means that managers and team members agree on the point that their companies have allowed them to communicate with each other.

Table 4. Teams and managers on data sharing

	Managers (1)	Team (2)
Managers	1	0.132
Team	0.132	1

The correlation analysis regarding sharing helpful information or data within teams indicates a correlation of 0.132 between leaders and team members. This implies agreement between managers and team members actively sharing crucial information.

Table 5. Teams and managers on face-to-face communication

	Managers (1)	Team (2)
Managers	1	0.139
Team	0.139	1

The correlation analysis on face-to-face communication within software houses, comparing responses from team members and project managers, indicates a correlation of 0.139. This suggests that managers

and team members agree that their company has actively promoted face-to-face communication.

Table 6. Teams and Managers on the Use of Facebook

	Managers (1)	Team (2)
Managers	1	0.120
Team	0.120	1

The correlation analysis regarding using Facebook as a communication tool reveals a correlation of 0.120 between team members and managers. This indicates a consensus among managers and team members that their company has endorsed using Facebook for communication purposes.

Table 7. Teams and Managers on the Use of WhatsApp

	Managers (1)	Team (2)
Managers	1	0.311
Team	0.311	1

The correlation analysis between team members and project managers related to the use of WhatsApp as a communication tool suggests a correlation between the team and members (0.311). This means that managers, as well as team members, are agreeing on the point that their company has allowed them to make use of WhatsApp as a tool of communication.

Table 8. Teams and Managers on the Use of Skype

	Managers (1)	Team (2)
Managers	1	0.114
Team	0.114	1

The analysis of the correlation between team members and project managers regarding the utilization of Skype as a communication tool indicates a correlation of 0.114. This implies a consensus among managers and team members, affirming that their company has granted permission to use Skype as a communication tool.

Table 9. Teams and Managers on the Use of the Email

	Managers (1)	Team (2)
Managers	1	0.134
Team	0.134	1

The correlation analysis between team members and project managers related to the use of email as a communication tool suggests a significant correlation between the team and members (0.134). This means that managers, as well as team members, are agreeing on the point that their company has allowed them to use email as a tool of communication.

4.2 Hypothesis Testing

The author collected data from two groups—managers and team members—measuring the same variables. Therefore, the most suitable statistical analysis for hypothesis verification is the T-test [37]. This test compares the means of two data sets from different samples, assessing whether a significant difference exists and how the standards are related. There are three types of T-tests, each based on additional sample attributes [38]. Given the characteristics of samples from two populations, the Paired Sample T-test is applicable in this study [39]. Thus, the author utilized the Paired Sample T-Test to test null and alternative hypotheses for each independent query, such as feedback and social media platforms. Four conditions are defined to determine whether the hypothesis is accepted or rejected:

- TIt applies when the researcher looks at both sides (samples) of a test.
- The researcher will look at P(T<=t) two-tail.
- The significance level for the two-tail test is 0.75 (1-0.05/2=0.75).
- If the absolute value of the t Stat is greater than the two-tail significance level and the critical value, the hypothesis is accepted, and the null hypothesis is rejected.

4.2.1 Information about in-source and outsourced projects

To ascertain the alignment of viewpoints between team members and managers regarding the handling of in-house and outsourced projects within their companies, the author employed a T-test and posited that: *H1: Team managers and members are aware of in-source and outsourced projects*

Table 10. Communication on in-source and outsourced projects between teams and the company

	Managers	Team
Mean	3.82	3.12
Variance	1.9057	2.1077
Observations	50	50
Pearson Correlation	0.194	
Hypothesized Mean Difference	0	
Df	49	
t Stat	2.7521	
P(T<=t) one-tail	0.0041	
t Critical one-tail	1.6765	
P(T<=t) two-tail	0.0082	
t Critical two-tail	2.0096	

The t-test results in the table above indicate that the t Stat values surpass the significance level (0.75). Consequently, the null hypothesis is rejected in the current study, and H1 is accepted. This implies that managers consistently discuss with team members regarding the ongoing status of insourced and outsourced projects.

4.2.2 Regular Feedback

To verify the current status of feedback asked by managers and given by team members, the author has used a t-test to identify whether the following hypothesis is accepted or not. *H2: Managers regularly take feedback from team members.*

The table emphasizes the outcomes of feedback-related queries posed to team members and managers within software houses. As per the t-test results, where the t Stat values exceed the significance level, H2 was accepted. This indicates a consensus between managers and team members regarding the daily exchange of feedback—taken by managers and provided by team members.

Table 11. Exitance of feedback communication between team members and managers

	Managers	Team
Mean	3.96	3.72
Variance	1.6718	3.5526
Observations	50	50
Pearson Correlation	0.2130	
Hypothesized Mean Difference	0	
Df	49	
t Stat	2.8294	
P(T<=t) one-tail	0.2054	
t Critical one-tail	1.6765	
P(T<=t) two-tail	0.4108	
t Critical two-tail	2.0095	

4.2.3 Team communication

H3: There is regular communication between team members and managers regarding progress in ongoing projects.

Table 12. Communication on ongoing projects between members and managers

	Managers	Team
Mean	4.06	3.24
Variance	1.1187	2.5534
Observations	50	50
Pearson Correlation	0.1994	
Hypothesized Mean Difference	0	
Df	49	
t Stat	2.9339	
P(T<=t) one-tail	0.0025	
t Critical one-tail	1.6765	
P(T<=t) two-tail	0.0051	
t Critical two-tail	2.0096	

The results in the above table indicate the t-test results related to the ongoing communication on project-related queries between managers and their teams. It can be seen that values of t Stat are much more significant than values of the level of significance (0.75); hence, H0 is rejected, and H3 is accepted. This means

that managers regularly communicate with team members about queries related to ongoing projects, and the supervisors in the same software houses confirm the same.

4.2.4 Data Sharing

To verify whether managers and team members were on the same point about sharing valuable data, the author has formed null and alternative hypotheses and performed the t-test on sample data. *H4: Important data is regularly shared by team leaders and team members*

Table 13. Data sharing between team members and managers

	Managers	Team
Mean	4.2001	4.1200
Variance	2.6122	1.5771
Observations	50	50
Pearson Correlation	0.1321	
Hypothesized Mean Difference	0	
Df	49	
t Stat	2.2721	
P(T<=t) one-tail	0.3933	
t Critical one-tail	1.6765	
P(T<=t) two-tail	0.7866	
t Critical two-tail	2.0095	

The table displays t-test results that validate the sharing of crucial data between managers and their team members. With the t Stat value (2.272) surpassing the significance level (0.75), the null hypothesis is rejected, and H4 is accepted. Consequently, the conclusion is that team members and their managers consistently share essential data.

4.2.5 Face-to-face communication

To verify whether there is face-to-face communication between team members and managers on ongoing in-source and outsource projects, the author has formulated the following hypothesis: *H5: There is face-to-face communication between managers and their teams*

Table 14. Face-to-face communication between members and managers

	Managers	Team
Mean	3.6401	3.4601
Variance	2.3575	1.7228
Observations	50	50
Pearson Correlation	0.1389	
Hypothesized Mean Difference	0	
Df	49	
t Stat	2.5908	
P(T<=t) one-tail	0.2786	
t Critical one-tail	1.6765	
P(T<=t) two-tail	0.5573	
t Critical two-tail	2.0095	

The results shown in the above table indicate that values of t stat are more significant than the level of significance (2.590 > 0.75). Furthermore, the null hypothesis was rejected as values of t stat are much higher than the level of importance. Therefore, hypothesis 5 is accepted. This means face-to-face communication between team members and their leaders in software houses.

4.2.6 The use of Facebook

Table 15. Facebook as a tool of communication

	Managers	Team
Mean	2.8200	2.5010
Variance	2.8036	2.7857
Observations	50	50
Pearson Correlation	0.1205	
Hypothesized Mean Difference	0	
Df	49	
t Stat	2.0205	
P(T<=t) one-tail	0.1562	
t Critical one-tail	1.6765	
P(T<=t) two-tail	0.3124	
t Critical two-tail	2.0095	

The author has inquired managers and their team members about the different social media tools they use for regular communication with each other and

their clients. To verify it, the author has proposed: *H6: Managers and team members use Facebook as a tool for communication*

The table depicts the outcomes of the t-test conducted by the author to assess the null hypothesis. With the t Stat values (2.020) exceeding the significance level (0.75), the null hypothesis is rejected, and H6 is accepted. This implies that Facebook is a communication tool utilized by both the team and their managers.

4.2.7 The use of WhatsApp

When asked by team members and their managers about the use of WhatsApp as a tool of communication, it was supported by both that they are using WhatsApp as a tool of communication. Therefore, it is proposed that: *H7: WhatsApp as a tool of communication is used in Pakistan's software houses*

Table 16. Use of WhatsApp

	Managers	Team
Mean	4.1210	3.4803
Variance	1.6179	2.2131
Observations	50	50
Pearson Correlation	0.0317	
Hypothesized Mean Difference	0	
Df	49	
t Stat	2.2771	
P(T<=t) one-tail	0.0136	
t Critical one-tail	1.6766	
P(T<=t) two-tail	0.0272	
t Critical two-tail	2.0096	

The results shown in the above table indicate that the values of t Stat are more significant than the level of significance (2.277 > 0.75). Therefore, the null hypothesis was rejected, and the alternative hypothesis (H7) was accepted. This means that both groups of samples are on the same point that they used WhatsApp as a communication tool.

4.2.8 The use of Skype

To verify whether team members and managers used Skype for communication with each other and their clients, the author has proposed the following null and alternative hypotheses: *H8: Skype is used as a means of communication in software houses*

Table 17. Use of Skype

	Managers	Team
Mean	3.4001	3.6003
Variance	2.7347	3.0205
Observations	50	50
Pearson Correlation	0.1137	
Hypothesized Mean Difference	0	
Df	49	
t Stat	2.6261	
P(T<=t) one-tail	0.2671	
t Critical one-tail	1.6765	
P(T<=t) two-tail	0.5342	
t Critical two-tail	2.0096	

The table shows the t-test results to verify or reject the null hypothesis. The results suggest that the values of t Stat (2.626) are more significant than the level of significance (0.75). Hence, the null hypothesis is rejected, and H8 is accepted based on the t-test results. This means that the team manager and their team were on the same point: they used Skype as a communication tool.

4.2.9 The use of the email

Table 18. Use of Email

	Managers	Team
Mean	3.7802	3.9200
Variance	1.9711	2.0343
Observations	50	50
Pearson Correlation	0.1138	
Hypothesized Mean Difference	0	
Df	49	
t Stat	2.5315	
P(T<=t) one-tail	0.2988	
t Critical one-tail	1.6766	
P(T<=t) two-tail	0.5976	
t Critical two-tail	2.0096	

To determine the alignment of viewpoints between team members and their managers regarding the utilization of email as a communication tool, the author formulated the following hypotheses and subsequently conducted a t-test on the sample data. H9: Email is used to communicate between team members and managers in IT firms.

The table above displays results indicating that the t Stat values exceed the significance level (2.531 > 0.75). Consequently, the null hypothesis is rejected due to the considerably higher t Stat values, and Hypothesis 9 is accepted. This affirms that team members and their managers employ email as a communication tool.

5 Discussions and Conclusion

The research aimed to assess the present state of team communication in software houses in Pakistan and the communication strategies employed by these firms to facilitate effective team communication. To investigate and substantiate these aspects, separate questionnaires were administered to team members and managers, collecting 50 responses from each group. Following data collection, analysis, and interpretation were presented.

The findings regarding communication between team managers and their teams indicate the presence of effective team communication within the software industry of Pakistan. Additionally, the research explored various aspects such as information about insourced and outsourced projects, team engagement in communication with customers, daily reports on feedback from team members, team involvement in decision-making, use of face-to-face communication, team comfort in sharing information on new projects, and permission for team members to express their opinions. The majority of team managers affirmed positive communication in all the mentioned areas. Consequently, it can be concluded that robust team communication exists within the software houses in Pakistan.

The survey analysis of team communication among team members in software houses indicates that these firms are involved in team communication. Furthermore, research questions on project managers' discussions with team members related to insource and outsource projects, communication tools used by software houses, feedback from team members by managers, and team members are encouraged to communicate regularly. Team members are given information on the overall picture of the project and involvement of team members in insource and outsource tasks found that most team members agreed on effective communication in software firms in Pakistan.

In addition, it is found that there is a face-to-face communication strategy that exists in software houses. Based on the literature review in Chapter 2 and responses of team members and managers in Chapter 4, it is found that communication strategies such as frequency, direction, modality, and content communication strategy in individuals and groups exist in software houses. Besides, WhatsApp, Skype, and email are three primary communication tools and a comprehensive list of professional tools software houses use to maintain communication among teams and with customers.

Upon analyzing the responses from team members and managers in software firms, it was evident that effective team communication prevails in the software industry in Pakistan. This underscores the importance for companies within the software industry to prioritize and establish team communication, aiming to enhance employee satisfaction and facilitate the smooth flow of valuable information from the organization to employees and, subsequently, from employees to customers. Moreover, in project-based firms like software houses, promoting team communication significantly contributes to the likelihood of project success.

Additionally, the study revealed that communication strategies, encompassing direction, frequency, content, and modality, are crucial in enhancing effective and efficient communication between team members and leaders within software firms in Pakistan. This underscores the significance of communication strategies in the management and successful execution of software-related projects in the country. Consequently, software houses should employ diverse communication strategies to elevate

the likelihood of project success in Pakistan.

Like others previously discussed in the literature, this research project has its inherent limitations. However, it is essential to note that limitations can serve as valuable pointers for future research endeavors. The scope of this study is confined to the software industry in Pakistan, so the findings cannot be extrapolated to other sectors within Pakistan or internationally. Therefore, it is suggested that future researchers explore similar investigations within different industries in Pakistan or potentially replicate this study in neighboring industries for broader insights.

This study is constrained by a limited number of respondents, having received only 100 responses. To address this limitation, future research is advised to collect data from a more extensive sample, aiming for a minimum of 200 respondents. Additionally, given the cross-sectional nature of this study, future research should adopt a longitudinal approach to mitigate the limitations associated with short-term data. Moreover, since this study primarily explored the current state of team communication in software houses, it is recommended that future research delves into investigating the impact of team communication on project success within the software industry or other project-oriented sectors. Lastly, to overcome the limitation of homocentric data, future studies should ensure data collection from a more diverse respondent group.

Author Contributions

Syed Umar Shah: Conceptualization, Methodology, Software, Data curation, Writing- Original draft preparation. **Dr. Muhammad Sohail Khan**: Visualization, Investigation, Software, Validation, Reviewing and Editing

Compliance with Ethical Standards:

It is declared that all authors don't have any conflict of interest. Furthermore, informed consent was obtained from all individual participants included in the study.

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