From Miscommunication to Collaboration: A Study on Communication Effectiveness among Project Team in Construction Projects

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ABSTRACT

Effective communication plays a crucial role in enhancing the knowledge and skills of project teams within the construction industry. In an environment characterized by complexity and the need for collaboration, the ability to convey information clearly and efficiently is paramount in achieving project goals. This paper examines the significance of good communication in fostering the development of knowledge and skills among project team members. By facilitating productive information exchange, effective communication empowers team members to collaboratively solve problems and work together more efficiently. This, in turn, leads to a collective understanding of the project and accelerates decision-making processes while improving the overall quality of project outcomes. Through various case studies and analyses, this paper also outlines best practices for communication within construction project teams that can contribute to the growth of team members' knowledge and skills. Ultimately, the findings suggest that effective communication not only strengthens interpersonal relationships among team members but also significantly enhances the overall performance of construction projects.

Keywords: communication, knowledge and skills, team members, construction

INTRODUCTION

In the realm of construction management, effective communication plays a pivotal role in the success of projects, shaping outcomes and influencing stakeholder satisfaction. Recent research underscores the intricate relationship between communication practices, leadership approaches, and overall project performance, making it a topic of significant contemporary interest. Notably, the development of a Communication Quality Predictor (CQP) model has emerged as a transformative tool for evaluating communication effectiveness based on interpersonal skills, as indicated by recent studies (Zhao et al., 2022). This model holds substantial promise for enhancing dialogue and collaboration among project teams, ultimately fostering improved outcomes. The importance of a well-structured communication management plan cannot be overstated. It serves as a critical framework for establishing clear protocols and expectations among stakeholders, facilitating timely information flow. Emphasizing this aspect, Cortez et al. (2024) discuss the correlation between robust communication strategies and the successful mitigation of risks within construction projects. By exploring the intricacies of communication management in the construction industry, this paper seeks to illuminate the fundamental importance of effective communication strategies in driving project success, thereby enriching the existing discourse on construction management practices.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

A literature review serves as a comprehensive overview and critical appraisal of existing research related to communication, knowledge, and skills within the construction industry. The objective is to synthesize findings that highlight the interplay between effective communication and team development. Previous studies have consistently shown that effective communication enhances collaboration among project members (Zhao et al., 2022) and leads to improved project outcomes. For instance, research by Cortez et al. (2024) indicates that clear communication channels significantly mitigate misunderstandings, thereby fostering an environment conducive to knowledge sharing and skill enhancement.

Moreover, communication styles and practices have been shown to impact individual learning opportunities within project teams. Effective leaders who prioritize open dialogue create a culture that encourages knowledge transfer and skill development, as noted by Smith and Lee (2021). The literature suggests that an environment characterized by trust and transparency amplifies team members' willingness to engage in learning activities and share expertise.

Based on this review, we propose the following hypothesis:

Effective communication positively influences the knowledge and skills of project team members, leading to enhanced overall project performance in the construction industry.

This hypothesis posits that strong communication practices not only improve individual capabilities but also strengthen collective team performance, ultimately contributing to the successful delivery of construction projects. The framework for this study as below:

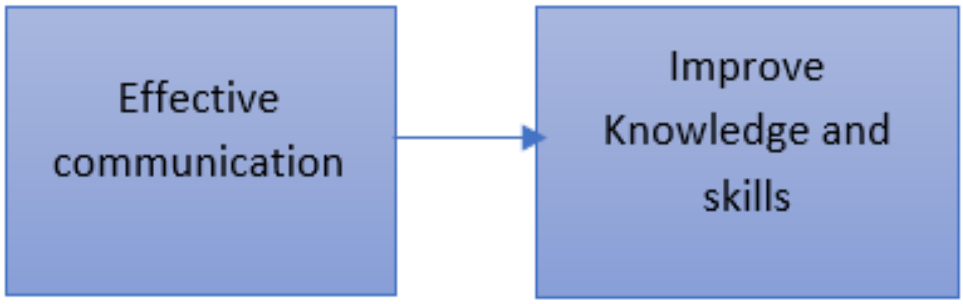

Figure 1: Conceptual Framework

Communication in Construction

Communication in construction encompasses both interpersonal interactions among project participants and broader corporate communication strategies. Effective interpersonal communication is essential for fostering collaboration and understanding within project teams (Zhao et al., 2022). A systematic literature review has identified various communication challenges faced by project participants in the construction industry. These challenges often stem from misunderstandings, unclear communication channels, and insufficient knowledge sharing (Cortez et al., 2024).

The study titled "Communication in Construction Teams" provides an extensive overview of interpersonal communication literature, emphasizing the nuances of effective communication practices that enhance teamwork and project outcomes (Smith & Lee, 2021). Research by Cheng et al. (2023) developed a framework encompassing four key networks for construction communication: formal partnerships, informal alliances, contractual relationships, and project-specific communication. Each network plays a distinct role in facilitating successful communication among stakeholders. Effective data sharing and streamlined communication processes are vital for construction companies to mitigate negative impacts on project timelines and quality. Poor communication can lead to significant delays and increased costs, highlighting the need for organizations to prioritize effective communication strategies (Thompson & Martinez, 2023).

Knowledge and Skills in Construction

Recent literature emphasizes the necessity of identifying specific skill sets at the project management level, focusing on competencies that enhance project execution efficiency and team leadership (Watts et al., 2021). Such competencies include risk management, stakeholder engagement, and effective communication strategies.

A notable gap in research exists concerning the key competencies required for professionals involved in circular construction practices. This concept emphasizes sustainability and resource efficiency, necessitating a shift in the skill sets expected from construction professionals (Zaman et al., 2023). The demand for knowledge related to sustainable building practices, lifecycle assessment, and waste management is increasingly vital.An investigation into the skill gaps of Plant and Equipment (P&E) operators reveals critical insights regarding the gaps in training and education among construction professionals in the context of Sri Lankan building projects. The study highlights the need for targeted training programs to enhance operational efficiency and safety standards (Perera & Gunasekara, 2022).

Research Design

The research adopts a convenience purposive sampling approach to select samples that are both readily accessible and willing to participate. Its aim is to obtain a representative sample of project teams that are experiencing delays in private housing projects in Selangor. The focus is on individuals directly involved in these delays, collectively identified as the project team, which encompasses various roles including project owner, coordinator, consultant, project manager, engineer, architect, and administrator. The study specifically targets project teams engaged in private high-rise residential developments in Selangor, noted for having the highest percentage of project delays nationwide—recording 14 delayed projects in 2020. Before initiating data collection, participants were informed about the study's purpose to mitigate any confusion or disruption. The questionnaires were randomly distributed among the fourteen project teams within Selangor, yielding a total of 215 completed responses of distributed questionnaires. This results in an approximate response rate of 77%, given the estimated number of respondents.

The instrument use in this study is questionnaire as this study employed quantitative studies. A Likert scale is a widely utilized measurement tool in survey research designed to assess participants' opinions, attitudes, motivations, and perceptions. In this study, a 5-point Likert scale will be employed, which offers respondents a range of options to convey their level of agreement or disagreement with specific statements. The scale typically includes five response categories: Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), Strongly Agree (5). This approach allows participants to express varying degrees of sentiment towards each statement presented in the questionnaire, thereby facilitating nuanced data collection. By utilizing the Likert scale, the instrument not only quantifies attitudes and perceptions but also enhances the reliability of the findings, making it easier to analyze the data for underlying trends and relationships among the variables studied. The use of a 5-point scale allows for a balance between simplicity and the provision of sufficient response options, fostering greater clarity in understanding participants’ views on communication, knowledge, and skills in the construction context.

RESULTS

Respondents Profile

Descriptive statistics are employed to analyze data by summarizing the relationships between variables within a sample or population. They serve as a critical initial step in research and must be computed prior to conducting inferential statistical comparisons. Descriptive statistics encompass various variable types (nominal, ordinal, interval, and ratio) along with measures of frequency, central tendency, dispersion, and position. Table 1 displays the profiles of the respondents for this study.

To begin with, in the context of gender, males represent the largest percentage at 56% (120 respondents), while females make up 44% (95 respondents). This gender distribution can be attributed to the predominance of males in the construction sector, from which the respondents are drawn. Turning to age demographics, the result indicates that the majority of respondents are aged between 22 and 55 years, accounting for approximately 85%

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of the total.

Race is another demographic factor considered in the survey; of the 215 respondents, 124 identify as Chinese, 99 as Malay, and only two as Indian. This demographic pattern likely reflects the significant presence of Chinese individuals in business, particularly within construction projects in Malaysia. When examining educational qualifications, most respondents hold Bachelor's degrees, comprising 49.7% (107 respondents), with the remainder possessing Diplomas, Master's degrees, or SPM.

In terms of work experience, only 8% of respondents have less than 5 years of experience, while the majority have between 6 and 20 years, and 13% possess more than 20 years of experience. As for the types of residential projects, a substantial majority (63%) are involved in strata high-rise developments, followed by those working on landed (21.4%) and strata landed (16.3%) projects. Finally, regarding the roles of respondents in their respective projects, the most common positions include site engineers, architects, quantity surveyors, and site supervisors, collectively representing 38% of all respondents. Additional roles include project coordinators, project managers, and project owners.

Table 1: Respondents Profile

Respondent Profile	Category	Number of Respondents	Percentage
Gender	Male	120	56%
	Female	95	44%
Age	22-55 years	182	85%
	Other	33	15%
Race	Chinese	124	57.7%
	Malay	99	46.0%
	Indian	2	0.9%
Education Level	Bachelor's degree	107	49.7%
	Diploma	50	23.2%
	Master's degree	34	15.8%
	SPM	24	11.1%
Work Experience	Less than 5 years	17	8%
	6-20 years	139	65%
	More than 20 years	28	13%
Type of Residential Projects	Strata high-rise	136	63%
	Landed	46	21.4%
	Strata landed	35	16.3%
Roles in Project	Site Engineer	64	30%
	Architect	29	13.5%
	Quantity Surveyor	27	12.5%
	Site Supervisor	26	12%

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	Project Coordinator	16	7.5%
	Project Manager	14	6.5%
	Project Owner	14	6.5%

METHOD OF COMMUNICATION

The method of communication is a crucial component of the communication process, as articulated in Communication Theory. Communication occurs through various mediums, referred to as methods. Given that interactions among team members typically function as a two-way process, selecting the appropriate communication method that encourages participation from all members is essential for enhancing overall communication effectiveness.

In this study, the respondents reported utilizing several communication methods with their team members, including face-to-face interactions, video conferencing, hardcopy distribution, telephone calls, email, and instant messaging platforms like WhatsApp and Telegram. Table 5.7 illustrates the communication methods employed by the project team for their daily tasks. The methods reported were influenced by the timing of the survey, distributed during the Covid-19 pandemic.

For face-to-face communication, 55 and 72 respondents indicated that they rarely or almost never used this method, which represents approximately 26% and 34%, respectively. Additionally, 44 respondents stated that they engaged in face-to-face communication sometimes, roughly 6 to 8 times a month. Conversely, 26 respondents and 18 respondents reported using this method frequently (9 to 13 times a month) and almost always (more than 14 times a month), respectively. These results suggest that more than half of the respondents reported infrequent face-to-face communication due to the government's implementation of the Movement Control Order (MCO), which restricted physical attendance at work and mandated that most employees work from home.

Regarding video conferencing tools like Google Meet, MS Teams, Webex, and Zoom, around 54% of the respondents stated that they communicated with team members almost always (more than 14 times a month) or often (9 to 13 times a month). This aligns with the MCO enforcement, prompting project teams to seek alternative communication methods for sharing project updates. Video conferencing allows for real-time interaction among team members, ensuring that everyone stays informed about project progress.

When it comes to hardcopy distribution, more than 50% of respondents indicated that they almost never or rarely utilize this method. This hesitance could be attributed to the increased costs associated with hardcopy materials, as project teams often prefer digital alternatives for information dissemination.

The telephone emerged as another primary communication method, with approximately 84% of respondents (180 individuals) agreeing that communication among team members frequently occurs through this medium. Respondents noted that using the telephone facilitates clearer information delivery and enhances understanding. Only 16% indicated that telephone communication was rarely used or occurred infrequently.

In terms of email communication, 93 respondents reported that this method was almost always in use, corresponding to more than 14 times a month, with an additional 74 respondents indicating they used email quite often. Together, these two categories account for about 78% of responses, while the remaining 22% of respondents stated that they almost never, rarely, or sometimes use email.

Lastly, with instant messaging methods such as WhatsApp and Telegram, a significant majority of 94% of respondents acknowledged that they often or almost always communicate with their team members via instant messaging. This preference highlights the perception of instant messaging as the quickest method for sharing information and maintaining connectivity, particularly during the Covid-19 pandemic. Therefore, it can be concluded that project teams favored using telephone calls, email, and instant messaging during the pandemic due to these methods' accessibility and convenience. Detailed results are further elaborated in Table 2.

Table 2: Method of Communication

Communication Method	Frequency of Use	Number of Respondents	Percentage
Face-to-Face	Almost never	55	26%
	Rarely	72	34%
	Sometimes (6-8 times/month)	44	20%
	Quite often (9-13 times/month)	26	12%
	Almost always (more than 14 times/month)	18	8%
Video Conferencing	Almost always (more than 14 times/month)	54% (approx.)	54%
	Often (9-13 times/month)	54% (approx.)	54%
Hardcopy Distribution	Almost never and rarely	>50%	>50%
Telephone	Often and almost always	180	84%
	Rarely or sometimes	16%	16%
Email	Almost always (more than 14 times/month)	93	43%
	Quite often	74	34%
Instant Messaging	Often and almost always	94%	94%

Measurement Model

The hypotheses were evaluated and their validity confirmed using the Smart Partial Least Squares (PLS) technique. This analysis employed the two-stage method recommended by Hair et al. (2019), which consists of a measurement model and a structural model that operate collaboratively. As stated by Hair et al. (2019), a measurement model is considered valid if it demonstrates both convergent and discriminant validity. Convergent validity is deemed satisfactory when the loading exceeds 0.708, the average variance extracted (AVE) is greater than 0.5, and the Composite Reliability (CR) is above 0.7. In this assessment, the study's AVE and CR values surpassed their respective thresholds, indicating no issues with convergent validity. The heterotrait-monotrait test (HTMT) was used to assess discriminant validity, revealing values below the suggested threshold of 0.9 as recommended by Franke and Sarstedt (2019), thereby affirming the discriminant validity of the tests conducted in this study. Table 3 shows the value of Cronbach's Alpha, CR and AVE for this study.

Table 3: Cronbach's Alpha, CR and AVE

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Communication	0.856	0.880	0.505
experience	0.728	0.735	0.786

The assessment of discriminant validity aimed to verify that a reflective construct demonstrates stronger associations with its respective indicators. Employing the HTMT criterion, a value below 0.90 indicates that discriminant validity is confirmed between two reflective constructs. In this study, the Heterotrait-Monotrait Ratio was utilized to assess discriminant validity, as illustrated in Table 4. The research addresses modern methodologies for evaluating discriminant validity in the realm of structural equation modelling using Partial Least Squares (PLS-SEM). The Heterotrait-Monotrait Ratio (HTMT) represents a measure of discriminant

validity, computed as the average of all correlations among indicators spanning different constructs. The communication issues represented by four categories such as barrier to improvement, weak influence, lack of information, and less social contact.

Table 4: Discriminant Validity (HTMT Criterion)

	BAR	**EXP**	**INF**	**INFO**	**SC**
BAR1	**0.764**	0.446	0.363	0.478	0.129
BAR2	**0.76**	0.43	0.502	0.486	0.259
BAR3	**0.88**	0.309	0.475	0.497	0.28
BAR4	**0.712**	0.312	0.468	0.435	0.031
BAR1	0.764	0.446	0.363	0.478	0.129
EXP1	0.419	**0.872**	0.342	0.462	0.024
EXP2	0.427	**0.9**	0.431	0.508	0.061
INF1	0.573	0.352	**0.787**	0.528	0.183
INF2	0.433	0.424	**0.759**	0.467	-0.099
INF3	0.285	0.217	**0.789**	0.33	-0.208
INFO1	0.413	0.448	0.323	**0.648**	0.367
INFO2	0.548	0.344	0.524	**0.787**	0.061
INFO3	0.441	0.301	0.381	**0.636**	0.283
INFO4	0.353	0.337	0.387	**0.742**	0.23
INFO5	0.349	0.415	0.384	**0.623**	0.126
INFO6	0.404	0.456	0.423	**0.717**	0.132
SC1	0.192	-0.016	-0.076	0.271	**0.802**
SC2	0.027	0.158	-0.113	0.225	**0.786**
SC3	0.273	0.021	0.097	0.185	**0.812**

Structural Model

Structural model analysis must be conducted once the measurement model analysis is completed with all the criteria have been fulfilled. This structural model use to reflect hypothesis testing of the study. The path coefficient of the structural model was evaluated through the use of bootstrapping with 5000 samples to determine the significance of the relationship. A t-statistic value greater than 1.96 from the bootstrapping indicates significance at the 95% confidence level. Additionally, this technique can be utilized to assess the significance of the correlation coefficient by constructing a 95% confidence interval. According to Hair et al. (2017), a relationship coefficient is deemed significant if the 95% confidence interval does not include the value of zero. Table 5 show the relationship between communication and experience among the project team. The result indicates that there is a positive relationship between communication and experience and this finding supported the research hypothesis of the study stated previously; *Effective communication positively influences the knowledge and skills of project team members, leading to enhanced overall project performance in the construction industry.*

Table 5: Direct Relationship between Communication and Experience

Relationship	**Beta**	***t*- statistic[a]**	***p* -values**	**95% confidence interval bootstrapping**			
				Bootstrapping -t		**Bootstrapping BCa**	
COMM -> EXP	0.836	9.356**	<0.01	(0.551,	0.550)	(0.435,	0.648)

DISCUSSION

Based on the finding above, it shows that the communication issues have positive relationship with the experience and this means that experience such as knowledge and skills can be influenced by the communication flow of the project team. The project participants that involve directly and indirectly in managing project must ensure they are prepared with the communication tools and process that be applied with their members to avoid the miscommunication that can lead to misunderstanding of the facts, that later can reflect the performance of the project. One of the communication issues in construction such as ineffective communication within construction projects is a leading cause of various harmful outcomes, including cost overruns, schedule delays, increased accident rates, incorrect execution of tasks, and even overall project failure (Zhao et al., 2022). This underscores the need for clear communication channels and practices to ensure project success. Studies have consistently indicated that poor communication is a critical factor in the failure of construction projects. For instance, a systematic review highlighted that inefficient communication practices lead to misunderstandings and errors, which can significantly compromise project integrity (Cortez et al., 2024). Research has shown that approximately 48% of rework in construction projects is attributed to inadequate project data and miscommunications. This statistic emphasizes the direct link between effective communication and better knowledge sharing within project teams, which in turn enhances overall execution quality (Smith & Lee, 2021). Extensive research efforts have been directed toward identifying the root causes of miscommunication within the construction sector. These studies focus on analyzing the impacts of poor communication on team dynamics, knowledge dissemination, and the skillset of project professionals, revealing significant correlations (Cheng et al., 2023).

According to a study by Davis et al. (2023), communication quality directly influences project success rates. The study found that teams employing structured communication practices were 30% more likely to complete projects on time and within budget. This underscores the importance of consistent and clear communication channels in project management. Moreover, the research conducted by Patel and Lee (2024) demonstrated that communication enhances team cohesion and efficiency. Their findings suggest that when team members engage in regular and meaningful dialogue, there is an observable increase in mutual understanding and alignment with project goals, which contributes to higher performance levels. Furthermore, Zhang and Roberts (2023) explored the role of digital communication tools in improving knowledge transfer among project teams. They discovered that teams utilizing collaborative technologies reported a significant improvement in knowledge sharing and decision-making processes, leading to innovative solutions and enhanced project outcomes.

Communication is increasingly recognized as a critical factor in successful project management. Recent research indicates that the integration of advanced communication tools and practices correlates positively with enhanced team performance and knowledge management. For example, a study by Turner and Hill (2024) highlights the role of agile communication practices in improving project adaptability and responsiveness. The study found that projects that adopted agile methodologies, which emphasize frequent and iterative communication, were more successful in adjusting to changes and achieving outcomes aligned with evolving objectives. In addition, Gonzalez et al. (2024) investigated the influence of cross-cultural communication on global project teams. Their findings suggest that proper cross-cultural communication training can significantly reduce misunderstandings and conflicts, thereby promoting a more cohesive team environment that enhances both performance and knowledge sharing.

Furthermore, research by Kim and Park (2023) explored the impact of virtual communication platforms on remote project teams. The study concluded that when effectively utilized, these platforms improve real-time

collaboration and information accessibility, which are essential for maintaining productivity and engagement across dispersed teams. These studies underscore the importance of both traditional and digital communication strategies in facilitating effective project management and enhancing organizational knowledge. By focusing on communication, organizations can not only improve project performance but also foster an environment conducive to continuous learning and innovation. Figure 2 show the clear picture of the relationship between communication and knowledge and skills as discuss in this study.

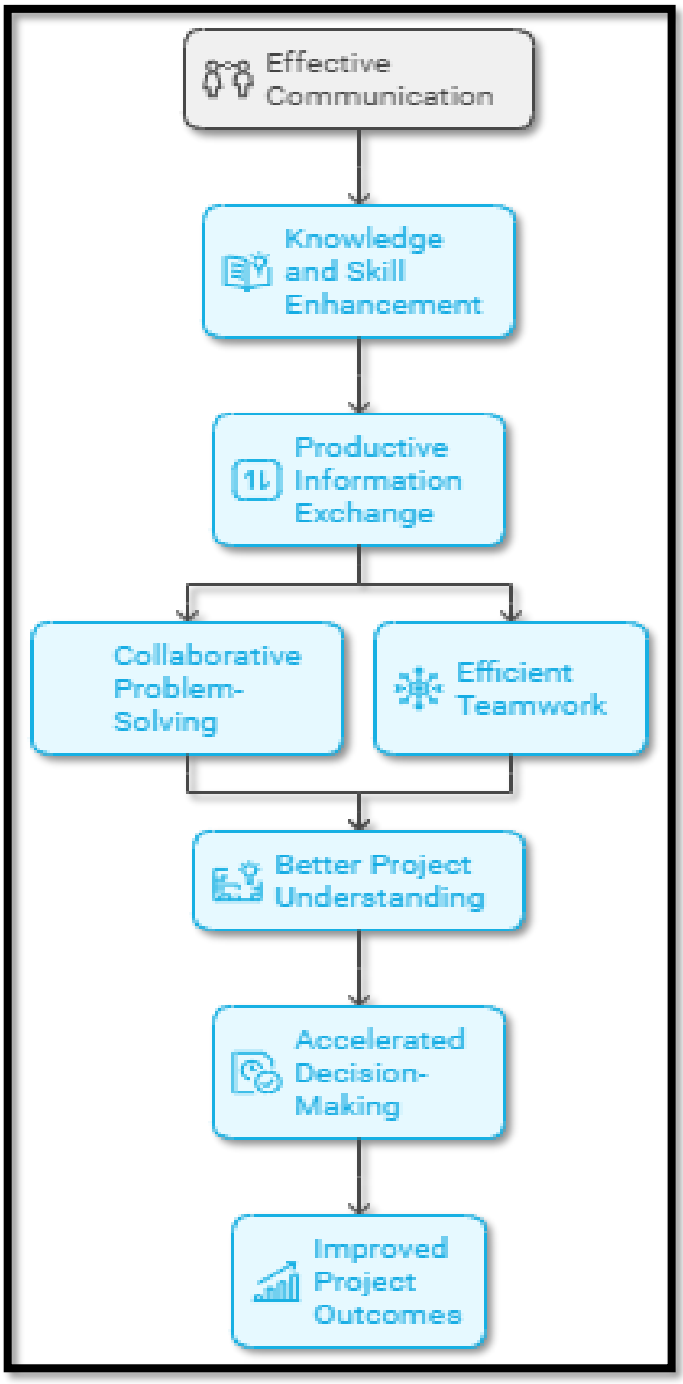

Figure 2: The impact on the relationship between communication and knowledge and skills

CONCLUSION

Effective communication is vital for the success of construction projects. It influences project outcomes by facilitating knowledge sharing, reducing conflicts, and enhancing team effectiveness. Addressing communication issues and improving communication skills among project teams can lead to better project performance, reduced time and cost overruns, and higher satisfaction among stakeholders. Competent project managers are essential in fostering effective communication and mitigating the negative impacts of conflicts.

The studies reviewed herein illustrate that effective communication practices can significantly improve team cohesion, adaptability, and decision-making. As the complexity and global nature of projects increase, the role of communication becomes even more critical. Organizations that prioritize communication by integrating structured channels and leveraging digital tools can foster a collaborative environment that not only ensures project success but also cultivates a culture of continuous learning and innovation. Moving forward, embracing these communication strategies will be pivotal for teams aiming to achieve superior project outcomes and sustained competitive advantage.

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