International Journal Of Health, Engineering And Technology (IJHET) *E-ISSN 2829 - 8683*
Volume 5, Number 2, July 2026, *Page. 1656 - 1674*
Email : editorijhess@gmail.com

Evaluation Of Risk-Based Leadership Systems, Communication Systems, And Decision-Making Processes To Improve Project Time Performance In Indonesian Construction MSME Contractors

Fadhil Ahmad Rusydi[1)], Yusuf Latief[2)]
[1,2)] Construction Management Study Program - Civil Engineering, Faculty of Engineering, Universitas Indonesia

*Corresponding Author
Email : fadhilahmadrusydi@gmail.com

Abstract

The construction service industry at the Micro, Small, and Medium Enterprise (MSME) level in Indonesia plays an important role in supporting national development. However, MSME construction companies still face various challenges in achieving project time performance. Project delays in MSME construction companies are generally influenced by weak leadership systems, ineffective communication systems, and suboptimal decision-making processes during project implementation. Therefore, this study aims to analyze the influence of leadership systems, communication systems, and decision-making processes on project time performance, as well as to develop a relationship model among these variables in MSME construction service companies in Indonesia. This study employed a quantitative approach using a survey method through questionnaire distribution to MSME construction service companies in Indonesia. Data analysis was conducted using the Structural Equation Modeling–Partial Least Square (SEM-PLS) method to examine the relationships among the research variables. The independent variables in this study consist of leadership systems, communication systems, and decision-making processes, while the dependent variable is project time performance. The results indicate that leadership systems, communication systems, and decisionmaking processes have a positive and significant effect on project time performance in MSME construction service companies. The communication system was identified as the most dominant variable in improving work coordination, accelerating project information delivery, and reducing the potential for project delays in the field. This study also produced a structural relationship model describing the interaction between leadership systems, communication systems, and decision-making processes in improvingconstruction project time performance within MSME companies. The resulting model demonstrates that the implementation of effective leadership systems, supported by effective communication systems and fast and accurate decision-making processes, can improve the timeliness of construction project completion. The novelty of this study lies in the development of an integrative model that simultaneously connects leadership systems, communication systems, and decisionmaking processes within the context of MSME construction service companies in Indonesia, which remains relatively underexplored in previous studies. This research is expected to serve as a reference for MSME construction companies in improving project performance, particularly in terms of project time performance

Keywords: Leadership System, Communication System, Decision-Making Process, Project Time Performance, Construction MSMEs, SEM-PLS.

INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) constitute a vital component of the Indonesian economy. According to Statistics Indonesia (BPS), more than 99% of national business entities are classified as MSMEs, collectively employing over 97% of the national workforce. This positions MSMEs as a key driver of economic growth and equitable distribution of social welfare. From a macroeconomic perspective, MSMEs contribute approximately 61% of Indonesia's Gross Domestic Product (GDP) (Ministry of Cooperatives and SMEs, 2024). Through the Integrated MSME Data Collection Program (PL-KUMKM), the government, in collaboration with BPS, has developed a comprehensive database covering non-agricultural and regional MSMEs (Ministry of Cooperatives and SMEs & BPS, 2023). As of December 31, 2024, approximately 30.18 million MSMEs were officially registered, of which 307,519 operated within the construction sector (Kementerian UKM, 2024).

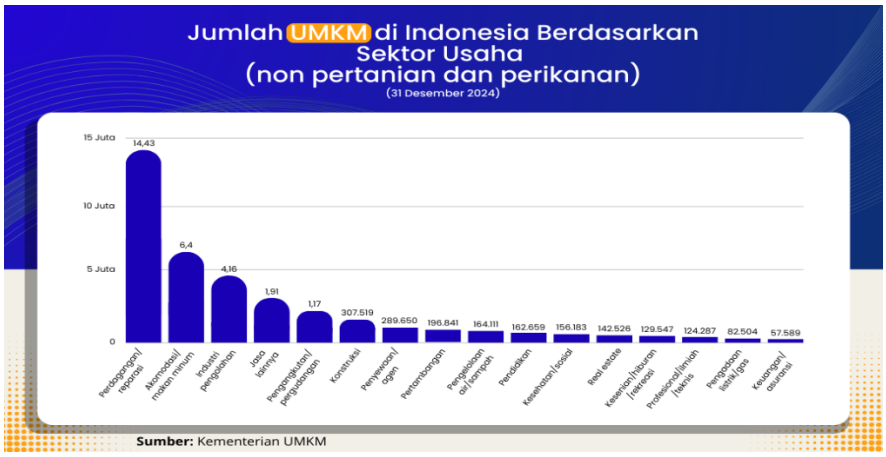

Figure 1. Number of MSMEs by Business Sector in 2024
Source: Author's Editing, 2025

The Micro, Small, and Medium Enterprises (MSME) sector constitutes an essential component of Indonesia's economic landscape. According to data provided by Statistics Indonesia (BPS), more than 99% of the country's business entities fall within the MSME classification, collectively employing over 97% of the national workforce. This positions MSMEs as a significant driver of economic development and equitable social welfare distribution. From a macroeconomic perspective, regulatory provisions governing MSMEs in Indonesia are stipulated under Law No. 20 of 2008 concerning Micro, Small, and Medium Enterprises, which classifies businesses based on their turnover and asset valuation. Meanwhile, the specific nomenclature applicable to the construction sector is regulated under Law No. 2 of 2017 concerning Construction Services and its implementing regulations, which classify contractors into small, medium, and large categories based on the Business Entity Certificate (Sertifikat Badan Usaha/SBU) issued by the Construction Services Development Board (LPJK) and the Ministry of Public Works and Housing (PUPR). Consequently, MSME-level construction service providers, hereinafter referred to as "MSME Contractors" in this study, denote construction service providers that are economically classified as MSMEs and/or technically possess SBU qualifications at the small to medium level.

Numerically, construction companies in Indonesia that qualify as small and medium enterprises represent the majority within the national construction services sector, with 158,104 companies classified as small enterprises, 27,254 companies classified as medium enterprises, and 1,176 companies classified as large enterprises (BPS, 2024). This numerical dominance makes construction MSMEs, particularly small and medium-sized contractors, an important demographic for academic investigation (Glowka et al., 2024; Somashekar, 2025).

The phenomenon of project delays remains one of the dominant issues within Indonesia's construction services sector, particularly among Micro, Small, and Medium Enterprise (MSME) construction service providers. Although the number of construction business entities continues to increase, most MSME contractors still face limitations in managerial capabilities, project control, human resources, and the implementation of integrated risk management systems. These conditions make MSME contractors more vulnerable to project completion delays compared to large-scale construction companies.

According to data from Statistics Indonesia (2024), the construction sector is one of the sectors that significantly contributes to national economic growth through the development of infrastructure, buildings, and public facilities. On the other hand, data from the Ministry of Cooperatives and Small and Medium Enterprises of the Republic of Indonesia (2024) indicate that MSMEs dominate the national business structure, accounting for more than 99% of all business entities in Indonesia. Within this total, the construction sector represents one of the continuously growing business sectors and is dominated by enterprises with small and medium qualifications. Furthermore, Statistics Indonesia

(2024) reports that construction service companies with small qualifications continue to dominate the national construction business structure compared to medium and large qualifications.

The dominance of MSME contractors indicates that the success of national construction development is highly influenced by the managerial capacity of small and medium-sized construction companies. Nevertheless, previous studies have shown that MSME contractors continue to face various challenges in project management, including weak organizational leadership, low effectiveness of project communication, slow decision-making processes, and suboptimal implementation of project risk management practices (Simpeh & Ndihokubwayo, 2021; Rehan et al., 2024; Ismaeil et al., 2025; Shriharsha et al., 2025). These conditions contribute to a high potential for project delays, reduced labor productivity, cost overruns, and declining project schedule performance.

This phenomenon was also identified in one MSME-scale construction service company, namely PT.X, which operates in supporting mining infrastructure facilities. Based on the company's internal data from the 2023–2025 period, several projects experienced schedule delays, indicating the existence of challenges related to work coordination, organizational communication, project decision-making, and construction risk control. Therefore, PT.X is utilized in this study as an empirical case representing a phenomenon commonly encountered among MSME construction contractors in Indonesia.

As shown in Table 1, several projects undertaken by PT.X experienced delays in the completion of various construction work packages. This condition demonstrates that project delays remain a significant challenge for MSME contractors, particularly for companies facing resource limitations, project management systems that have not been optimally integrated, and high levels of project complexity.

Table 1. Project Delay Data of MSME Contractors (PT.X)

No.	Work Package	Building	Project Location	Year	Delay (Days)
1	Workshop Facility	Main Workshop	Sekako, Central Kalimantan	2023	- 14
2		Extend Main Workshop	Sekako, Central Kalimantan	2025	0
3		SSE Workshop	Sekako, Central Kalimantan	2023	- 20
5		SSE Workshop	Sekako, Central Kalimantan	2025	0
5	Mess Facility	Non-Staff Mess	Sekako, Central Kalimantan	2023	- 35
6		Non-Staff Mess	Sekako, Central Kalimantan	2024	- 15
7		Non-Staff Mess	Sekako, Central Kalimantan	2025	+5
8		Junior Staff Mess	Sekako, Central Kalimantan	2023	- 45
9		Junior Staff Mess	Sekako, Central Kalimantan	2024	+7
10		Junior Staff Mess	Sekako, Central Kalimantan	2025	- 15

Source: Author's Compilation, 2025

As shown in the table above, among the projects located in the Sekako District, Central Kalimantan, 6 out of 10 projects experienced delays, indicating that 60% of the projects were affected by schedule disruptions.

Prior to the occurrence of these delays, the underlying issue was identified as the inadequacy of a formalized project management framework. A considerable number of contractors demonstrated deficiencies in standardized communication frameworks (Akintelu et al., 2023), consistent leadership methodologies (Purasinghe, 2024), and decision-making procedures, which were often characterized by complex and bureaucratic chains of authority (Chen et al., 2025). These challenges were further exacerbated by the limited adoption of risk management technologies and the suboptimal implementation of digital communication strategies (Maoeng & Ntakana, 2025).

The primary sources of these problems can be categorized into four distinct factors: (1) inadequacies in adaptive leadership capabilities (Rehan et al., 2025), (2) ineffective communication practices (Ismaeil et al., 2025), (3) delays in risk-informed decision-making processes (Sivasubramanian & Lee, 2022; Shriharsha et al., 2025), and (4) the absence of a cohesive risk management methodology (Araujo Lima et al., 2021; Soyingbe & Simeon, 2025).

The occurrence of project delays in construction MSMEs has significant consequences at both the macroeconomic and microeconomic levels. At the macroeconomic level, such delays adversely affect government budget absorption, hinder the timely delivery of public infrastructure, and reduce contributions to national economic growth (Ministry of Public Works and Housing, 2024). At the meso level, companies face lost business opportunities, declining client trust, and obstacles in securing financing. At the microeconomic level, contractors experience direct impacts, including reduced profitability, cash flow constraints, and increased internal team conflicts (Baloyi & Ozumba, 2020; Jung et al., 2021).

This scientific investigation aims to explore the interrelationships among organizational factors, particularly leadership, communication, decision-making, risk management, and project schedule performance among construction MSME contractors. Drawing upon the existing literature, it is argued that improving project schedule performance in the construction MSME sector requires the integration of four essential components. First, strengthening adaptive and inclusive leadership frameworks capable of responding rapidly to project variations (Han, H., et al., 2025; Siddiquei, A.N., et al., 2025; Bibi et al., 2025). Second, establishing formal and structured communication frameworks, including the utilization of digital communication technologies to reduce miscommunication (Rehan, A., et al., 2024; Lukito, A.J., et al., 2024; Ismaeil, E.M.H., et al., 2025). Third, enhancing decision-making processes through the incorporation of risk-based methodologies and supply chain integration (Khahro, S.H., et al., 2023; Shriharsha et al., 2025; Chen et al., 2025). Finally, adopting proactive risk management strategies that utilize predictive technologies such as artificial intelligence (Tian, K., et al., 2025; Araujo Lima et al., 2021; Pineda-Pomachagua & Núñez-Romero, 2024) to identify and monitor potential delays in a timely manner.

Through the implementation of this integrative framework, construction MSMEs are expected to improve their project schedule performance, enhance their competitiveness, and make greater contributions to national development. By institutionalizing structured systems, construction MSMEs in Indonesia will be empowered to strengthen their competitive advantage, maintain their reputational integrity, and assume a more significant role in the advancement of national infrastructure development.

RESEARCH METHODS

This study is limited to small and medium-sized construction service companies (SMEs) in Indonesia, particularly those located in Jakarta and Bekasi, focusing on the influence of leadership systems, communication systems, decision-making processes, and risk factors on project time performance as the main dependent variable. The research does not extensively examine aspects of cost, quality, and project sustainability, and therefore has limitations in generalizing its findings to large-scale construction companies. The scope includes small to medium-scale construction projects that are prone to delays due to managerial weaknesses. Conducted in 2025, this study employs a quantitative approach using questionnaires and interviews, with data analyzed through statistical methods such as multiple regression or SEM-PLS. Theoretically, the research is grounded in project management, leadership, organizational communication, and risk-based decision-making theories, aiming to contribute to the development of an integrated understanding of managerial factors influencing project time performance in SME construction sectors.

RESULTS AND DISCUSSION

Research Question 1 (RQ1)

The condition of internal management systems—comprising leadership systems, communication systems, decision-making processes, and risk management—implemented in projects managed by SME construction service providers in Indonesia is not yet optimal. This is due to the fact that many indicators have not been fully applied, particularly in the aspect of risk management, based on actual field conditions.

Research Question 2 (RQ2)

The condition of time performance in projects managed by SME construction service providers in Indonesia is also not yet optimal, as many indicators remain unimplemented, especially in terms of time control, based on actual conditions in the field.

Research Question 3 (RQ3)

The leadership system concept that needs to be developed in SME construction service companies is an integrated and adaptive leadership system that supports effective decision-making, operational control, and project coordination.

The recommended leadership system concept includes several key components:

1. The leadership system should develop effective, open, and collaborative communication skills among leaders to support coordination and integration of project activities (Al-Nady & Al-Hamdan, 2016; Gamil & Rahman, 2023).
2. The leadership system should integrate a transactional leadership approach as the primary mechanism for project performance control, supported by a transformational approach to enhance team motivation and commitment (Han & Chen, 2025; PMI, 2017).
3. The leadership system must be adaptive to project dynamics, enabling leaders to adjust their leadership approach according to situational conditions (Shriharsha, 2025).
4. The leadership system should define the leader's role as a strategic director and primary decision-maker, supported by adequate technical and managerial competencies (McDonough, 2025; Sarvari et al., 2021).
5. The leadership system should develop mechanisms for team empowerment, conflict management, and strengthening leadership integrity to maintain organizational stability and project performance (Li & Yang, 2024; Wicker, 2024).

Thus, the recommended leadership system concept emphasizes the development of a structured, adaptive, and competency-based leadership system that enables leaders to effectively perform their roles in improving project performance within SME construction service companies.

Figure 2. Conceptual Model Recommendation of Leadership System for SME Construction Service Providers
Source: Author's elaboration, 2025

Research Question 4 (RQ4)

The communication system concept that needs to be developed in SME construction service companies is a planned, structured, integrated, and controlled communication system that supports effective coordination and project decision-making.

The recommended communication system concept includes several key components:

1. The communication system must be designed based on a clear communication plan, including identification of information needs, communication channels, responsibilities, and communication frequency.
2. The communication system should be equipped with mechanisms for communication control, monitoring, and evaluation to ensure effectiveness and sustainability.
3. The communication system needs to be supported by appropriate communication technology and adequate user competence to ensure smooth information flow.
4. The communication system should implement clear communication models and flows, utilizing various communication methods and media in an integrated manner.
5. The communication system must establish a clear communication structure to support vertical, horizontal, and cross-functional coordination.
6. The communication system must ensure the quality, relevance, and timeliness of information, and support project decision-making processes (clear, accurate, complete, consistent, and timely).

Thus, the recommended communication system concept emphasizes the development of a structured, information-driven, and integrated communication system that enhances communication effectiveness and supports improved project performance in SME construction service companies.

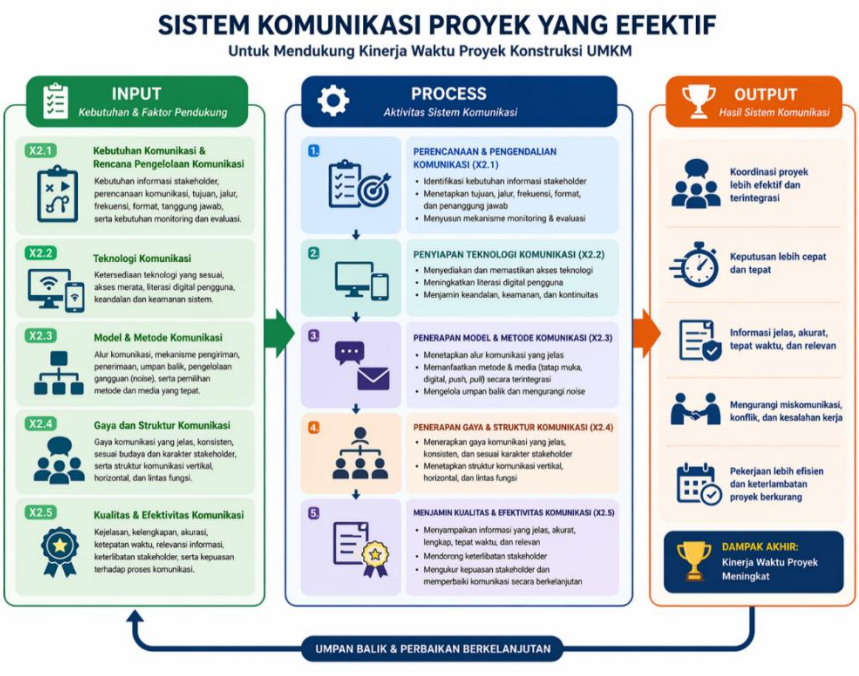

Figure 3. Conceptual Model Recommendation of Communication System for SME Construction Service Providers

Research Question 5 (RQ5)

The decision-making process that needs to be developed in SME construction service companies is a structured, participatory, data-driven process that is integrated with risk management, as well as adaptive and oriented toward project performance control. The recommended concept for improving the decision-making process includes:

1. Establishing a clear and well-documented decision structure and workflow.
2. Implementing delegation of operational authority to enhance responsiveness.
3. Utilizing data analysis and objective evaluation of alternatives in every decision-making process.
4. Integrating risk analysis into the selection of decision alternatives.
5. Applying continuous monitoring, evaluation, feedback, and decision revision mechanisms.

Thus, the recommended decision-making process concept positions decision-making as part of a dynamic and adaptive project management cycle that directly influences project time performance in SME construction service companies.

.

Figure 4. Conceptual Model Recommendation of Decision-Making Process for SME Construction Service Providers
Source: Author's elaboration, 2025

Research Question 6 (RQ6)

The dominant risk factors in project implementation by SME construction service companies consist of three causal indicators related to the leadership system, five causal indicators related to the communication system, and seven impact indicators related to the decision-making process. Each of these indicators is accompanied by preventive actions representing mitigation-type risk responses, as well as impact-handling measures or corrective

Table 2. Causes, Preventive Actions, Impacts, and Corrective Actions for Dominant Risk Factors

Code	Description
LEADERSHIP SYSTEM	
P_L	Causes of Leadership System Risk
P_L1	SME organizational structures tend to be centralized under leadership, so almost all decisions must wait for top management approval, accompanied by a lack of delegation systems and non-real-time communication between project teams and leadership.
P_L2	The project organizational structure does not yet have a clear division of tasks and authority, and there are no formal documents regulating decision authorization between positions.
P_L3	Many SME construction company leaders come from field experience without formal project management training, so managerial and technical capabilities are not yet optimally integrated.
TP_L	Preventive Actions for Leadership System Risk

TP_ L1	Establish a clear decision authority structure through an authorization matrix, strengthen transparent project reporting systems, and improve decision-making capacity at the project manager level.
TP_L2	Develop a project organizational structure, job descriptions, and an authority matrix that is clearly documented and communicated to all project teams.
TP_L3	Conduct project management, leadership training, and professional certification, and strengthen technical coordination with engineering teams before important decisions are made.
D_L	Impacts of Leadership System Risk
D_L1	Project decision-making becomes slow, causing operational delays and affecting fieldwork delays.
D_L2	Confusion in decision-making, conflicts of authority between teams, and ineffective project coordination.
D_L3	Inaccurate strategic project decisions potentially increase the risk of project management errors and schedule delays.
TK_L	Corrective Actions for Leadership System Risk
TK_L1	Delegate operational decision authority to the project manager or site management and establish fast communication channels for field decisions.
TK_L2	Redefine authority boundaries for each project position and clarify responsibilities through management coordination meetings.
TK_L3	Involve external experts or consultants in complex projects and conduct evaluation and lessons learned from previous projects.
COMMUNICATION SYSTEM	
P_C	Causes of Communication System Risk
P_C1	There is no structured project issue reporting system, and coordination between head office and field teams does not operate in real time.
P_C2	Many project communications are carried out informally via telephone or messaging without official records and without a proper project administration system.
P_C3	There are no guidelines regarding the selection of communication methods based on the urgency level of project information.

P_C4	Each project function has different information needs but is not well managed, leading to inter-departmental miscommunication.
P_C5	The organizational communication flow is unclear, and much information is delivered orally without documentation and information distribution control.
TP_C	Preventive Actions for Communication System Risk
TP_C1	Establish a structured project issue reporting mechanism, use fast communication media, and set response time limits for issue handling.
TP_C2	Require documentation of important communications through meeting minutes or written reports and develop a consistent communication documentation system.
TP_C3	Develop communication guidelines based on information classification such as routine, coordination, and emergency communication.
TP_C4	Identify information needs for each project function from the beginning and conduct regular cross-functional coordination.
TP_C5	Establish a formal communication flow structure and clear information distribution mechanisms.
D_C	Impacts of Decision-Making Risk
D_C1	Delayed project issue handling causes minor field problems to escalate into major issues affecting project schedules.
D_C2	Multiple interpretations of project instructions may lead to work errors and rework.
D_C3	Important information is not immediately followed up, reducing project coordination effectiveness and delaying problem resolution.
D_C4	Misinterpretation of information and misalignment between planning and execution occur.
D_C5	Important information does not reach the required parties, leading to execution errors in project work.
TK_C	Corrective Actions for Communication System Risk
TK_C1	Establish fast communication channels and escalation procedures for critical project issues.
TK_C2	Reconstruct project decision records through written reports and improve project documentation systems.
TK_C3	Direct the use of communication media according to urgency levels

	and establish emergency communication channels.
TK_C4	Realign information flow between project functions and improve coordination mechanisms.
TK_C5	Re-clarify and re-deliver project information through briefings or coordination meetings.

DECISION-MAKING PROCESS

P_D	Causes of Decision-Making Risk
P_D1	Project decisions are often based on experience without formal risk analysis and without a risk management system.
P_D2	Organizational authority structures are not clearly documented, and many operational decisions still wait for leadership approval.
P_D3	The company focuses more on execution than decision evaluation, with no system for monitoring project decision impacts.
P_D4	Project planning is not yet mature and there are changes in stakeholder instructions or lack of coordination between project functions.
P_D5	Project information is not properly verified, and documentation and reporting of project conditions are inaccurate.
P_D6	There is no project performance monitoring system and no complete decision documentation.
P_D7	There are no emergency handling procedures, and decisions still wait for leadership approval.
TP_D	Preventive Actions for Decision-Making Risk
TP_D1	Establish risk analysis procedures before strategic decision-making and integrate risk identification into project planning.
TP_D2	Establish authority structures and clear SOPs for decision-making within project organizations.
TP_D3	Establish periodic decision evaluation mechanisms and indicators for monitoring decision impacts.
TP_D4	Strengthen project planning and implement change management procedures.
TP_D5	Establish project information verification processes before decisions are made and improve reporting systems.
TP_D6	Develop project control systems and periodic monitoring of decision impacts.

TP_D7	Develop emergency response procedures and provide rapid decision authority to project teams.
D_D	Impacts of Decision-Making Risk
D_D1	Unidentified risks may cause project disruptions, delays, and cost increases.
D_D2	Confusion and authority conflicts hinder project follow-up activities.
D_D3	Decision-making errors may recur and their impacts are not detected early.
D_D4	Project disruptions occur and rework reduces project efficiency.
D_D5	Decisions not aligned with actual project conditions increase execution errors.
D_D6	Project time deviations are not detected early, leading to poor performance.
D_D7	Project disruptions are not handled promptly, leading to potential delays.
TK_D	Corrective Actions for Decision-Making Risk
TK_D1	Re-evaluate decisions made and develop risk mitigation strategies.
TK_D2	Redefine authority distribution and clarify responsibilities through project coordination meetings.
TK_D3	Conduct project decision reviews and prepare evaluation documentation.
TK_D4	Adjust project schedules and execution strategies after decision changes.
TK_D5	Re-clarify and re-verify project information before continuing work.
TK_D6	Evaluate project decisions and adjust execution strategies based on monitoring results.
TK_D7	Take rapid project recovery actions and improve emergency handling procedures.

Source: Processed Primary Data, 2025

Furthermore, the relationships among causes, preventive actions, impacts, and corrective actions for the validated dominant risk factors are presented in the following table.

Table 3. Relationship between Causes, Preventive Actions, Impacts, and Corrective Actions of Dominant Risk Factors

Code	Risk Factor	Causes	Preventive Actions	Impacts	Corrective Action
X4.1	Leadership System Risk				
X4.1.5	Centralized & slow decision-making at leadership level	SME organizational structures tend to be centralized under leadership, so almost all decisions must wait for top management	Establish clear decision-making authority through an authorization matrix, strengthen transparent project reporting systems, and improve	Project decision-making becomes slow, causing delayed operational actions and	Delegate operational decision-making authority to project managers or site management and

		approval, accompanied by weak delegation systems and non-real-time communication between project teams and leadership.	decision-making capacity at the project manager level.	resulting in fieldwork delays.	establish fast communication channels for field decisions.
X4.1.6	Unclear authority across organizational levels	The project organizational structure lacks clear division of tasks and authority, and there are no formal documents regulating decision authorization between positions.	Develop a project organizational structure, job descriptions, and a clearly documented authority matrix, and disseminate it to all project teams.	Confusion in decision-making, authority conflicts between teams, and ineffective project coordination.	Re-establish authority boundaries for each project position and clarify responsibilities through management coordination meetings.
X4.1.2	Limited technical/managerial capability	Many SME construction leaders originate from field experience without formal project management training, resulting in suboptimal integration of managerial and technical competencies.	Provide project management, leadership training, and professional certification, and strengthen technical coordination with engineering teams before making important decisions.	Inaccurate strategic project decisions, increasing the risk of project management errors and schedule delays.	Involve external experts or consultants in complex projects and conduct evaluation and lessons learned from previous projects.
X4.2	Communication System Risk				
X4.2.9	Delayed response to issues/problems	Absence of a structured project issue reporting system and non-real-time coordination between head office and field teams.	Establish a structured issue reporting mechanism, use fast communication media, and set response time limits for issue reports.	Delayed project issue handling, causing minor field problems to escalate into major issues that affect project schedules.	Establish fast communication channels and escalation procedures for handling critical project issues.
X4.2.6	Lack of formal communication documentation	Many project communications are conducted informally via telephone or messaging without official records, and a proper project administration system is not yet in place.	Require documentation of important communication through meeting minutes or written reports and develop a consistent communication documentation system.	Dual interpretation of project instructions leading to work errors and rework.	Reconstruct project decision records through written reports and improve the project documentation system.
X4.2.5	Inappropriate communication methods (issue vs. urgency mismatch)	Lack of guidelines for selecting communication methods based on project information urgency levels.	Develop communication guidelines based on information classification such as routine, coordination, and emergency communication.	Important information is not promptly followed up, reducing coordination effectiveness and delaying issue resolution.	Direct the use of communication media according to urgency levels and establish dedicated channels for emergency situations.

X4.2.2	Misalignment of information needs across functions	Each project function has different information needs that are not properly managed, resulting in inter-departmental miscommunication.	Identify information needs of each project function from the beginning and conduct regular cross-functional coordination.	Misinterpretation of information and misalignment between planning and execution.	Realign information flow between project functions and improve coordination mechanisms.
X4.2.1	Important information not reaching relevant parties	Unclear organizational communication flow and reliance on verbal communication without documentation and information distribution control.	Establish a formal organizational communication flow and clear information distribution mechanisms.	Important information is not received by the required parties, leading to execution errors in project work.	Re-clarify and re-deliver project information through briefings or coordination meetings.
X4.3	Decision-Making Process Risk				
X4.3.7	Risks not considered before decisions are made	Project decisions are often based on experience without formal risk analysis, and there is no formal risk management system in the company.	Establish risk analysis procedures prior to strategic decision-making and integrate risk identification into project planning.	Unidentified risks may cause project disruptions, delays, and cost increases.	Re-evaluate decisions that have been made and develop risk mitigation strategies.
X4.3.2	Unclear authority boundaries	Organizational authority structures are not clearly documented, and many operational decisions still depend on leadership approval.	Establish clear authority structures and SOPs for decision-making within the project organization.	Confusion and authority conflicts that hinder technical project follow-up.	Redefine the division of authority and clarify responsibilities through project coordination meetings.
X4.3.8	No post-decision risk review mechanism	The company focuses more on execution than decision evaluation, and there is no system for monitoring project decision impacts.	Establish periodic decision evaluation mechanisms and develop indicators for monitoring decision impacts.	Repeated decision-making errors whose impacts are not detected early.	Conduct project decision reviews and prepare evaluation documentation.
X4.3.9	Changes in instructions during implementation	Project planning is not yet mature, and there are changes in stakeholder instructions or lack of coordination between project functions.	Strengthen project planning and implement change management procedures.	Disruptions in work progress and rework that reduce project efficiency.	Adjust project schedules and execution strategies following decision changes.
X4.3.4	Unverified project information	Project information is not properly verified, and documentation and reporting of project conditions are inaccurate.	Establish project information verification procedures before decisions are made and improve reporting systems.	Decisions are not aligned with actual project conditions, increasing the risk of execution errors.	Re-clarify and re-verify project information before continuing work.
X4.3.10	Lack of decision impact monitoring	There is no project performance monitoring system and no complete decision documentation.	Develop project control systems and periodic monitoring of decision impacts.	Time deviations are not detected early, resulting in suboptimal project performance.	Evaluate project decisions and adjust execution strategies based on monitoring results.

X4.3.5	Slow response to emergency conditions	There are no emergency handling procedures, and decisions still depend on leadership approval.	Develop project emergency response procedures and grant rapid response authority to project teams.	Project disruptions are not handled promptly, potentially causing work delays.	Take rapid project recovery actions and improve emergency handling procedures.

Source: Author's elaboration, 2025

Research Question 7

The conceptual model of relationships among Leadership System (X1), Communication System (X2), Decision-Making Process (X3), Risk Factors (X4), and Project Time Performance (Y) has been statistically and empirically validated, demonstrating strong levels of reliability and validity.

The results of the measurement model testing indicate that all constructs meet the required validity and reliability criteria, as shown by Average Variance Extracted (AVE) values greater than 0.50, as well as Composite Reliability and Cronbach's Alpha values exceeding 0.70. This indicates that the research instrument accurately represents the latent variables and is appropriate for analyzing causal relationships among variables within the model.

Structurally, the relationships among variables in the model are not partial but form an integrated and hierarchical project management system. The Leadership System (X1) functions as the main exogenous variable that initiates the effectiveness of the project management system. Effective leadership is proven to have a significant influence on the Communication System (X2), Decision-Making Process (X3), and Risk Factors (X4).

The Communication System (X2) acts as a coordination foundation that connects various project functions and strengthens the decision-making process. Effective communication improves both the quality and speed of project decision-making, which subsequently contributes to more systematic risk control.

The Decision-Making Process (X3) plays a strategic mediating role, bridging communication systems and risk management. Data-based, coordinated, and responsive decision-making has been shown to enhance risk control effectiveness, thereby minimizing potential project delays.

Risk Factors (X4) represent the variable with the most significant direct influence on Project Time Performance (Y). This indicates that project success in achieving time targets is highly determined by the ability to identify, manage, and control risks proactively throughout the project execution cycle.

The model also shows that Project Time Performance is not directly influenced by a single variable, but rather is the result of interactions within an integrated management system. Leadership does not directly improve time performance; instead, its effect is mediated through strengthened communication, decision-making, and risk control mechanisms. These findings emphasize the importance of a systems-based approach in project management, particularly in SME construction enterprises.

The high coefficient of determination (R^2) values for endogenous variables, particularly Risk Factors and Project Time Performance, indicate that the model has strong predictive power in explaining relationships among variables. This suggests that the developed model comprehensively represents real-world conditions in the field.

Conceptually, the resulting relationship model illustrates a hierarchical causal flow, starting from Leadership System (X1) to Communication System (X2), followed by Decision-Making Process (X3), then Risk Management (X4), and ultimately influencing Project Time Performance (Y). This pattern demonstrates that project time performance is strongly determined by the synergy of leadership, communication, decision-making, and risk management within an integrated system.

Thus, the Research Question (RQ) regarding the inter-variable relationships in this study can be empirically answered. The resulting model not only describes statistical relationships among variables but also serves as a conceptual framework and decision-support tool for SME construction

practitioners in improving project time performance in a more effective, structured, and system-based manner.

CONCLUSIONS

The main conclusions of this study can be formulated as follows:

1. Existing Condition of Project Management Systems in Construction MSMEs

This study successfully identified that project management systems within MSME-scale construction companies remain largely unstructured and highly dependent on individual leaders (leader-dependent). Leadership, communication, and decision-making systems have not yet been formally integrated into an organizational framework, resulting in inconsistencies in project execution and weak control over project performance.

2. Existing Condition of Project Schedule Performance

The findings indicate that project schedule performance in construction MSMEs remains suboptimal, as evidenced by the frequent occurrence of project delays. These delays are primarily influenced by inadequate planning, insufficient coordination among stakeholders, and slow responses to issues arising in the field. This condition suggests that project schedule performance is not managed systematically and remains largely reactive to emerging problems.

3. Characteristics of Leadership Systems in Construction MSMEs

The results demonstrate that leadership plays a dominant role as the primary driver of project systems within construction MSMEs. However, leadership practices continue to face challenges related to centralized decision-making and limited delegation of authority. These conditions contribute to slower decision-making processes at the operational level and reduce organizational flexibility in responding to project dynamics.

4. Effectiveness of Communication Systems on Project Schedule Performance

This study found that unstructured communication systems that are not aligned with project information requirements constitute one of the major causes of project delays. Conversely, effective, well-directed, and timely communication has been proven to enhance stakeholder coordination and minimize the risk of miscommunication, thereby improving project schedule performance.

5. The Role of Risk-Based Decision-Making in Projects

The analysis reveals that decision-making processes that fail to systematically consider risk factors diminish the organization's ability to anticipate project-related issues. Risk-based decision-making has been identified as a critical factor in improving responsiveness to changing field conditions and reducing the likelihood of project delays.

6. Identification and Mapping of Integration Risk Factors

This study successfully identified and mapped the key risk factors affecting the integration of leadership, communication, and decision-making systems within construction MSME project management. The dominant risks identified include centralized decision-making, ineffective communication flows, limited organizational resources, and the absence of formal risk management systems. These factors were found to have a significant impact on both system integration effectiveness and project schedule performance.

7. Development of a Statistical Model of Interrelationships Among Variables

A statistical model examining the relationships among leadership systems, communication systems, risk-based decision-making, and project schedule performance was successfully developed and empirically validated using the SEM-PLS method. The results indicate that all variables exert significant effects on project schedule performance, demonstrating that the proposed model effectively explains the causal relationships among variables and can serve as a reliable foundation for managerial decision-making.

8. Identification of Priority Strategies Through Expert Validation

Using the Delphi approach, this study successfully identified practical and applicable priority strategies, particularly those requiring minimal resources, easy implementation, and a strong focus on improving communication speed, decision-making effectiveness, and responsiveness to risks. These strategies were considered the most suitable for the characteristics of MSME-scale construction companies.

9. Development of a Risk-Based Project Management System Model and Standard Operating Procedures (SOPs)

As the primary outcome of this study, an integrated project management system model based on leadership, communication, and risk-based decision-making was developed and complemented by comprehensive Standard Operating Procedures (SOPs). These SOPs were systematically designed to cover the following stages:

a. Leadership system planning;
b. Establishment of organizational structures and authority;
c. Project communication management;
d. Risk-based decision-making;
e. System implementation;
f. Monitoring and evaluation; and
g. Continuous improvement.

The developed model and SOPs function not only as operational guidelines but also as organizational control mechanisms capable of consistently enhancing project schedule performance in MSME construction companies.

REFERENCES

(PMI), P. M. (2017). *A guide to the project management body of knowledge, 6th ed.* Newtown Square: Pennsylvania, USA.

Ahmad N. Siddiquei, S. A. (2025). Fostering team resilience with servant leadership: A multi-level study of the construction industry. *ScienceDirect* .

Aliu Adebayo Soyingbe, a. D. (2024). Appraising Risk Management Strategies in Construction Small and MediumSized Enterprises: A Sector-Specific Analysis. *Journal of Project Management Practice*, 20-38.

Alvin Jayadinata Lukito, R. B. (2024). Evaluation of communication management on project success (PT XYZ case). *Jurnal Indonesia Sosial Teknologi, Vol 5, No 6*, 2916-2931.

Ashok Rehan, D. T. (2025). Empirical Study on Project Managers' Leadership Behavioral Practices Impacting Project Success : The Australian Construction C2Sector. *International Journal of Construction Education and Research, vol 21, No 2* , 164-188.

Athenkosi Sogaxa, E. S. (2021). Assessment of Time Management Practices of Small Medium Sized Contractors in Project Delivery in The Eastern Cape Province, South Africa. *UFS*, 117-141.

Aynur Kazaz, G. A. (2024). An Assessment of Risk Impact on Time and Cost Performance of Construction Projects. *Proceedings of the Creative Construction Conference*.

Bahaà Abdul-Hafez Attallah Al-Nady, S. I.-H. (2016). The role of time, communication, and cost management on project management success: an empirical study on sample of construction projects customers in Makkah City, Kingdom of Saudi Arabia. *International Journal Services and Operation managemen, Vol 23, No 1* , 77-112.

Bianca Nicole Fontanilla, J. M. (2024). Leadership Styles in the Construction Firms in Luzon, Philippines: Comparing Leadership Style and their Workers' Preferences. *Universal Journal of Management* , 35-43.

Brayaham Angel Pineda-Pomachagua, R. J.-R. (2024). Significant Efficiency Gains in Construction SMEs through Lean Procurement Practices: A Case Study on Integrating Kanban, Systematic

Layout Planning, and 5S. *International Conference on Industrial Engineering and Operations Management* (pp. 93-107). Muscat, Oman: IEOM Society International USA.

Chen, S. E. (2025). Supply Chain Risks for SMEs in Construction Projects: A Structured Literature Review and Research Agenda. *International Journal of Logistics Management*, 1-68.

Dharmaraj Sivasubramanian, J. G. (2022). Decision-Making Framework for Sustainable Construction Products Selection in SMEs. *MDPI Sustainability*, 1-15.

Elnaz Safapour, S. K. (2020). Analysis of effective project-based communication components within primary stakeholders in construction industry. *Emerald Insight, Build Environtment Project and Asset Management* .

Esam M. H. Ismaeil, H. Z. (2025). Effective communication management for mitigating potential risk in construction projects. *Environtment and Socila Psychology, Vol 10 No 1* , 2424-7979.

Esam M. H. Ismaeil, H. Z. (2025). Effective communication management for mitigating potential risk in construction projects. *Enviromental and Social Psychology*, 1-25.

Gundula Glowka, ·. R. (2024). Strategic Risk Management among Small Enterprises in the Construction Industry. *Risk Management* , 1-27.

Hajira Bibi, A. B. (2025). Impact of inclusive leadership on project success through mediating role of project citizenship behavior: Project complexity as a moderator. *Journal of Project Management*, 1-15.

Heliza Rahmania Hatta, E. H. (2023). Assessing the Influence of Leadership Style, Decision Making, Communication, and Team Building on the Success of MSME Entrepreneurial Businesses in Bandung City. *West Science Business and Management* , 1-9.

Huibin Han, C. M. (2025). Transformational leadership and project success: the mediating roles of team reflexivity and project team resilience. *Frontiers in Psychology*.

Irem Dikmen, G. A. (2022). A decision-support tool for risk and complexity assessment and visualization in construction projects. *ScienceDirect*.

Isa Adewale Olatinwo, F. A. (2025). Effect of Communication Pattern on the Construction Project Success in North, Central Nigeria . *Open Journal of Business and Management* , 870-886.

Jianmin Song, M. M. (2025). Examining the impact of risk management practices on sustainable project performance in the construction industry: the role of stakeholder engagement. *Frontiers in Built Environment*, 1-15.

Jikul Li, Z. Y. (2024). Examining the Impact of Leadership Styles ande Decision Making Progress on Conflict Management and Project Success in Virtual Teams : A Modern Project Management Prespective. *Journal Modern PM*, 53-63.

Jin Woo Won, W. J. (2024). Probability and Impact Perspectives on Cost and Schedule Risks in International Construction Projects: An Empirical Investigation. *Journal of Civil Engineering, Vol 28, No 7* , 2601-2612.

Kawina Muneku., E. M. (2025). Evaluating the Practical Effectiveness of Risk Management rameworks among SMEs in Zambia's Construction Sector: A Case Study of Lusaka Building Contractors. *INTERNATIONAL JOURNAL OF RESEARCH AND INNOVATION IN SOCIAL SCIENCE*, 4515 - 4526.

Kumar, R. (2011). *Research Methodology, a Step-by-Step Guide for Beginners (3rd ed.).* New Delhi, India: SAGE Publishers Ltd.

Kun Tian, Z. Z. (2025). Artificial intelligence in risk management within the realm of construction projects: A bibliometric analysis and systematic literature review. *ScienceDirect*.

Liyanagamage, N. (2024). Navigating Machiavellianism in Construction Projects:Leaders' Communication Strategies and Employees' Voice. *Journal Management Engineering* .

Maoeng M, Ntakana K (2025), Assessing the improvement of information communication technology for the construction SMES in the 4IR. *Journal of Infrastructure, Policy and Development*, 81-98.

McDonough, A. F. (2025). The Importance of Executive Leadership for Construction Projects.

International Journal of Management, Vol 16 No 2 , 280-301.

Me Me Maw, S. K. (2025). Evaluating Contractor Performance through Cost-Time Management Strategies in Educational Building Project. *Jurnal Ilmiah Telsinas Vol 8, No 1* , 2671-5276.

Mehran Vahedi Nikbakht, M. G. (2023). Identification and Ranking of Factors Affecting the Delay Risk of High-Rise Construction Projects Using AHP and VIKOR Methods. *MDPI, Infrastructures*, 1-22.

Ohiwere, E. A. (2025). Construction Micro, Small and Medium Enterprises Competencies for Business Continuity Planning in Abuja, Nigeria. *International Journal of Built Environtment and Earth Science*, 53-70.

Önder Ökmen, M. L.-R. (2024). Employee Perspectives on Risk Management in Construction Company. *Journal of Risk Research Vol 27, No 3*, 404-422.

Ozan Okudan, M. Ç. (2024). Development of Delay and Disruption Cause Monitoring Framework for Megaprojects: A Claim Management Approach from the Contractor's Perspective to Enhance Sustainability in the Built Environment. *MDPI, Sustainability*, 1-24.

Ozumba, T. B. (2020). Strategic Risk Management among Small Enterprises in the Construction Industry. *MATEC Web of Conferences*, 1-9.

Priscila Ferreira de Araujo Lima, M.-S. S. (2021). Successful implementation of project risk management in small and medium enterprises: a cross-case analysis. *International Journal of Managing Projects in Business*, 1023-1045.

Purasinghe, S. N. (2024). Analysis of Leadership Styles Practiced in Construction Projects – A Review. *International Journal of Innovative Science and Research Technology*, 685-698.

Rebeca Lambers, F. C. (2024). Risk management strategies for common residential construction defects : the case of Queensland, Australia. *International Journal of Construction Management*, 1126-1135.

Sarvari, H. C. (2021). Critical Success Factors for Managing Construction Small and Medium-sized Enterprises in Developing Countries of Middle East: Evidence from Iranian Construction Enterprises. 1-44.

Shriharsha, J. B. (2025). Enhancing decision-making in construction projects : The mediating role of adaptability and response strategy in supply chain and coordination dynamics. *ScienceDirect*.

Somashekar, L. (2025). Leadership and Strategic Skills for Business Continuity: A Framework for SME Managers. *Journal of Advanced Management Studies*, 20-28.

Summaira Malik, M. T. (2021). Exploring the Relationship between Communication and . *MDPI Sustainability*, 1-16.

Sunday Olufemi Akintelu, A. I. (2023). The impact of project communication management on successful project . *International Journal of Development and Sustainability*, 376-386.

Vaus, D. d. (2002). *Surveys in Social Research. 5th Edition.* Routledge, London: SAGE Publishers Ltd.

Wang Peng, N. A. (2022). Leadership in Construction: A Scientometric Review. *MDPI, Buildings* , 1-21.

Wicker, J. (2024). Leadership in the Construction Industry: An LMX Analysis. *Senior Honors Project, Bridgewater College*, 1-26.

Wooyong Jung, S. H. (2022). Three-Phased Risk-Management Benchmark for Internationalization of Small and Medium-Sized Construction Companies. *KSCE Journal of Civil Engineering*, 1024-1039.

Yaser Gamil, I. A. (2023). Studying the relationship between causes and effects of poor communication in construction projects using PLS-SEM approach. *Emerald Insight, Journal of Facilities Management, Vol 21, No 1* , 102-148.

Yin, R. K. (2018). *Case Study Research and Applications: Design and Methods (6th ed.).* Thousand Oaks, CA: SAGE Publishers Ltd.