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Risk Analysis of Communication Flows for Enhancing Project Time Performance (A Case Study of PT.X Coal Mining)

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Abstract

This study was conducted to identify and develop communication risk management guidelines for a coal mining project at PT. X. The research focus was directed toward five main aspects: the roles and responsibilities of internal and external stakeholders; mining business processes from licensing to post-mining activities; communication procedure flows in production activities and mine expansion licensing; risks and dominant risks within each communication flow; and the development of risk-based communication flow documents to support project time performance. The results showed that internal stakeholders (management, operations, and legal departments) and external stakeholders (regulators, local governments, and communities) play complementary roles in supporting project execution. Business processes proceed sequentially from licensing, exploration, and production to post-mining activities, with critical communication points identified at each stage. Formal communication through official documents and coordination meetings, along with informal communication in the field, were found to be vital factors in maintaining the continuity of production activities and licensing processes. Risk analysis revealed dominant risks in the forms of document delays, technical miscommunication, and licensing ambiguities, which affect project time performance. As a solution, this study developed a Communication Risk Management Guideline containing preventive and corrective measures for high-risk communication flows. Expert validation demonstrated that the guideline was consistent, relevant, and effective as an official reference for optimizing project time performance. Thus, the developed guideline provides a tangible contribution to improving the effectiveness of communication management and supporting the successful implementation of the coal mining project at PT. X.

INTRODUCTION

PT. X is a company operating in the coal mining sector and holds concession rights to conduct mining activities and manage coal resources within its mining business license area (Natsir et al., 2024; Noverizky & Hikmah, 2024; Peta, 2022; Suhariyanto, 2025; Werner et al., 2024). The phenomenon of coal production delays at PT. X indicates that communication management issues remain unresolved and have not yet functioned effectively. Production delays are not only caused by technical factors, such as geological conditions, equipment failures, or weather conditions, but are also influenced by non-technical factors, particularly communication among departments involved in project execution. Ineffective communication can result in delays in information delivery, coordination errors in operational activities and licensing processes, and slower decision-making processes (Abdallah et al., 2024; Khahro et al., 2023; Mohammed, 2024; Sanusi, 2024; Suleiman, 2022; Ylitalo, 2023). These conditions have the potential to disrupt operational continuity and affect the achievement of production targets (Gaudenzi et al., 2023; Schmidt & Raman, 202S2; Vital-Soto & Olivares-Aguila, 2023).

The current issues are not isolated cases but reflect a broader trend within the mining industry. Silva and Frossard (2024) highlighted that communication failures are among the primary causes of project delays in large-scale mining operations. Furthermore, Yang et al. (2021) emphasized that the application of information technology in communication systems is crucial for improving operational efficiency in mining activities. In the Indonesian context, Saputra et al. (2026) found that the implementation of good governance in mining licensing processes often encounters challenges due to ineffective communication between companies and regulatory authorities. This finding is supported by Sholikin and Jamil (2024), who identified that miscommunication among communities, governments, and mining companies is a primary cause of social conflicts that can subsequently disrupt or halt production activities. These studies underscore that communication is a critical non-technical factor that directly influences project time performance; however, it is frequently overlooked in project risk management plans.

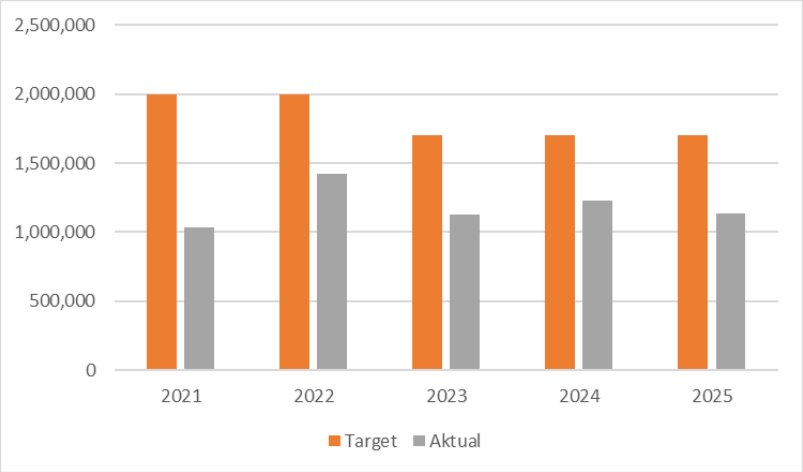

Figure 1. Coal Excavation Target Tonnage vs. Actual Coal Excavation Tonnage in the South Block of PT. X

There are three problems occurring at PT X,

a) The ambiguity of the stakeholder structure affects the decision-making process and information distribution in the Coal Mining Project at PT. X.
b) Negative impacts arise from PT. X's unclear business processes, where productive time is depleted solely for repetitive coordination.
c) The absence of a clear communication procedure flow and the associated risk levels arising at each flow to separate areas requiring immediate handling from those that must be monitored and mitigation periodically.

METHOD

Various methods were used to address the issues identified in this study. The research aimed to determine the actual communication flow at PT. X that affected information distribution through literature studies, questionnaires, and expert validation. Data were collected through expert validation questionnaires involving five experts with at least ten years of experience in PT. X coal mining projects. The respondents consisted of project team members who had previously managed or were currently involved in coal mining projects.

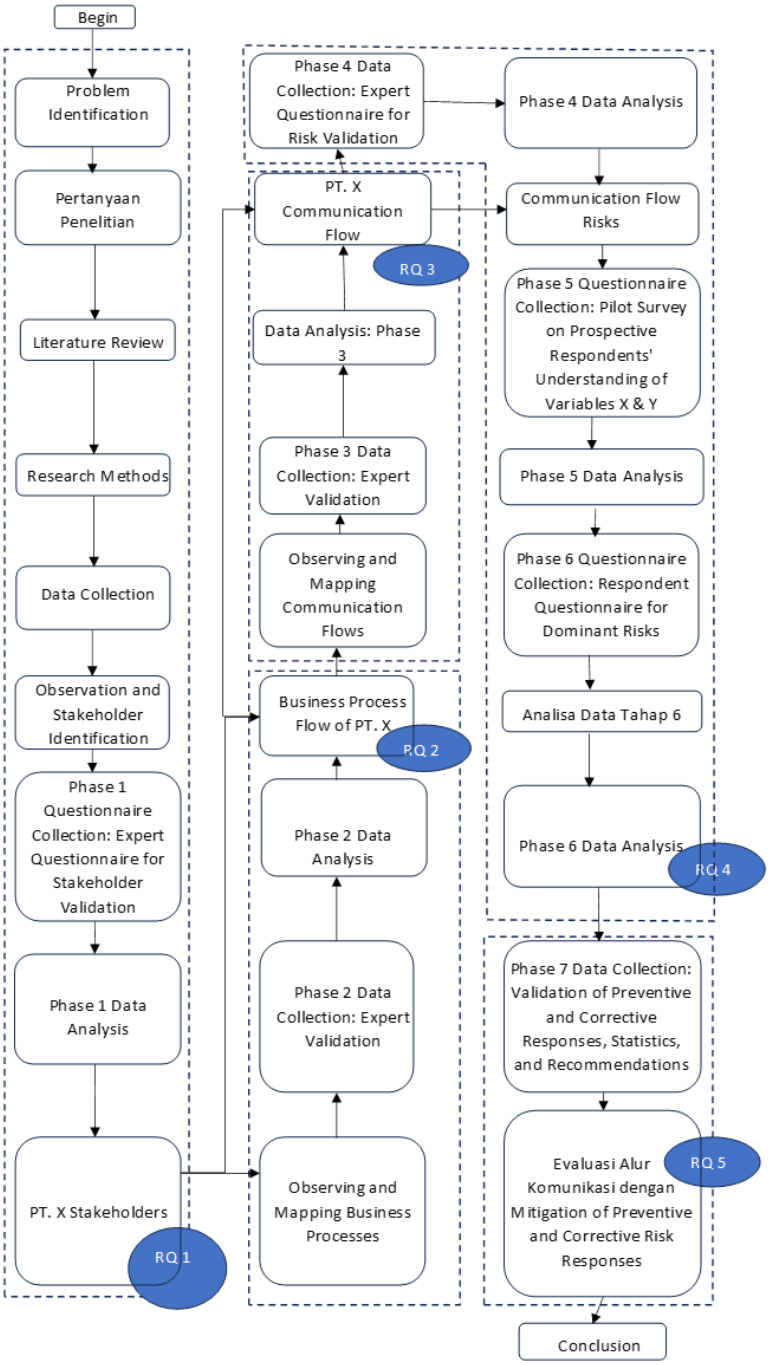

Figure 2. Flowchart of Research Stages

RESULTS AND DISCUSSION

A literature study regarding stakeholders, business process flows, and communication flows in the coal mining project control at PT X has been conducted, and data collection has been carried out using questionnaires to obtain expert validation. Subsequently, discussions and analyses were performed to identify the stakeholders, business process flows, and communication flows within the coal mining project control at PT X. The research results indicate that coal mining activities at PT X involve the engagement of various internal and external stakeholders, each with distinct yet interrelated duties and responsibilities. Internal stakeholders include the Board of Directors (BOD), Compliance Division, Legal Division,

Land Acquisition Team, Planning and Development Division, Operations Division, Procurement Division, and Finance Division. Meanwhile, external stakeholders comprise Contractors, the Government (Ministry of Energy and Mineral Resources & Local Government), and Communities/NGOs.

Table 1. Internal and External Stakeholders of PT. X

No	Stakeholder
	Internal
1	BOD
2	Compliance Division
3	Legal Division
4	Land Acquisition Team
5	Planning and Development Division
6	Operations Division
7	Procurement Division
8	Finance Division
	External
9	Contractor
10	Government (Ministry of Energy and Mineral Resources & Local Government)
11	Local Community

Furthermore, the existing business processes in the PT.X Coal Mining Project run sequentially, starting from the mine planning stage, land acquisition, mining operations, mine expansion licensing, through to reclamation and post-mining.

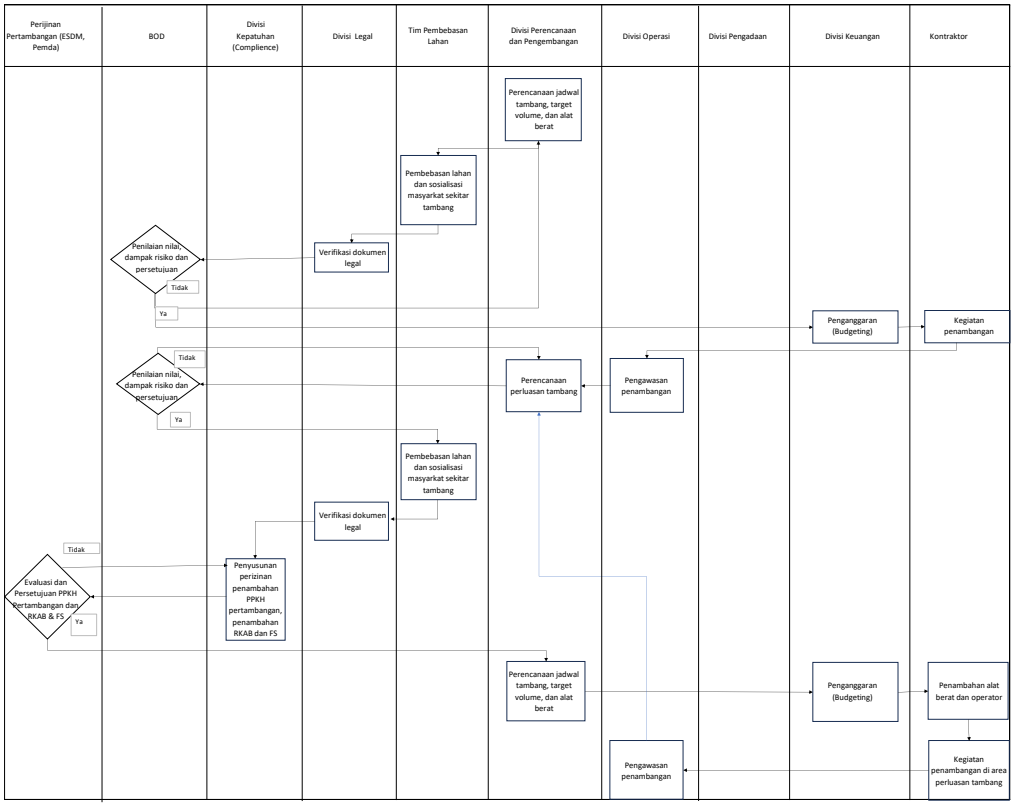

Figure 3. PT. X Coal Mining Business Process Flow

In the communication flow, production activities and mine expansion licensing at PT. X take place through a series of activities involving various internal and external parties. The process begins with the submission of the monthly mine plan by the Planning and Development Division to the BOD for evaluation and approval. Subsequently, operational activities such as overburden removal and coal getting are conducted by the contractor team with routine reporting to the Operations Division, which then generates official minutes of work validation. Furthermore, communication also covers the submission of equipment productivity reports, mine expansion planning presentations, up to the land acquisition process involving the community.

At this stage, socialization becomes a vital part of ensuring mutual understanding between the company and the community, which is then documented in official minutes and meeting notes. The next stage is the submission of mine expansion licensing requirements from the Planning and Development Division to the Compliance Division, which is then forwarded to the Ministry of Energy and Mineral Resources (MEMR) and the local government to obtain official approval for the licensing documents. Exploration processes in the mine expansion area are also communicated formally through exploration reports approved by MEMR. Overall, this communication flow illustrates the close interconnection among operational activities, planning, licensing, and community relations.

Table 2. Communication Flow of PT. X in the Coal Mining Project

No	Activity	Sender	Receiver	Input	Output
1	Submitting monthly mining plan and request for approval	Planning and Development Division	BOD	Draft document and mining plan presentation	Evaluation and approval of mining plan
2	Overburden removal activity	Contractor Team	Operations Division	Weekly/monthly report presentation on overburden removal volume	Signed minutes of overburden removal volume
3	Coal getting activity	Contractor Team	Operations Division	Weekly/monthly report presentation on coal getting tonnage	Signed minutes of coal getting tonnage by both parties
4	Submitting equipment productivity report	Contractor Team	Operations Division	Equipment productivity report	Meeting minutes
5	Presentation of mine expansion plan and request for approval	Planning and Development Division	BOD & Land Acquisition Team	Mine expansion planning document	Map of land boundaries to be acquired
6	Socialization	Land Acquisition Team	Community	Socialization materials	Minutes of socialization and agreement notes
7	Land acquisition	Land Acquisition Team	Community	List of land to be acquired	Land acquisition carried out
8	Submitting mine expansion requirements and permits	Planning and Development Division	Compliance Division	Requirements for additional production operation permits	Permit documents for additional PPKH, RKAB, and FS

				(PPKH), RKAB, and FS	
9	Submitting permit requirements for mine expansion	Compliance Division	Ministry of Energy and Mineral Resources (ESDM) & Local Government	Approval documents	Signed authorization letter of permit documents by Directorate General of Mineral and Coal, ESDM
10	Conducting exploration activities in expansion area	Planning and Development Division	Compliance Division & Ministry of Energy and Mineral Resources (ESDM)	Exploration plan and targets	Approval of Detailed Final Exploration Report of Coal by ESDM through Compliance Division

Furthermore, based on the results of the communication flow risk factor identification and validation by 5 (five) experts, there are 19 communication flow risk factors that influence time performance in the Mining Project. Subsequently, a survey was conducted among respondents in the PT.X Coal Mining Project to determine the extent to which these communication management risk factors affect time performance in the PT.X Coal Mining Project. The analysis of the respondent survey results regarding the communication management risk levels affecting time performance yielded 4 dominant or high-level risks, 11 moderate-level risks, and 4 low-level risks. Further analysis was conducted on the 4 dominant or high-level risks. The 4 dominant risks are as follows:

Table 3. Identification of communication flow risk factors

No	Activity	Communication Risk Factor	Source	Risk Ranking
1	Submitting monthly mining plan and request for approval	Differences in perspective between mine technical management and the BOD as strategic decision-makers may cause miscommunication regarding priorities, urgency, and implications of the mining plan.	Weick (1995); Cornelissen (2020)	14
		Delay in BOD approval of the monthly mining plan may directly impact production schedules, operational efficiency, and achievement of company targets.	Kerzner (2017); Meredith & Mantel (2014)	9
2	Overburden removal activity	Unclear communication of work instructions regarding boundary areas, elevation, or excavation sequence may cause errors in field execution and increase the potential for accidents and deviations from the mining plan.	Endsley (2017); Weick & Sutcliffe (2015)	16
		Lack of communication among teams during overburden removal	Hale et al. (2010); Hopkins (2014)	19

		may cause unsynchronized control of technical and safety risks.		
3	Coal getting activity	Unclear communication regarding seam boundaries, work floor elevation, and production targets between mine planning, supervisors, and operators may cause excavation errors and potential coal loss.	Weick (1995); Hustrulid et al. (2013)	18
		Contractor's failure to communicate findings related to contamination or material mixing may reduce coal quality and lead to owner claims.	Darling (2011); Hustrulid & Bullock (2001)	11
		Lack of communication about front conditions, wall stability, or potential coal hazards (slippery floor, gas, or water seepage) may increase the risk of workplace accidents during coal getting.	Flin et al. (2008); Reason (1997)	13
4	Submitting equipment productivity report	Delay in communication of productivity reports may reduce operational response effectiveness and cause resource waste.	Barki, Rivard, & Talbot (2001)	8
		Information not communicated in real-time about equipment status, weather, or field conditions may trigger queues and long downtime.	Expert 2	10
		Miscommunication between operators, field supervisors, and report compilers may cause heavy equipment productivity data to not reflect actual operational conditions.	Eppler (2006)	15
		Report compilers adjust productivity data based on production target pressure or performance perception, reducing report objectivity.	Tversky & Kahneman (1974)	17
5	Presentation of mine expansion plan and request for approval	Technical information about mine expansion delivered in overly complex language may not be understood by non-technical parties, potentially triggering resistance and rejection.	Matenga (2025); Komnitsas (2020)	12
6	Socialization	Socialization and information not tailored to the literacy level of the local community, causing the core message to not be conveyed effectively.	Matenga (2025); Matikainen (2022)	7
		Risk factor of community demonstrations due to differences in perception of interests, where the company emphasizes profit and	Expert 4	5

		production while the community focuses on land rights, health, and environmental safety.		
7	Submitting mine expansion requirements and permits	Documents not neatly prepared according to government format and not aligned with policy context risk being misinterpreted by authorities, which may lead to requests for revision or correction.	Aristyavani (2021); Susiloningtyas et al. (2023)	1
		Ignoring environmental and social risks can make the government more cautious, slowing down the permitting process and even potentially halting it entirely. If environmental and social aspects are not considered or communicated properly, mining permits may be delayed or rejected for failing to meet sustainability and safety standards.	Matikainen (2022); Amiruddin et al. (2023)	2
		Changing government regulations and policy inconsistencies create legal uncertainty, slowing down the permitting process for mine expansion.	Expert 3	6
8	Submitting permit requirements for mine expansion	Communication regarding environmental and social impacts of mine expansion delivered in a non-transparent manner can create distrust, potentially hindering approval by relevant stakeholders.	Komnitsas (2020); Sícoli Pósleman & Sallan (2019)	4
		Data submitted that fails to address specific issues of concern to regulators, communities, or NGOs may give the impression that the company is neglecting important matters, thereby risking criticism, rejection, or requests for revision from these parties.	Matenga (2025); Komnitsas (2020)	3

Subsequently, a cause analysis, along with preventive and corrective responses for each dominant risk, was conducted and then validated by experts. Furthermore, the communication flow was developed by incorporating a Communication Risk Management Guideline into the communication flows that possess dominant or high-level risks, based on the preventive and corrective responses according to expert consensus as follows:

Table 4. Risk Mitigation

No	Communication Flow	Potential Risk	Preventive Steps	Corrective Steps
7	Submitting mine expansion requirements and permits	Documents not neatly prepared according to government format and not aligned with policy context risk being misinterpreted by authorities, which may lead to requests for revision or correction.	1. Hold routine communication forums with stakeholders. 2. Use an internal digital document management system to ensure format and content consistency according to government standards. 3. Conduct regular evaluations of internal communication strategies.	1. Revise permit documents according to official government standards to avoid misinterpretation and accelerate approval. 2. Hold clarification meetings with stakeholders to explain the intent of documents or policies that previously caused confusion.
		Ignoring environmental and social risks can make the government more cautious, slowing down the permitting process and even potentially halting it entirely. If environmental and social aspects are not considered or communicated properly, mining permits may be delayed or rejected for failing to meet sustainability and safety standards.	1. Increase transparency of permit information. 2. Train company staff in communication skills. 3. Strengthen communication of permits with the company's commitment to workplace safety and environmental protection.	1. Rebuild communication with local communities through public consultation forums after conflicts or permit rejections. 2. Retrain company staff to better understand updated regulations and clearly communicate permit information.
8	Submitting permit requirements for mine expansion	Communication regarding environmental and social impacts of mine expansion delivered in a non-transparent manner can create distrust, potentially hindering approval by relevant stakeholders.	1. Increase transparency of permit information. 2. Hold routine communication forums with stakeholders. 3. Conduct regular evaluations of internal communication strategies.	1. Retrain company staff to better understand updated regulations and clearly communicate permit information. 2. Conduct internal communication audits to identify weaknesses in information delivery and promptly correct them.
		Data submitted that fails to address specific issues of concern to regulators, communities, or NGOs may give the impression that the company is neglecting important matters, thereby risking criticism, rejection, or requests for revision from these parties.	1. Increase transparency of permit information. 2. Hold routine communication forums with stakeholders. 3. Train company staff in communication skills.	1. Rebuild communication with local communities through public consultation forums after conflicts or permit rejections. 2. Conduct internal communication audits to identify weaknesses in information delivery and promptly correct them.

Following the expert validation results, this study demonstrates that the developed Communication Risk Management Guideline has met the criteria for feasibility and relevance. The experts assessed that the preventive and corrective risk mitigation measures incorporated into the guideline are appropriately placed as a separate document rather than being added directly to the project's communication flow. Consequently, the resulting guideline not only strengthens the company's communication system but also provides a tangible contribution to improving time performance and the success of the coal mining project.

CONCLUSION

This study found that internal and external stakeholders played complementary roles and responsibilities in supporting the continuity of the coal mining project at PT. X. The mining business processes proceeded sequentially from planning, land acquisition, mining operations, licensing, and exploration to post-mining activities, with critical communication points identified at each stage. Formal communication through official documents and coordination meetings, along with external communication, proved to be vital factors in maintaining production activities and supporting mine expansion licensing processes. Risk analysis indicated the presence of dominant risks in the forms of document delays, technical miscommunication, and licensing ambiguities, which affected project time performance. As a solution, this study developed a Communication Risk Management Guideline containing preventive and corrective measures for high-risk communication flows. Expert validation confirmed that the guideline was consistent, relevant, and effective as an official reference for optimizing project time performance, thereby providing a tangible contribution to improving coal mining project management at PT. X.

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