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THE INFLUENCE OF QUALITY MANAGEMENT ON HIGHWAY CONSTRUCTION PROJECT PERFORMANCE

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Abstract

The highway construction industry is experiencing serious problems in terms of achieving quality, cost, and project implementation time. These problems arise due to the weakness of the quality management system that has not been fully integrated into the project cycle. Projects that fail to meet quality standards result in waste of resources and reduce public trust in project implementers. This study aims to analyze the effect of quality management on the performance of highway construction projects systematically and in depth. This study uses a qualitative approach based on literature review to identify elements of quality management that play an important role in improving project performance. The results of the study indicate that quality standards, workforce training, effective communication, use of technology, and organizational culture have significant contributions to the quality of construction results. The study also found that external supervision, type of contract, and project leadership strengthen the sustainable quality system. The periodic evaluation system and stakeholder involvement strengthen the accountability of the quality of highway projects as a whole. The study concludes that structured and integrated quality management can improve project efficiency in terms of cost, quality, and time simultaneously. The study recommends strengthening the sustainable training system, implementing digital technology, and establishing a quality culture in the project organizational structure. Project organizations are advised to integrate the quality system into all lines of decision-making and technical implementation. Stakeholders must be involved from the planning stage to create a sense of ownership of the development results. This study is expected to be a reference in the development of a national quality system in the highway construction sector.

Keywords: ***Project quality integration, Road construction performance, Periodic quality evaluation, Quality organization culture, Continuous training***

BACKGROUND

The highway construction industry faces serious problems with suboptimal project performance. Research shows that delays, cost overruns, and poor quality are the impacts of weak quality management (Juran, 2023). Projects that fail to meet quality standards tend to be economically detrimental to project owners. Deming (2024) emphasized that quality management needs to be an integral part of the project cycle since planning. Many project implementers still separate quality control from the main managerial processes. This condition causes disintegration between the implementing division and quality control. Modern project management must unite technical functions and quality functions in an integrated framework. Therefore, this study is important to systematically evaluate the effect of quality management on project performance. Highway construction projects require an accurate and measurable quality control system. Project performance that depends on many variables makes quality a fundamental element (Juran, 2023). The implementation of unclear standards contributes to the non-conformity of construction results. According to Wawak (2024), consistent quality standards help project teams achieve efficiency and predictability in implementation. The implementation of quality management not only includes technical specifications but also the involvement of all stakeholders. The concept

of quality touches on managerial and socio-technical aspects in project implementation. Therefore, this study is important to describe the role of quality management holistically. Researchers want to know whether strengthening quality can improve performance sustainably. The implementation of quality management is often still partial in highway projects. Projects usually only focus on controlling the final results without restructuring the upstream process (Deming, 2024). The concept of continuous improvement taught by Juran (2023) emphasizes evaluation from the design stage. Failure to design an adaptive quality system results in waste of resources. This mismatch indicates a gap between quality theory and practice in the field. Many contractors consider quality as an additional cost, not a performance investment. In fact, poor quality actually results in greater corrective costs. Through this study, the researcher wants to examine the pattern of the relationship between quality management and the effectiveness of highway projects.

Several previous studies have examined the elements of quality management separately. However, there are not many studies that have tried to integrate the influence between quality elements in the context of highway construction (Thurain Htoo et al., 2023). Factors such as worker training, team communication, and contract selection are rarely studied together. The theory of Esat Gashi & Ivezaj (2023) states that the selection of a contract model greatly affects the quality system of infrastructure projects. Integration between these factors can strengthen the project quality control system. This study aims to answer the gap in comprehensive literature. Quality management must be seen as a unity between elements, not just one performance indicator. This study is important for formulating an integrated approach to improving road projects. The performance of a highway project is not only influenced by technical quality, but also by external factors such as leadership and organizational culture. Schein (2023) stated that organizational culture determines worker behavior towards quality. Without commitment from top management, quality becomes just a non-operational jargon. Handoko (2023) also emphasized the importance of the role of human resources in the success of quality control. Therefore, this study examines internal and external factors simultaneously. This study views performance as the result of systemic interactions between managerial and social components. This framework is important so that highway projects are no longer plagued by recurring problems. This study presents a comprehensive understanding of the construction quality system.

The main question answered in this study is how much influence does quality management have on the performance of highway construction projects. In addition, the study also wants to find out which factors are the most dominant in this influence. According to Homthong et al. (2024), project personnel competence and cross-functional collaboration are the determinants of the success of infrastructure projects. Data from Nnadi & Oyama (2023) show that 79.6% of road projects fail without stakeholder participation. Therefore, the focus of this study is directed at the interaction between quality variables contextually. This study will test the relationship between factors using a qualitative deductive approach. This study not only answers direct relationships but also looks for intermediary factors. The results of this study are expected to be a real contribution to improving highway construction quality practices. In general, this study aims to analyze the relationship between the implementation of quality management and the achievement of highway project performance. This study also aims to formulate improvement strategies based on empirical findings. According to Juran (2023), a strategy-based quality approach can reduce defects by up to 80%. Meanwhile, Deming's theory (2024) states that systemic improvement is only possible if the organization consistently implements the PDCA cycle. This study not only contributes to the development of quality theory but also offers applicable solutions. This study seeks to fill the gap between theory and practice in the field. Therefore, this study is relevant to practitioners and academics. This study presents a mapping of factors that influence the success of highway projects.

METHOD

This study uses a qualitative approach based on literature review to analyze the effect of quality management on the performance of highway construction projects. A qualitative approach allows researchers to understand the reality in the field in depth (Creswell, 2023). Researchers use secondary data from scientific articles, reference books, and the latest research results between 2023 and 2025. Juran (2023) explains that literature reviews are able to identify general patterns in quality management. This study places the influence of quality management as the main variable on project output. Researchers choose this method because it is relevant to describe the interaction between managerial and technical variables. Deming (2024) suggests this approach to understand the system as a process unit. Therefore, this method was chosen to uncover the relationship between quality elements and their impact on highway projects. This study examines various relevant theories and practices to describe field conditions conceptually. Researchers analyze literature that discusses quality management elements such as quality standards, training, communication, and technology. Juran (2023) states that these elements must be viewed as an integral whole. This study also refers to the theory of Handoko (2023)

regarding the importance of the role of human resources in the quality system. Researchers conduct literature selection using the criteria of topic suitability, data novelty, and source credibility. The selected literature reflects the diversity of approaches in road construction projects. This approach allows researchers to develop a framework based on a strong theoretical foundation. This study produces a contextual and relevant understanding of the quality system in highway projects. Researchers use thematic analysis techniques to process secondary data that has been collected. According to Creswell (2023), this technique helps researchers identify dominant themes in the literature. The main themes analyzed include training, standards, communication, organizational culture, and technology. Deming (2024) emphasizes the importance of repeating the analysis process to achieve the validity of the findings. This study categorizes the findings based on the dimensions of process, structure, and results. This is done to see the influence of the quality system on various stages of the project cycle. Handoko (2023) states that a strong quality system must involve input and output dimensions simultaneously. Thus, this method strengthens the accuracy and completeness of the findings.

This study also considers the social and cultural dimensions in the implementation of project quality management. Schein (2023) revealed that organizational culture significantly influences the effectiveness of the quality system. The researcher reviewed the literature that highlights the influence of organizational values on employee behavior. Juran (2023) explained that employee commitment to quality cannot be separated from the context of corporate culture. This study also explores the relationship between project leadership and quality achievement. Deming (2024) emphasized that project managers must be the main drivers of quality improvement. Therefore, the human aspect is the main concern in secondary data collection. This approach aims to develop a comprehensive understanding of the road project quality system.

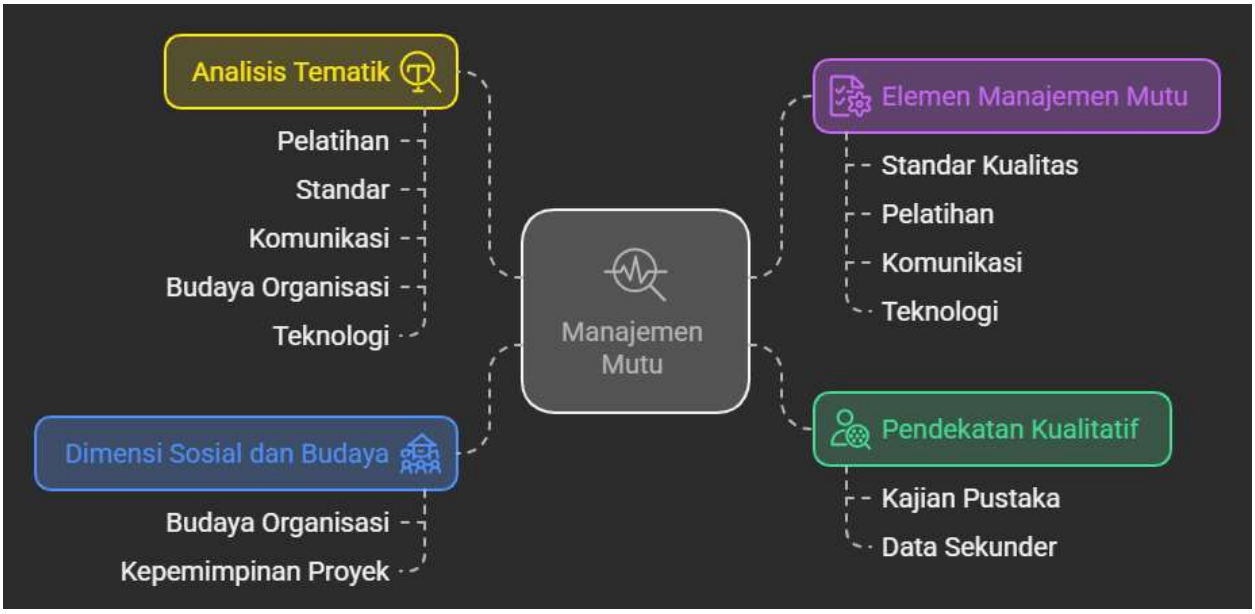

Figure 1. Research Methodology in Quality Management

This study avoids overgeneralization and emphasizes in-depth analysis of representative cases. According to Creswell (2023), this approach is appropriate for understanding the local context and social dynamics surrounding construction projects. Researchers do not seek a single answer but explore the complex relationships between quality and performance variables. Handoko (2023) emphasizes the importance of understanding local variations in the implementation of quality systems. Therefore, this study not only explains what happened, but also why it happened. This approach adds interpretive weight to the results obtained. Deming (2024) suggests that quality success lies in understanding the process, not just in control. Therefore, this methodology is considered the most relevant to answer the research questions thoroughly.

RESULTS AND DISCUSSION

The results of the study indicate that the implementation of quality standards has a significant impact on improving the performance of highway projects. The project team needs standard guidelines to ensure the quality of work

at each stage of the activity (Juran, 2023). Clear standards help the team set realistic quality targets and achievement methods. Wawak (2024) stated that standards are the basis for effective communication and coordination in construction projects. Without measurable references, the project will face different interpretations of quality among implementers. Therefore, quality standards need to be prepared technically and operationally. This study found that projects that follow international standards have lower quality deviations. This finding shows that the implementation of standards is the main foundation of the quality management system for road projects. Worker training and skills development have a direct correlation to construction project performance. Workers who have high competence are able to minimize technical errors during implementation (Deming, 2024). Proper training results in consistent productivity and maintainable quality. Manoharan et al. (2023) stated that project-based work training can increase efficiency by up to 30 percent. Trained workers demonstrate the ability to handle heavy equipment, read working drawings, and carry out safety procedures. Routine training also forms a disciplined and responsible work pattern. Organizations that invest in human resource development create a strong quality culture (Almarashdah, 2024). Therefore, training is an important element in the continuous improvement cycle of road project quality.

Effective communication between stakeholders encourages synchronization in project implementation. This study found that successful road projects have high frequency and open communication between teams. Malik et al. (2023) explained that internal communication strengthens the clarity of roles and responsibilities between project actors. Gil (2023) added that communication also functions as an instrument to avoid conflict and decision delays. Good cross-functional coordination can reduce negotiation time and speed up field execution. Ineffective communication has the potential to trigger miscommunication of technical specifications and work schedules. Therefore, project management must design a responsive and adaptive communication system. This finding emphasizes that the effectiveness of communication directly affects the quality and time of highway projects. Information technology has been shown to strengthen the efficiency of quality management systems in highway projects. The use of software such as BIM and e-log books facilitates real-time field quality monitoring (Handoko, 2023). The use of this technology allows the team to identify deviations early and make corrections accurately. L. Ping et al. (2023) emphasized that IT increases the connectivity between project actors and project data flows. In complex projects, data processing speed is key to quality effectiveness. Integration of digital systems facilitates reporting, recording, and documentation of quality. Therefore, technology is not just a tool, but becomes part of the quality control system itself. This study shows that projects that adopt technology have a lower risk of errors and more assured quality.

Organizational culture plays a fundamental role in maintaining the consistency of quality management implementation. A work culture that supports continuous improvement shapes workers' attitudes towards quality (Schein, 2023). Organizations that instill quality values as part of their corporate identity will influence the way employees work. Sun et al. (2024) found that green culture and work ethics have a direct impact on environmental performance and project quality. This study shows that organizations that structure quality values in their organizational structure tend to have more stable results. In highway projects, quality culture includes work discipline, technical integrity, and time commitment. Therefore, quality change must start with cultural change. Quality culture has been shown to be a major driver in the long-term performance of construction projects.

Figure 2. Factors Affecting the Quality of Highway Projects

A scheduled internal quality evaluation system has a major impact on the quality of project implementation. Periodic evaluations allow management to systematically detect technical errors. Deming (2024) emphasized the importance of the PDCA cycle in a continuous quality system. Thurain Htoo et al. (2023) stated that the maturity of quality management is determined by the consistency of the evaluation and feedback process. Evaluation not only measures achievements but also designs improvements for the next project. Project teams that involve all members in evaluations create transparency and a sense of quality ownership. This study found that projects that actively conduct evaluations have lower quality deviations from the initial target. Therefore, evaluation is not just a procedure, but a strategic quality reinforcement mechanism. The choice of project contract type directly affects the quality control structure in the field. The Design and Build model provides greater control flexibility to the main contractor (Esat Gashi & Ivezaj, 2023). While the Design-Bid-Build model divides quality responsibility between the designer and the implementer. This study shows that the type of contract affects the quality communication flow and the technical validation process. Thurain Htoo et al. (2023) explained that contracts that encourage collaboration result in superior project performance. In highway projects, the wrong choice of contract has the potential to cause quality dysfunction. Therefore, the type of contract must be adjusted to the complexity of the project and the desired quality system. This study proves that quality management cannot be separated from the design of contractual institutions.

Project leadership plays a crucial role in quality control at every stage of implementation. A project leader who is committed to quality is able to mobilize the team towards measurable quality targets. Schein (2023) suggests that leadership values are reflected in the daily practices of the project team. Govindaras et al. (2023) added that transformational leadership strengthens the team's resilience to project pressure. This study found that highway projects with active leaders were faster to overcome quality deviations. Leadership is not only about technical instructions, but also a moral example of work discipline. Therefore, the quality management system must involve the active role of leaders in every quality policy. These results confirm that project quality is highly dependent on the value orientation brought by the project manager. Active stakeholder involvement has a significant impact on the smooth running of quality control of highway projects. This study shows that projects involving local communities have a higher level of quality compliance. Nnadi & Oyama (2023) stated that 79.6% of successful road projects were supported by stakeholder participation from the early stages. Malik et al. (2023) added that cross-actor collaboration strengthens the legitimacy of project quality decisions. When local communities are empowered, they tend to maintain work results to meet standards.

This approach creates a sense of shared responsibility for construction results. Therefore, quality management needs to expand the definition of involvement to the community level. This study concludes that a participatory approach strengthens the accountability of highway project quality. Integration of quality management systems and cost control systems contributes to project efficiency. This study found that highway projects that integrate both systems can reduce repair costs by up to 20%. Juran (2023) emphasized that poor quality will incur much more expensive corrective costs than initial prevention. Ibrahim et al. (2024) explained that project performance measurement should include financial and non-financial indicators such as quality and environmental impact. Projects that balance quality and cost can achieve maximum efficiency. Therefore, the quality management system must be aligned with the project's financial system. This study proves that an integrative approach produces structural efficiency. This finding reinforces the urgency of quality planning that is in sync with budget planning.

Human resources with balanced soft skills and hard skills will strengthen the quality system in the field. Research shows that communication skills, teamwork, and decision-making greatly determine the smoothness of quality control. Handoko (2023) emphasized that HR is a strategic asset in project quality management. Mtotywa & Mdlalose (2023) found that job-based training improves technical competence as well as work ethic. Highway projects involving multidisciplinary workers tend to be more adaptive to changes in the field. The balance between technical and interpersonal competence has been shown to improve project team collaboration. Therefore, strengthening HR needs to be a priority in quality policies. This study confirms that the quality of workers determines the overall quality of the project. External oversight by an independent agency increases trust in the quality system of road projects. This study shows that third-party audits help avoid conflicts of interest in quality implementation. Deming (2024) suggested the need for external validation to strengthen the integrity of the quality process. Idrissi Gartoumi et al. (2023) revealed that an independently supervised lean construction approach can significantly reduce quality waste. External oversight creates positive pressure on project implementers to comply with agreed standards. This study found that audited projects tend to be more orderly in quality documentation. Therefore, the oversight mechanism must be open, fair, and professional. This finding shows that quality success comes not only from internal but also external supervision.

Timeliness of project completion is closely related to the maturity of the quality management system used. Thurain Htoo et al. (2023) found that public organizations have higher time management maturity than private organizations. However, private organizations excel in quality and cost management. This study concluded that on-time road projects always show consistency in quality reporting. Wawak (2024) stated that a routine quality reporting system reduces project surprises such as delays due to work revisions. The integration of time and quality allows management to design interventions early before risks arise. Therefore, discipline in reporting is an indicator of the quality maturity of the project organization. This study strengthens the argument that time and quality are two indicators that reinforce each other in road projects. Innovation in quality management approaches opens up opportunities for continuous improvement in highway projects. Technologies such as field sensors and digital quality dashboards accelerate the quality decision-making process. G. Arana-Landín et al. (2023) explained that industry 4.0 technology can improve energy efficiency and production quality. Handoko (2023) stated that technological adaptation in management increases the organization's capability to respond to change. Projects that adopt quality innovation show a decrease in work deviations of up to 25%.

This study confirms that innovation is not just an option, but a necessity in the context of modern projects. Therefore, investment in technology-based quality systems is a future strategy for the construction sector. These results show that a dynamic quality system creates efficient and sustainable projects. This study found that the effectiveness of quality management is highly dependent on the synergy between strategy, structure, and organizational culture. Juran (2023) stated that quality must be part of the company's core strategy. Schein (2023) added that organizational values and norms determine the success of quality system implementation. Successful projects show that quality is not treated as an additional component, but as part of the project value system. This study also underlines the importance of the managerial role in bridging quality policies and technical realities in the field. Therefore, quality improvement requires a comprehensive institutional transformation. An effective quality system must be able to unite strategic objectives, functional structures, and work culture. This study concludes that quality is not just a matter of technique, but a reflection of the integrity of the project organization.

CONCLUSION

This study concludes that quality management plays a central role in improving the performance of highway construction projects. Elements such as quality standards, training, communication, technology, and organizational

culture have been shown to have significant contributions to project outcomes. Juran (2023) stated that quality is not just a technical tool, but part of an overall organizational strategy. Deming (2024) emphasized the importance of a systemic approach so that quality becomes part of the entire project process. Projects that implement quality management holistically show cost efficiency, timeliness, and high quality of work results. Evaluation systems and stakeholder involvement strengthen the effectiveness of quality implementation. This study also found that technological innovation and project leadership are the main drivers of quality transformation. Therefore, quality management must be embedded in the structure, strategy, and culture of highway construction projects.

This study recommends that project organizations integrate quality management into all levels of decision-making and implementation. Organizations need to build a quality-based work culture through continuous training and inspirational leadership (Schein, 2023; Handoko, 2023). The use of technology such as quality management software and field sensors should be part of the daily operational system. Projects should establish clear quality standards, regular evaluation systems, and adaptive work contracts (Esat Gashi & Ivezaj, 2023; Thurain Htoo et al., 2023). Construction companies also need to establish independent quality units to increase transparency in project supervision. Local stakeholders should be involved from the planning stage so that project outcomes have social legitimacy. This study suggests collaboration between the government, contractors, and academics to strengthen the national quality system. With this approach, the quality of highway projects will be the foundation for efficient, reliable, and sustainable infrastructure development.

REFERENCES

Almarashdah, M. A. (2024). The role of organizational culture on the relationship between employee training and job performance in Jordan. *Uncertain Supply Chain Management*, *12*(1), 505–512. doi:10.5267/j.uscm.2023.9.002

Arana-Landín, G., Uriarte-Gallastegi, N., Landeta-Manzano, B., & Laskurain-Iturbe, I. (2023). The contribution of lean management—Industry 4.0 technologies to improving energy efficiency. *Energies*, *16*(5), 2124. doi:10.3390/en16052124

Caglayan, S., & Ozorhon, B. (2023). Determining building information modeling effectiveness. *Automation in Construction*, *151*(104861), 104861. doi:10.1016/j.autcon.2023.104861

Creswell, J.W. (2023). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. SAGE Publications, Inc.

Deming, W.E. (2024). Out of the Crisis. MIT Center for Advanced Educational Services.

Gashi, E., & Ivezaj, M. (2024). Quality management for design – Bid-build versus design-and-build contracts for infrastructure projects. *International Review of Applied Sciences and Engineering*, *15*(1), 130–137. doi:10.1556/1848.2023.00730

Gil, N. A. (2023). Cracking the megaproject puzzle: A stakeholder perspective? *International Journal of Project Management*, *41*(3), 102455. doi:10.1016/j.ijproman.2023.102455

Govindaras, B., Wern, T. S., Kaur, S., Haslin, I. A., & Ramasamy, R. K. (2023). Sustainable environment to prevent burnout and attrition in project management. *Sustainability*, *15*(3), 2364. doi:10.3390/su15032364

Handoko, T.H. (2023). Manajemen Personalia dan Sumber Daya Manusia. BPFE Yogyakarta.

Homthong, S., Moungnoi, W., & Charoenngam, C. (2024). Whole life critical factors influencing construction project performance for different objectives: Evidence from Thailand. *Buildings*, *14*(4), 999. doi:10.3390/buildings14040999

Htoo, T. T., Dodanwala, T. C., & Santoso, D. S. (2023). Project management maturity and performance of building construction projects in Myanmar. *Practice Periodical on Structural Design and Construction*, *28*(1). doi:10.1061/ppscfx.sceng-1192

Ibrahim, A., Zayed, T., & Lafhaj, Z. (2024). Enhancing construction performance: A critical review of performance measurement practices at the project level. *Buildings*, *14*(7), 1988. doi:10.3390/buildings14071988

Idrissi Gartoumi, K., Aboussaleh, M., & Zaki, S. (2024). Implementing lean construction to improve quality and megaproject construction: a case study. *Journal of Financial Management of Property and Construction*, *29*(1), 1–22. doi:10.1108/jfmpc-12-2022-0063

Juran, J.M. (2023). Juran's Quality Handbook. McGraw-Hill Education.

Li, P., Zhou, Y., & Huang, S. (2023). Role of information technology in the development of e-tourism marketing: A contextual suggestion. *Economic Analysis and Policy*, *78*, 307–318. doi:10.1016/j.eap.2023.03.010

M. Mtotywa, M., & Mdlalose, S. (2023). The influence of assessment on training to improve productivity of construction companies. *Problems and Perspectives in Management*, *21*(1), 169–182. doi:10.21511/ppm.21(1).2023.15

Malik, S. H., Fu, W., Rasool, S. F., Wani, G. A., Zaman, S., & Wani, N. A. (2023). Investigating the impact of communication factors and stakeholders engagement on renewable energy projects in Pakistan. *Sustainability*, *15*(14), 11289. doi:10.3390/su151411289

Manoharan, K., Dissanayake, P., Pathirana, C., Deegahawature, D., & Silva, R. (2023). A constructive system to assess the performance-based grading of construction labour through work-based training components and applications. *Construction Economics and Building*, *23*(3/4). doi:10.5130/ajceb.v23i3/4.8779

Nnadi, & Oyama, E. O. (2023). Evaluating the influence of stakeholders' involvement on the performance of road construction project in Nigeria. *International Journal of Project Management*, *5*(2), 1–14. doi:10.47672/ijpm.1529

Purba, R. P., Irawan, M. D., & Alda, M. (2024). Implementasi Sistem Informasi E-Log Book Penangkapan Ikan di Dinas Kelautan dan Perikanan Sumatera Utara. *Journal of Information Technology*, *4*(2), 211–216. doi:10.46229/jifotech.v4i2.940

Roehrich, J. K., Davies, A., Tyler, B. B., Mishra, A., & Bendoly, E. (2024). Large interorganizational projects (LIPs): Toward an integrative perspective and research agenda on interorganizational governance. *Journal of Operations Management*, *70*(1), 4–21. doi:10.1002/joom.1280

Schein, E.H. (2023). Organizational Culture and Leadership. Jossey-Bass.

Sun, H., Mulindwa Bahizire, G., Bernard Pea-Assounga, J. B., & Chen, T. (2024). Enhancing employee green performance through green training: The mediating influence of organizational green culture and work ethic in the mining sector. *Journal of Cleaner Production*, (141105), 141105. doi:10.1016/j.jclepro.2024.141105

Wawak, S. (2024). Enhancing project quality through effective team management. *International Journal of Information Systems and Project Management*, *12*(2), 50–67. doi:10.12821/ijispm120203