Implementation of Project Management Information Systems to Improve Efficiency and Accountability in Infrastructure Development

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Abstract

Government infrastructure development often faces various challenges in terms of implementation efficiency and budget management accountability. Projects involving many stakeholders usually experience coordination obstacles, slow reporting, and a lack of accountable documentation. Amidst the increasing complexity of projects and demands for public transparency, the use of information systems has become an unavoidable need. This study aims to examine how information system implementation strategies can improve the effectiveness of infrastructure project governance. The study was conducted with a qualitative approach and used data sources from previous research results. Data analysis was carried out thematically to describe the challenges and strategies for implementing information systems in government projects. The results of the study show that the success of implementation is greatly influenced by the adjustment of organizational workflows, human resource readiness, and managerial support. An integrated information system can accelerate reporting, increase performance visibility, and strengthen internal supervision. Therefore, the adoption of information systems needs to be accompanied by a comprehensive strategy in order to have a real impact on the efficiency and accountability of infrastructure projects.

Keywords: *Management Information System, Efficiency, Accountability, Infrastructure Development.*

A. INTRODUCTION

Infrastructure development is one of the main pillars in driving economic growth, increasing regional connectivity, and accelerating equitable development in various regions. In the context of national development, infrastructure is a key factor in strengthening the country's competitiveness, encouraging investment, and providing more equitable and quality access to public services. However, the process of implementing infrastructure projects is often faced with various complex challenges, especially those related to limited coordination between parties, delays in project completion, budget overruns, and weak internal monitoring systems. These problems not only have implications for low project implementation efficiency but also create gaps in the accountability of public fund management, thus creating public distrust of the institutions responsible for development (Mardiyani, 2024).

In various government projects, the implementation of infrastructure construction is still often hampered by manual and fragmented management systems. The information needed to support decision-making is often spread across various units, difficult to access in real time, and not systematically documented. The lack of integration of this system results in a gap between the planning and implementation stages, thereby increasing the risk of deviation from the initial work plan. In this

situation, there is an urgent need to build a more integrated, adaptive project management system that is able to present data accurately in a timely manner. Inefficiencies in the management of infrastructure projects that are repeated over time have also contributed to the waste of the state budget and slowed down the achievement of national development targets, both at the central and regional levels (Susantio & Beatrice, 2024).

The increasingly complex scale of projects, the growing number of stakeholders, and the increased demand for public transparency have created new challenges in infrastructure project management. Conflicts between involved parties are often caused by a lack of shared understanding of project developments, unclear communication channels, and weak progress reporting (Tariq & Gardezi, 2023). Strategic national and regional projects, which should be driving the economy, are instead hampered by poor coordination and monitoring systems. In many cases, the lack of accurate and up-to-date information poses a significant obstacle to the evaluation and decision-making process, particularly when projects encounter field dynamics that require rapid response and strategic adjustments (Permatasari, 2025).

In the audit and reporting process, many infrastructure projects encounter obstacles in providing adequate administrative evidence, including financial records, technical documentation, and progress reports. This weak documentation then becomes a vulnerable point for administrative violations and budget irregularities that are difficult to trace in detail. This raises significant concerns about the integrity of project implementation and the effectiveness of the existing oversight system. The inability to present comprehensive evidence of work ultimately has an impact on reducing the credibility of the implementing agency before the public and the auditing institution (Fahlevvi et al., 2025).

Furthermore, the infrastructure project control process within the government bureaucracy is often burdened by convoluted and slow governance. Lengthy reporting channels and heavy reliance on manual processes prevent information from being processed and disseminated promptly. Consequently, responses to technical and administrative issues are delayed, increasing the potential for project delays (Hidayat, 2023). This situation also makes it difficult to estimate project performance in real time, making it difficult for leaders to identify critical points requiring intervention. In the long term, this work pattern not only erodes project efficiency but also reduces the bureaucracy's competitiveness in carrying out development managerial functions (Szatmari et al., 2021).

These trends indicate that large-scale infrastructure projects can no longer be managed with conventional approaches that minimize the use of technology. Public expectations for transparent, efficient, and accountable development are increasing, along with growing public awareness of the importance of effective state budget use (Chadalawada, 2024). When project management systems fail to meet these expectations, pressure arises from various parties to improve development governance. In this context, a new approach is needed to strengthen project

management performance across the board, from planning and implementation to reporting and oversight (Empol et al., 2025).

The push to improve the efficiency and accountability of infrastructure development is becoming increasingly crucial, especially in the digital era, which demands speed and accuracy. Governments are required not only to build more, but also to build better, on time, and within budget. In an increasingly tight fiscal environment and uncertain global challenges, the capacity to manage projects efficiently and responsibly is a key determinant of development success. Therefore, systematic steps need to be taken to reduce gaps in project implementation, improve the flow of information between work units, and ensure that each development stage is properly recorded and transparently accounted for to the public (Hanan et al., 2025).

The need to accelerate quality, equitable, and sustainable infrastructure development is inextricably linked to the demand for reforms in the project management system itself. Inefficient project implementation not only hinders economic growth but also creates social injustice due to limited access to basic facilities. This is where the urgency of evaluating and strengthening project management systems becomes crucial, particularly in encouraging the adoption of digital-based systems that are more adaptive to field dynamics. As the complexity of the development environment increases and the pressure for clean governance increases, improving information systems in infrastructure project management has become a strategic imperative that cannot be postponed any longer.

B. LITERATURE REVIEW

A Management Information System (MIS) is an integration of software, hardware, and human resources (HR) that interact to process data into useful information through the creation of a structured system. In practice, humans are not only users but also the primary controllers in the technology utilization process, through ideas, analysis, and reasoning applied to the operation of software and hardware. This system encompasses various important processes, such as planning, control, coordination, and decision-making, making it a complex and dynamic system (Rahmatullah & Nugraha, 2024).

According to Gordon B. Davis, a MIS is an integrated system of humans and machines designed to produce information to support operational activities, managerial functions, and decision-making within an organization (Bratha, 2022). Similarly, Soetedjo Moeljodiharjo states that a MIS is a systematic approach aimed at providing timely information needed for decision-making as part of efforts to improve the effectiveness of organizational planning and control (Nuryana et al., 2024).

Robert W. Holmes defines a management information system as a system specifically designed to provide selected information oriented towards decision-making, to support the planning, monitoring, and evaluation processes of organizational activities within a systematic framework (Winarto, 2021). Meanwhile, D. Joseph F. Kelly emphasizes that a management information system is an integration of human resources and other computer-based resources, which collectively produce

a mechanism for storing, retrieving, communicating, and utilizing data efficiently in order to support management operations (Farid et al., 2025).

The function of information systems is inseparable from the role of management itself, where the effectiveness and efficiency of achieving organizational goals depend heavily on the availability of relevant and reliable information. Therefore, management information systems play a crucial role in supporting every managerial activity (Febyanti & Suwarno, 2025), particularly in the following three main functions:

1. Planning.
   Planning is a strategic decision-making process aimed at designing the organization's future following its vision and desired goals. This function is the primary foundation of leadership, as through proper planning, organizations can establish a clear direction and minimize uncertainty in operational activities (Suharyani & Djumarno, 2023).
2. Decision-Making.
   In the context of daily operations, leaders, such as school principals, are required to continuously make decisions related to various problems and opportunities. The decision-making process includes identifying problems, exploring alternatives, and selecting the most appropriate solution. To support this process, accurate, relevant, and timely information is required so that decisions can lead to optimal results and support the achievement of organizational goals effectively and efficiently (Duhartono et al., 2021).
3. Control.
   Control is a mechanism to ensure that organizational activities are implemented according to established plans. Through the control process, any deviations from the planned path can be promptly identified and corrected. Thus, control serves as an instrument for maintaining consistency between plans and implementation, and ensures that the organization remains within the outlined strategic corridor (Handini et al., 2024).

C. METHOD

The research method used in this study was designed to support an in-depth understanding of the implementation of project management information systems in improving the efficiency and accountability of infrastructure development. Given the research's focus on implementation processes, challenges, and strategies within the context of project governance, a qualitative approach was chosen as the primary approach. This approach allows researchers to explore in depth various dynamics that cannot be explained quantitatively, such as obstacles to coordination between stakeholders, untimely decision-making, and the integration of technology into organizational work structures. This approach also provides space for researchers to examine the relationships between managerial, administrative, and technical elements comprehensively within the framework of information technology utilization. This research will be conducted by collecting data from various relevant sources, such as

previous research results and scientific publications discussing infrastructure project management systems and the implementation of information systems in the public sector. The collected data will then be analyzed thematically to identify patterns, key challenges, and strategies that emerge within the context of information system implementation. The analysis is conducted by considering the empirical relevance and conceptual contribution of each data used, so that the results of this study not only provide a comprehensive picture of existing practices but also provide recommendations that can be used as references in policy formulation or the implementation of similar systems in the future.

D. RESULT AND DISCUSSION

1. Efficiency Issues in Infrastructure Project Management

The issue of infrastructure project implementation effectiveness often occupies a central place in the national development agenda, particularly for large-scale projects that cross sectors and involve numerous institutional actors. Public infrastructure development is inherently a collective process and cannot be separated from the involvement of various stakeholders, from central and regional government authorities, planning consultants, implementing contractors, material providers, and technical supervisory agencies. This multi-stakeholder involvement creates a complex relationship structure, which often presents coordination challenges due to differing perceptions regarding project orientation, implementation schedules, and work quality benchmarks. Inequality in communication mechanisms increases the potential for miscommunication, inconsistent technical execution in the field, and slow handling of emerging issues. This lack of synchronization ultimately results in delays in work progress and leads to inefficiencies in both time and resource allocation.

Limited access to real-time information also exacerbates the situation, particularly in decision-making, which requires fast and accurate data. In many cases, work progress data is still obtained manually and periodically, resulting in information received by policymakers often no longer relevant to current conditions on the ground. This lack of timely information delivery causes many project activities to proceed without a sound basis for decision-making (Mafata & Wibowo, 2025). This directly impacts project completion delays, as strategic decisions that should have been taken immediately are delayed due to the lack of up-to-date information. Furthermore, delays in information delivery also lead to a backlog of activities that should have been anticipated early, increasing the likelihood of schedule deviations and leading to resource waste.

In terms of monitoring work progress, weaknesses in project tracking systems are a major reason why early intervention cannot be implemented effectively. Project oversight, which still relies on manual reporting and unscheduled field visits, makes the monitoring process sporadic and unsystematic. When technical or administrative obstacles arise early on, their undetected nature can lead to them escalating into major obstacles later on. The inability to identify critical points in real time also results in project managers missing opportunities to adjust strategies, both technically and

logistically. This places projects in a fragile situation, where problem-solving efforts are more reactive than preventive, increasing the potential for losses due to accumulating delays.

Inflexible project planning and control processes also hinder efficiency. In many projects, planning is carried out using a rigid approach that is unable to adapt to changing field conditions. When dynamics such as weather changes, material supply delays, or other technical obstacles occur, the existing system does not provide sufficient room for rapid adjustments (Ainiyah et al., 2025). Overly theoretical planning and a minimal adaptive approach leave project implementation vulnerable to deviations, as there's no mechanism for structured strategic shifts. Projects proceed according to plans that are no longer relevant, but cannot be quickly corrected due to weak control systems. This situation fuels inefficiencies that grow over time and creates pressure for project completion, which falls further and further behind the initial target.

Delays in technical and administrative decision-making are the culmination of this chain of inefficiencies. Critical decisions concerning resource allocation, design changes, or corrective actions are often hampered by lengthy bureaucracy and multi-layered approval mechanisms. In a disjointed system, a single technical decision can take days or even weeks to be finalized due to the multiple authorization processes required. These delays not only hamper field activities but also have a ripple effect on other related activities. While work is delayed awaiting decisions, heavy equipment remains idle, labor continues to be paid, and contracts remain outstanding, ultimately leading to unplanned cost increases. When decision-making systems are inefficient, the entire project becomes difficult to control, and efficiency remains something that is written on paper, not reflected in actual implementation on the ground.

2. Accountability Challenges in Government Project Implementation

Issues related to accountability in the implementation of government projects remain a central concern on the agenda of public development governance reform. The larger the scale of infrastructure projects and the allocation of funds used from the state budget, the higher the public's expectations for an open, measurable, and reliable information system-based accountability mechanism. However, the implementation of government projects often faces obstacles in terms of budget transparency, which is characterized by weak recording and inadequate documentation. The expenditure of funds for various activities is often not accompanied by detailed and systematic reporting, making it difficult for supervisory authorities to trace the flow of funds—including the responsible party, the type of activities funded, and their impact on project achievements. The lack of clarity in this information not only hampers the overall internal evaluation process but also creates gaps for deviations, because the supervision system runs without being supported by valid, accurate, and comprehensive data.

On the other hand, the preparation and submission of project reports is often a problem in the implementation process. Many project implementers have difficulty in

preparing reports consistently and on time, either due to limited human resources, low technical capacity, or excessive administrative burdens. Projects that take place in different regions with different geographical and operational challenges make the reporting process more complex. When reports are not systematically prepared and submitted on time, monitoring and decision-making efforts that depend on them are hampered. Late or incomplete reports not only delay the evaluation and audit process but also disrupt project continuity because policies that should be responsive are implemented late. In this situation, accountability becomes blurred because the information needed to assess project performance is not adequately available (Perera & Dewagoda, 2021).

The lack of comprehensive documentation further exacerbates this situation. In many government projects, implementation documentation is not comprehensive, covering financial, technical, and administrative aspects. Proof of payment, progress photos, contract documents, and even design change reports are often scattered or not stored in a single, integrated system. When audited by either internal or external auditors, projects struggle to provide valid evidence to support accountability. This not only complicates the audit process but also weakens the government's position in the face of public criticism. Accountability is not merely about preparing a final report, but also about clearly tracing every step and expenditure within a project and formally documenting it. When this is not the case, the entire accountability system loses its foundation, and potential state losses cannot be fully clarified.

Another problem that arises is the lack of a reporting system capable of providing objective and independently verifiable data. In many projects, reports are often narrative and subjective, lacking the support of reliable quantitative data. When the information presented cannot be verified by external parties, the report loses credibility as a performance evaluation tool. The absence of clear indicators and a structured data system makes the reporting process vulnerable to manipulation, both intentional and unintentional. When information is not based on verifiable data, accountability is weakened, as there is no guarantee that the reports reflect the actual project conditions on the ground. This risks eroding public trust and increasing the burden on implementing agencies, who must re-explain their work to auditors or the public (Zuboff, 2022).

Furthermore, significant obstacles also arise in establishing a transparent and easily accessible work tracking system for stakeholders. Limited access to project information, whether for supervisory agencies, the media, the public, or other relevant agencies, leads to negative perceptions of transparency in government projects. When information about progress, budget utilization, and technical challenges is not publicly available, the space for public participation is blocked. Having a tracking system accessible in real time by various parties can strengthen accountability, as any deviations or problems can be immediately detected and addressed. However, in reality, many projects still lack a digital-based reporting system that enables such tracking. Existing systems tend to be closed, slow, and used only by a small group of individuals within the bureaucracy. This creates a gap between project

implementation and public oversight, making the potential for misappropriation more difficult to prevent.

3. The Role of Technology in Accelerating Project Management Transformation

Adopting technology in project management systems is no longer optional, but rather a strategic necessity to address the challenges of increasing complexity, demands for efficiency, and public expectations for transparency in the infrastructure development sector. In the implementation of government projects, manual and siloed management practices across work units have hampered process smoothness and increased the potential for coordination errors. Therefore, the use of digital technology—particularly through the integration of cross-functional data into a single, unified platform—is a crucial step in creating a more adaptive and responsive work system. The availability of real-time technical, administrative, and financial data in a single, connected system enables more accurate, faster decision-making that is in line with developments in the field. Furthermore, this integration also strengthens synergy between stakeholders, from planning teams to policymakers, by ensuring that all work processes are based on consistent information, reducing the risk of miscommunication, and minimizing deviations from project objectives.

Utilizing digital systems is also key to accelerating various crucial processes such as reporting, monitoring, and tracking project performance. When reporting is done manually, information tends to arrive late, be inaccurate, and be prone to repeated input errors. However, with a digital system specifically designed for infrastructure projects, reporting can be done automatically based on continuously updated data from the field (Tjiwidjaja, 2025). Monitoring no longer requires waiting for monthly final reports or field visits; it can be done daily or even in real time through a digital dashboard that displays key project performance indicators. Tracking work progress and budget utilization also becomes more accurate, as the system presents data sourced directly from operational activities. In this way, technology plays an active role in creating a connection between technical implementation and managerial functions, which were previously often disconnected by information constraints.

The transformation brought about by technology also impacts internal bureaucratic efficiency by reducing duplication of work and simplifying administrative processes. In conventional systems, a single activity is often recorded multiple times in different formats for each unit, which not only wastes time and effort but also opens up the possibility of data inconsistencies. Through the automation of administrative processes, digital systems can take over various repetitive functions such as data recapitulation, report document creation, and information distribution between units. This not only reduces manual workload but also allows the workforce to focus more on strategic functions that require analysis and decision-making. Automation also minimizes the risk of human error, improves data accuracy, and

expedites bureaucratic processes that were previously known to be slow and cumbersome.

Beyond speed and efficiency, technology also makes a significant contribution to presenting project information in a comprehensive and structured manner. All project stages, from planning and procurement to implementation and supervision, can be systematically documented in a single, easily accessible information system. Technical data, such as work schedules, work volumes, budget realization, as well as non-technical data such as policy changes or field constraints, can be logically linked into a coherent digital narrative (Fauzany, 2024). This structured presentation of information is a crucial asset for decision-makers, auditors, and the public seeking to objectively assess project progress. Technology, then, is not merely a technical tool, but a strategic instrument in building a robust, sustainable project documentation system that can be evaluated whenever needed.

Amid the push towards transparent governance, technology also plays a significant role in creating visibility into every stage of a project. Information is no longer the exclusive property of a few parties, but can be accessed by all stakeholders according to their respective roles and needs. With a public dashboard or open monitoring system, the public can directly see the progress of ongoing projects, including budget allocation and realization. This high level of visibility not only strengthens public trust in the government but also creates positive pressure for project implementers to maintain their integrity and performance. Technology-based transparency indirectly builds a more responsible work culture because every action is recorded and traceable.

4. Information System Implementation Strategy to Improve Project Governance Effectiveness

Efforts to improve the effectiveness of project governance through the implementation of information systems require a planned, comprehensive strategy that is tailored to the characteristics of the organization. One of the main challenges in this process lies in the need to adjust the structure and dynamics of institutional workflows with the logical framework of the information system being implemented. Not a few government agencies and project implementers still maintain traditional work mechanisms that are not in line with the principles of digitalization, so that the implementation of information technology is often faced with resistance or even redundancy between manual procedures and electronic systems. Without a comprehensive restructuring of business processes, information systems are at risk of not being utilized optimally. Therefore, it is necessary to rearrange the functional roles of work units, internal communication mechanisms, and reporting and decision-making procedures so that they are in line with the framework of the digital system being carried out. Synchronization between the information system and the operational structure of the organization is an essential requirement so that the technology adopted is truly able to accelerate work processes, increase efficiency, and support the achievement of project goals more systematically and measurably.

However, system adjustments will not run effectively without the support of adequate human resource capacity. Strengthening HR capabilities is a fundamental aspect of the information system implementation strategy. Many failures in information system implementation are not caused by technical weaknesses of the system, but rather by a lack of user understanding and skills in operating it. Therefore, comprehensive technical training and mentoring are essential, not only for technical operators but also for project managers, decision-makers, and administrative staff involved in data management. Human resource capacity building must be carried out continuously, in line with system development and changing project needs. In addition to training, it is also necessary to develop a digital work culture within the organization, so that all parties feel a sense of responsibility and a willingness to actively participate in utilizing information systems as part of their daily tasks.

To strengthen system effectiveness, developing a real-time, data-driven project performance evaluation mechanism is a crucial next step. With an optimally functioning information system, project progress data can be collected and processed automatically, eliminating the need for time-consuming manual reporting for performance evaluations (Widyowaty et al., 2025). Data-driven evaluations enable faster and more objective decision-making, as every performance indicator, such as physical progress, budget utilization, schedule deviations, and technical constraints, can be monitored directly. This mechanism not only benefits project management in refining implementation strategies but also internal supervisors and auditors in identifying potential deviations early. Real-time evaluations also provide greater flexibility in adjusting work plans, as corrective decisions can be made without having to wait for the end of the reporting period.

To ensure consistent system operation and uniform use, the development of clear operational guidelines and the division of responsibilities among system users are essential. In many cases, ineffective system use occurs due to the lack of technical guidelines explaining how the system should be used in each work process. A well-developed operational manual can help each unit understand its roles and responsibilities within the system, from who inputs data, who verifies it, who monitors it, and who makes decisions based on system output. The manual should also include standard operating procedures, reporting procedures, and mechanisms for resolving technical issues in the event of a disruption. Clear documentation allows all parties to work from a common reference point, reducing errors and improving system compliance.

Finally, the key to the successful implementation of information systems in development projects lies in strengthening managerial commitment to making the system the primary oversight tool. Often, well-developed systems are neglected in managerial practice because they are not used as a primary reference for evaluation and decision-making. The commitment of the project leader or responsible official is crucial in determining the optimal use of the system. When management only uses the system as a reporting formality, its impact on governance will be very limited. Conversely, if the system serves as the foundation for the entire monitoring and

evaluation process, the entire team will be motivated to maintain data accuracy and discipline in inputting information. This commitment can be realized through internal policies, the establishment of a system management unit, and the provision of adequate resources to support the system's ongoing operation. By making the information system the primary instrument in project management, governance effectiveness can significantly increase, both in terms of work efficiency, budget accountability, and transparency of implementation to the public.

E. CONCLUSION

Increasing efficiency and accountability in the management of government infrastructure projects is highly dependent on governance transformation through the implementation of an integrated information system. Problems such as weak coordination between stakeholders, late reporting, and slow decision-making processes indicate an urgent need to abandon conventional approaches that are no longer relevant to current project dynamics. The inability to track budget usage transparently, prepare reports on time, and provide complete documentation further emphasizes the importance of adopting digital technology as the main instrument in building a more responsive, adaptive, and reliable project management system. Implementing an information system requires not only the procurement of technology but also a comprehensive strategy, starting from adjusting workflows, increasing human resource capacity, and strengthening managerial commitment. An optimally running system can integrate data across work units, simplify administrative processes, present information comprehensively, and open wider access to project progress. With the development of data-based performance evaluation mechanisms and the preparation of clear operational guidelines, information systems can become the backbone in creating transparency, efficiency, and accountability. Therefore, the success of infrastructure development is not only determined by technical capabilities and budget alone, but also by the quality of project governance supported by an effective and sustainable information system.

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