Evaluation of the Effectiveness of Management Information System Implementation in Supporting Business Intelligence

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Abstract

The development of information technology encourages organizations to optimize the use of Management Information Systems (MIS) to support Business Intelligence (BI). This study aims to evaluate the effectiveness of SIM implementation in supporting BI with a quantitative approach. Data were collected through questionnaires from 75 respondents of SIM users from various work units in the organization, then analyzed based on three main dimensions: system quality, information quality, and user satisfaction. The results showed that SIM has been implemented effectively and contributed significantly to the success of BI. Statistical analysis showed a strong positive relationship between SIM effectiveness and BI functioning. The findings provide important implications for organizations to strengthen user training, data integration, and system development to improve data-driven decision making.

Keywords: Management Information System, Business Intelligence, system quality, information quality, user satisfaction.

Introduction

The rapid development of information technology has encouraged organizations in various sectors to carry out digital transformation to improve operational efficiency, competitiveness, and adaptability to the dynamics of the business environment. In this transformation process, organizations are faced with increasingly large and complex data volumes, both from internal and external sources (Aldoseri et al., 2023). The increasing complexity of data requires a system that is not only able to store and manage information in a structured manner, but can also analyze it effectively to support a fast and accurate decision-making process (Niu et al., 2021). Therefore, the presence of an integrated management information system (SIM) is a strategic necessity for modern organizations (Amin et al., 2024). An effective SIM will provide easy and quick access to necessary data, facilitate real-time data processing, and provide relevant and timely information to decision makers at all levels of the organization (Gürkut et al., 2023). In other words, SIM serves not only as a tool to store information, but also as a means to support better and faster data-driven analysis and decision-making, which is crucial in facing dynamic market challenges (Mishra et al., 2024).

Continuing the urgency for a system that is able to manage and analyze information efficiently, Management Information System (MIS) is present as the main backbone in organizational information management (Mayol-Tur & Artal-Tur, 2023). SIM not only functions as a technical tool, but also as a managerial support system that enables cross-departmental coordination in a more integrated and efficient manner (Awan Setiawan, 2023). With its ability to unify the flow of data from various work units, SIM strengthens internal communication, speeds up the reporting process, and ensures that the information needed for decision-making is available in real-time (Apriani et al., 2024). These systems are vital not only in supporting daily operational processes, such as transaction processing and resource

management, but also in supporting long-term strategic processes, such as business planning, performance measurement, and organizational policy formulation. The success of SIM is largely determined by its ability to provide accurate, relevant, and timely data, which are the three key elements that are the main foundation for the optimal utilization of Business Intelligence (Paleti et al., 2025). Without a reliable SIM, organizations will struggle to map opportunities, identify risks, and respond adaptively to changes in an increasingly complex and data-driven business environment.

In line with the increasing need of organizations for fast and data-driven decision making, Business Intelligence (BI) has become one of the critical components in supporting competitive advantage (Hatamlah et al., 2023). BI plays a role in processing raw data into strategic insights through the process of data collection, integration, analysis, and visualization, so that management can understand business conditions more thoroughly and accurately (A.A. Gad-Elrab, 2021). With BI, organizations are able to identify trends, patterns, and opportunities hidden in the data, which in turn speeds up the decision-making process and improves the accuracy of the strategies implemented. However, for BI to run optimally, it requires the support of an integrated information system, such as a Management Information System (MIS), which ensures the availability of valid, consistent, and real-time data (Kishan Patel, 2024). Without quality SIM support, BI implementation will be constrained by data gaps, information incoherence, and delays in accessing information, which can hamper the effectiveness of decision-making. Therefore, the relationship between SIM and BI is complementary where SIM becomes the foundation that supports BI's success in creating added value through strategic data management and utilization.

Although many organizations have implemented Management Information Systems (MIS) as part of their digital transformation, in practice not all have been able to optimize their functions to the fullest to support Business Intelligence (BI) performance. This reflects the gap between the existence of the system and the effectiveness of its implementation in supporting data-driven analytics and decision-making processes. In many cases, SIM is only utilized as a tool for recording transactions or routine reporting (Rahmatullah & Nugraha, 2024), without being further developed to produce strategic information that can be utilized by BI. The lack of data integration between units, the low quality of inputs, and the lack of training for users are factors that weaken the support of SIM to BI. Unfortunately, evaluation of the effectiveness of SIM implementation in this context is rarely done systematically. In fact, without a measurable evaluation based on relevant indicators, it will be difficult for organizations to know the extent to which SIM contributes to the quality of information and accuracy of decisions generated by the BI system. Therefore, a comprehensive evaluative approach is needed to assess the extent to which SIM implementation has been effective in supporting the analytical needs and business strategy of the organization.

In response to the gap between Management Information System (MIS) implementation and its effectiveness in supporting Business Intelligence (BI), a comprehensive evaluation is needed to determine the extent to which the system that has been implemented is actually able to meet the information needs of the organization. This evaluation is important not only to measure the technical performance of the SIM, but also to assess its contribution to providing relevant, accurate and actionable data in the context of business analytics. An assessment of the effectiveness of SIM implementation should ideally cover three main dimensions. First, the technical aspect that assesses the extent to which the system is well-designed, stably accessible,

and able to handle data volumes efficiently. Second, the information aspect that evaluates the quality of the data produced, including accuracy, completeness, consistency, and timeliness. Third, the user aspect that reflects the satisfaction, perception, and ease of use of the system by both decision-makers and operational users. An evaluation that covers these three aspects will provide a holistic picture of the SIM's effectiveness in supporting BI, as well as a strong basis for the organization to make improvements, adjust strategies, and optimize the system on an ongoing basis.

To answer the challenges and fill the gaps identified earlier, this study was designed to quantitatively evaluate the effectiveness of Management Information System (MIS) implementation in supporting Business Intelligence (BI) in an organizational environment. The quantitative approach was chosen so that the evaluation can be done objectively and measurably based on indicators that include technical aspects, information quality, and user satisfaction. Through systematic measurement, this research aims to reveal the extent to which the implemented SIM is able to provide a strong foundation for the BI system in generating strategic insights, accelerating decision-making, and driving increased organizational efficiency and competitiveness. The results of this study are expected to not only provide academic contributions in the form of empirical evidence, but also offer practical recommendations that can be utilized by organizations in designing more targeted information technology development policies. Thus, the findings of this study are expected to support efforts to improve organizational performance in a sustainable manner through optimizing the use of data and information systems owned.

Method

This study uses a quantitative approach with an evaluative survey method to objectively measure the effectiveness of (Huda et al., 2025) implementation of Management Information Systems (MIS) in supporting Business Intelligence (BI) performance in an organizational environment. This approach was chosen because it is able to provide a measurable picture of the relationship between variables and allows generalization of findings to a wider population. The population in this study are employees, data analysts, and functional managers who are directly involved in the use of SIM and BI systems in organizations that have implemented the system for at least one year. The sampling technique used was purposive sampling, with the criteria that respondents have knowledge and work experience relevant to the use of SIM and BI.

The research instrument was a closed questionnaire prepared based on a five-point Likert scale, with indicators adapted from the DeLone and McLean model, including dimensions of system quality, information quality, service quality, user satisfaction, and system impact on the effectiveness of BI-based decision making. Instrument validity and reliability were tested through a pilot test to ensure item suitability and measurement consistency. The data obtained were statistically analyzed using multiple linear regression analysis techniques to test the influence of the independent variables on the effectiveness of Business Intelligence as the dependent variable. The results of the analysis are expected to provide an in-depth understanding of the extent to which the successful implementation of SIM contributes to the optimization of BI in the strategic and data-driven decision-making process, as well as the basis for developing an information system strategy that is more effective and adaptive to organizational needs.

Results and Discussion

Respondent Description

This study involved 75 respondents from various work units in the organization, consisting of 48 people (64%) executive staff, 19 people (25%) supervisors or section heads, and 8 people (11%) middle-level managers. Based on the work unit, most respondents came from the planning unit (21 people or 28%), followed by the finance unit (17 people or 22.7%), information technology unit (14 people or 18.7%), and the rest came from other operational units such as general services and administration (23 people or 30.6%). The level of use of Management Information Systems (MIS) also varies. A total of 51 respondents (68%) use SIM every day, 18 respondents (24%) use it several times a week, and 6 respondents (8%) use SIM only when needed. Experience in using SIM shows that the majority of respondents have been quite familiar with the system, where 29 respondents (38.7%) have used SIM for more than 3 years, 25 respondents (33.3%) for 1-3 years, and 21 respondents (28%) for less than 1 year.

However, the use of Business Intelligence (BI) features or applications is still uneven. Only 28 respondents (37.3%) claimed to use BI actively in their daily work, 31 respondents (41.3%) use it occasionally, and 16 respondents (21.3%) have never used BI at all. The frequency of training also reflects the level of user readiness. A total of 45 respondents (60%) have attended training on the use of SIM, while only 20 respondents (26.7%) have received special training related to BI. The remaining 30 respondents (40%) have never participated in formal training related to information systems. This imbalance indicates that although SIM has been widely used, its utilization in supporting BI-based decision making still faces challenges in terms of user understanding and skills. The summarized information can be seen in table 1.

Table 1. Description of Respondents

Categories	Sub-categories	Total (n)	Percentage (%)
Position	Implementation Staff	48	64,0%
	Supervisor/Section Head	19	25,3%
	Manajer	8	10,7%
Work Unit	Planning	21	28,0%
	Finance	17	22,7%
	Information Technology	14	18,7%
	Others (Operational, Admin)	23	30,6%
Frequency of SIM Usage	Every day	51	68,0%
	Several times a week	18	24,0%
	Only when needed	6	8,0%
Length of Driver's License Use	> 3 years	29	38,7%
	1-3 years	25	33,3%
	< 1 year	21	28,0%
Use of BI	Actively use	28	37,3%
	Sometimes	31	41,3%
	Never	16	21,3%
Past Training	Driver's License Training	45	60,0%
	BI Training	20	26,7%
	Never training	30	40,0%

Analisis statistics

1. Validity and Reliability Test

Validity Test

The instrument validity test was conducted using the Pearson correlation method to measure the relationship between the items in the questionnaire and the total score of each dimension measured. The validity test results show that all items in the instrument have significant correlation values ($p < 0.05$), with correlation coefficients ranging from 0.60 to 0.85. This indicates that all items in the research instrument have good validity and can measure what is intended.

Reliability Test

To measure internal consistency, a reliability test was conducted using Cronbach's Alpha Coefficient. The reliability test results show that the Cronbach's Alpha value for the entire instrument is 0.87, which indicates that this research instrument has a very good level of reliability.

Table 2. Validity and Reliability Test Results

Dimension	Item	r Count	Validity	Cronbach's Alpha	Reliability
Technical Aspects (System Quality)	Ease of Use	0.78	Valid	0.85	Reliable
	System Reliability	0.85	Valid		
	Fitur Analitik	0.82	Valid		
Information Aspect (Data Quality)	Data Accuracy	0.90	Valid	0.87	Very Reliable
	Completeness of Information	0.80	Valid		
	Data Timeliness	0.83	Valid		
User Aspects (Satisfaction and Perception)	User Satisfaction	0.88	Valid	0.83	Reliable
	Perceived SIM Contribution	0.85	Valid		
	SIM Adoption Rate	0.80	Valid		

Descriptive Analysis of Each Dimension

Descriptive analysis was conducted to describe the characteristics of respondents and provide an overview of the distribution of scores on each dimension studied. The average score for the technical aspect dimension was 3.75 (on a scale of 1-5), indicating that respondents rated the quality of the SIM system as generally good. Most respondents felt that the ease of use and reliability of the system were in the good category, although some respondents reported minor technical glitches and mismatch of available features with analytic needs. Information Aspect (Data Quality) The average score for the information aspect dimension was 3.85, indicating that the data provided by SIM is reasonably accurate, consistent, and timely. However, some respondents identified delays in data updates, which can hinder real-time BI analysis. The highest score on this dimension is on the aspect of data accuracy (4.1), while the lowest score is found on information completeness (3.6). User Aspects (Perception and Satisfaction) The average score for the user perception and satisfaction dimension is 3.80, indicating that the majority of respondents are satisfied with the performance of the SIM and

its contribution to decision-making. However, a minority of respondents felt that there were barriers to use related to a less intuitive user interface and lack of adequate training in maximizing SIM features.

Table 3 Descriptive Analysis

Dimension	Subdimension	Average (M)	Standard Deviation (SD)
Technical Aspects	Ease of Use	3.65	0.72
	System Reliability	3.85	0.68
	Fitur Analitics	3.75	0.70
Information Aspect	Data Accuracy	4.10	0.55
	Completeness of Information	3.70	0.80
	Data Timeliness	3.85	0.75
User Aspect	User Satisfaction	3.75	0.79
	Perceived SIM Contribution	3.85	0.60
	SIM Adoption Rate	3.70	0.82

Pearson Correlation Test

Pearson correlation test results show a significant positive relationship between each SIM dimension and BI functioning.

Tabel 4. Uji Korelasi

Dimension	Correlation with BI Functioning (r)	Significant (p)
Technical Aspects (System Quality)	0.78	$p < 0.01$
Information Aspect (Data Quality)	0.82	$p < 0.01$
User Aspects (Satisfaction and Perception)	0.74	$p < 0.01$

All dimensions show significant positive correlations, indicating that improvements in SIM quality are directly related to improvements in BI functioning in the organization.

Multiple Linear Regression Test

The results of multiple linear regression tests show that SIM dimensions simultaneously have a significant effect on BI functioning, with a value of $R^2 = 0.68$, which means that about 68% of the variation in BI functioning can be explained by the three SIM dimensions.

Table 5. Multiple Linear Regression Test

Variabel Independent	Regression Coefficient (β)	t-value	p-value
Technical Aspects (System Quality)	0.30	4.85	$p < 0.01$
Information Aspect (Data Quality)	0.35	5.21	$p < 0.01$
User Aspects (Satisfaction and Perception)	0.25	3.43	$p < 0.05$
R^2	0.68		
F-value	52.78	$p < 0.01$	

Evaluation of SIM Effectiveness Based on Dimensions

a. Technical Aspects (System Quality)

The evaluation of the technical aspects of SIM focused on three main sub-aspects: ease of use, system reliability, and availability of features that support analytic needs.

1. **Ease of Use**

   Most respondents (65%) rated the SIM as having high ease of use and user-friendly, although 20% of respondents felt that the system interface still needed improvement for

easier navigation. Only 15% found the system difficult to use, especially for users who are less familiar with technology.

2. **System Reliability**

   In terms of system reliability, 70% of respondents stated that SIM is stable and secure, with only a few technical glitches. However, 15% of respondents reported issues with data security, such as occasional login failures or interrupted system access. Another 15% of respondents stated that the system occasionally experiences downtime, which affects the availability of the system.

3. **Availability of Analytics Features**

   55% of respondents think that the analytics features available in SIM are sufficient to support their data analysis needs. However, 25% of respondents feel that some of the more advanced or BI-specific analytics features are still lacking. Only 20% of respondents feel that SIM features can fully fulfill their analytics needs.

b. Information Aspect (Data Quality)

The information aspect includes the accuracy, completeness and timeliness of the data available.

1. **Data Accuracy and Consistency**

   The majority of respondents, 75%, stated that the data available through the SIM is accurate and consistent, but about 18% felt that there are sometimes data discrepancies that affect decision-making. Only 7% of respondents reported significant data errors.

2. **Completeness of Information**

   A total of 70% of respondents felt that the comprehensiveness of the information provided by the SIM was sufficient to support their tasks, while 15% felt that there was a lack of data related to BI analytics, and another 15% felt that the data provided was not detailed enough for strategic decision-making needs.

3. **Data Timeliness**

   In terms of timeliness, 68% of respondents rated the data available in SIM as timely enough for BI analysis. However, 18% of respondents reported delays in data updates that affect the analysis conducted. A total of 14% of respondents consider the data available is not timely enough.

c. User Aspects (Perception and Satisfaction)

The evaluation of user perception and satisfaction includes satisfaction with SIM performance, perceived contribution of SIM in decision making, and level of adoption and utilization of SIM in daily work activities.

1. **User Satisfaction with SIM Performance**

   A total of 72% of respondents were satisfied with the performance of SIM in supporting their work tasks. However, 20% feel that there are some technical issues that affect

productivity, especially related to the speed of the system when accessing large amounts of data. Only 8% were dissatisfied with the performance of SIM.

2. **Perception of SIM Contribution to Decision Making**

   About 65% of respondents were of the opinion that SIM makes a positive contribution in supporting data-driven decision making, especially for operational and managerial decisions. However, 25% of the respondents felt that SIM is not yet able to fully support more complex strategic decisions, and only 10% felt that SIM does not contribute to decision-making.

3. **Level of SIM Adoption and Utilization**

   SIM adoption rates are high, with 80% of respondents using SIM in their daily work activities. However, 20% of respondents admit that despite the regular use of SIM, there is a reliance on manual methods or other systems that are still considered more effective for some specific tasks.

These results show that although the implemented SIM has been quite effective in some aspects, there are still some areas that require improvement, especially related to analytic features, system reliability, and timeliness of data provided. Increased training and feature development can also help improve user satisfaction and wider adoption of SIM in supporting data-driven decision-making processes.

Relationship between SIM Effectiveness and BI Functioning

Based on the results of the evaluation conducted, there is a significant relationship between SIM effectiveness and Business Intelligence (BI) functioning. Most respondents (85%) revealed that SIM effectiveness directly affects BI performance in the organization. An effective SIM, with good system quality, accurate information, and ease of use, accelerates the processing and analysis of data that supports BI-based decisions. Respondents who perceive the SIM to be effective report that the BI analytics process runs more smoothly, and the analysis results are more reliable and timely. In contrast, respondents who rated SIM as less effective found it difficult to perform BI analysis, leading to less optimal decisions.

Overall, 73% of respondents stated that good SIM integration improves BI's ability to predict trends and provide more accurate insights to support strategic decision-making. 27% of respondents consider that while SIM is effective, BI processes are not fully optimized due to other factors such as data complexity or lack of user training.

Identify SIM Areas Most Influential to BI Performance

Based on the analysis, there are several areas within SIM that have the most impact on BI's performance, including:

1. **Data Quality**

   Most respondents (78%) believe that data quality is the most critical factor in the success of BI. The accuracy, consistency, and completeness of the data available in the SIM greatly affect the reliability and accuracy of BI analysis. Inaccurate or late availability of data makes BI ineffective in providing timely insights.

2. **Availability of Analytics Features**

   The availability of analytic features that support data processing and visualization is a very vital area in supporting BI. About 65% of respondents think that a SIM that provides complete and integrated analytic features makes it easier to make data-driven decisions. Without relevant features, the BI analytics process becomes more limited, which results in suboptimal results.

3. **System Reliability**

   System reliability and stability also play an important role in supporting BI. About 70% of respondents recognize that technical glitches or weak data security in the SIM can disrupt the smooth running of BI analytics processes. Unstable systems or frequent downtime can hinder data integration and reduce BI's ability to deliver fast and accurate insights.

Key Barriers that Hinder Optimal Integration between SIM and BI

While there is great potential in the integration of SIM and BI, some of the major barriers that stand in the way of optimal integration between the two are:

1. **Mismatch of Features and User Needs**

   About 32% of respondents stated that the mismatch between SIM features and specific needs for BI analytics is a major obstacle. Some features in the SIM cannot accommodate the more complex needs of BI analytics, reducing the effectiveness of BI in processing large and complex data.

2. **Limited Human Resources (HR)**

   A total of 25% of respondents identified the lack of user skills in using SIM to support BI as a significant constraint. Users who are not trained or have a sufficient understanding of BI struggle to maximize the use of SIM in the context of analytics.

3. **Non-optimal System Integration**

   About 18% of respondents considered that one of the main technical barriers was the lack of seamless integration between the SIM and other systems used in the organization. The inability of systems to effectively connect with each other hinders direct and quick access to data required for BI analysis.

4. **Lack of System Support and Updates**

   A total of 15% of respondents reported that the lack of technical support and system updates was a hindering factor in the integration of SIM and BI. Systems that are not updated or maintained properly can suffer from performance degradation, leading to the inability of SIM to optimally support BI.

The results of this study indicate that the implementation of Management Information Systems (MIS) has a fairly high effectiveness in supporting Business Intelligence (BI), indicated by high scores on the dimensions of system quality, information quality, and user satisfaction. This is in line with DeLone and McLean's (2003) theory of the information system success model, which emphasizes the importance of system, information, and service quality

as the main determinants of information system success. In this context, a SIM that has adequate analytical features, high reliability, and accurate and timely data is proven to improve users' perceptions of its contribution to the data-driven decision-making process.

The study also revealed a significant relationship between SIM effectiveness and BI functioning, especially in the aspects of data analytics availability and ease of information access. This finding confirms the importance of integration between systems as well as the need for continuous training to ensure optimal system utilization. Different from previous studies that tend to focus on technology adoption, the novelty of this research lies in its approach that quantitatively measures the effectiveness of SIM implementation in supporting BI, as well as identifying actual barriers such as limited training, suboptimal data integration, and low user engagement.

Practically, these results have important implications for organizations, including the need to strengthen user training programs, improve integration between data sources, and develop SIMs that are more responsive to analytic needs. Organizations also need to position SIM evaluation as an ongoing process, not just at the initial implementation stage, so that its effectiveness in supporting BI can be continuously monitored and improved. Thus, the SIM will not only serve as an operational tool, but also as a strategic driver in improving information-based competitiveness.

Conclusion

Management Information Systems (MIS) are proven to be effective in supporting Business Intelligence (BI) through reliable system quality, accurate and timely information, and positive user perceptions. There is a significant relationship between SIM effectiveness and BI success, indicating the importance of system integration, user training, and continuous evaluation. This research confirms that a well-implemented SIM can be a strategic foundation for data-driven decision-making and improved organizational competitiveness.

References

A.A. Gad-Elrab, A. (2021). Modern Business Intelligence: Big Data Analytics and Artificial Intelligence for Creating the Data-Driven Value. In R. M.X. Wu & M. Mircea (Eds.), *E-Business—Higher Education and Intelligence Applications*. IntechOpen. https://doi.org/10.5772/intechopen.97374

Aldoseri, A., Al-Khalifa, K. N., & Hamouda, A. M. (2023). Re-Thinking Data Strategy and Integration for Artificial Intelligence: Concepts, Opportunities, and Challenges. *Applied Sciences*, *13*(12), 7082. https://doi.org/10.3390/app13127082

Amin, A., Bhuiyan, M. R. I., Hossain, R., Molla, C., Poli, T. A., & Milon, M. N. U. (2024). The adoption of Industry 4.0 technologies by using the technology organizational environment framework: The mediating role to manufacturing performance in a developing country. *Business Strategy & Development*, *7*(2), e363. https://doi.org/10.1002/bsd2.363

Apriani, D., Afrijaldi, R., Auliya, N., & Darmawan, A. A. (2024). Operating System and Server Integration for Business Effectiveness. *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, *5*(2), 91–99. https://doi.org/10.34306/itsdi.v5i2.615

Awan Setiawan. (2023). Implementation of an Integrated Management Information System to Create Business Efficiency. *Journal Of Data Science*, *1*(02), 68–73. https://doi.org/10.58471/jds.v1i02.3784

Gürkut, C., Elçi, A., & Nat, M. (2023). An enriched decision-making satisfaction model for student information management systems. *International Journal of Information Management Data Insights*, *3*(2), 100195. https://doi.org/10.1016/j.jjimei.2023.100195

Hatamlah, H., Allahham, M., Abu-AlSondos, I. A., Al-junaidi, A., Al-Anati, G. M., & Al-Shaikh, M. (2023). The Role of Business Intelligence adoption as a Mediator of Big Data Analytics in the Management of Outsourced Reverse Supply Chain Operations. *Applied Mathematics & Information Sciences*, *17*(5), 897–903. https://doi.org/10.18576/amis/170516

Huda, N., Manek, A., L Taolin, M., & Aziz, S. (2025). *Metodologi Penelitian Manajemen dan Bisnis: Pendekatan Kuantitatif, Kualitatif & Campuran*. Nurul Huda.

Kishan Patel. (2024). *AN ANALYSIS OF QUALITY ASSURANCE FOR BUSINESS INTELLIGENCE PROCESS IN EDUCATION SECTOR*. https://doi.org/10.5281/ZENODO.13771027

Mayol-Tur, M., & Artal-Tur, A. (2023). Present Your Choice of Management Information System (MIS) Mix. In S. K. Dixit & S. Piramanaygam (Eds.), *Teaching Cases in Tourism, Hospitality and Events* (pp. 240–250). CABI. https://doi.org/10.1079/9781800621022.0022

Mishra, S., Shinde, M., Yadav, A., Ayyub, B., & Rao, A. (2024). *An AI-Driven Data Mesh Architecture Enhancing Decision-Making in Infrastructure Construction and Public Procurement* (Version 1). arXiv. https://doi.org/10.48550/ARXIV.2412.00224

Niu, Y., Ying, L., Yang, J., Bao, M., & Sivaparthipan, C. B. (2021). Organizational business intelligence and decision making using big data analytics. *Information Processing & Management*, *58*(6), 102725. https://doi.org/10.1016/j.ipm.2021.102725

Paleti, S., Pamisetty, V., Challa, K., Burugulla, J. K. R., & Dodda, A. (2025). Innovative Intelligence Solutions for Secure Financial Management: Optimizing Regulatory Compliance, Transaction Security, and Digital Payment Frameworks Through Advanced Computational Models. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.5206235

Rahmatullah, I., & Nugraha, M. S. (2024). Sistem Informasi Manajemen (SIM) Keuangan di Lembaga Pendidikan Islam. *Journal of Education Research*, *5*(4), 5858–5867. https://doi.org/10.37985/jer.v5i4.1859