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Strategy to Improve Operational Performance Efficiency through the Implementation of Management Information System

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Abstract

The rapid advancement of information technology has encouraged many companies to adopt Management Information Systems (MIS) to enhance operational performance. However, a significant number of organizations continue to experience suboptimal results due to inadequate employee training, inconsistent system maintenance, and weak managerial support. This indicates a critical gap between MIS implementation and its expected benefits, particularly in improving operational efficiency. This study aims to bridge that gap by investigating the impact of MIS implementation on operational performance and identifying key success factors that influence its effectiveness. Using a quantitative approach, the research involved a case study in a medium-sized manufacturing company, with data collected from 100 respondents across operational-related departments through a structured questionnaire. The findings show that effective MIS implementation contributes substantially to operational efficiency by streamlining workflows, minimizing processing time, and enhancing resource allocation. Furthermore, success is strongly associated with comprehensive user training, consistent system maintenance, and committed managerial support. These findings offer practical insights for organizations seeking to maximize the benefits of MIS and can serve as strategic references for improving operational performance through targeted system implementation efforts.

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1. Introduction

In today's competitive business environment [1], companies are constantly striving to improve their operational efficiency to remain sustainable and profitable [2]. One crucial strategy that has gained significant attention is the implementation of Management Information Systems (MIS) [3]. MIS is designed to streamline business processes, enhance decision-making, and improve resource allocation [4]. However, despite its promising potential [5], many companies still struggle to optimize the performance of their MIS[6], which often leads to inefficiencies such as data redundancy [7], slow decision-making processes, and ineffective resource management [8]. These persistent issues underline the importance of understanding the factors that influence the effectiveness of MIS [9], especially in medium-sized manufacturing firms that typically operate with more limited resources than large-scale enterprises[10].

Several previous studies have attempted to explore the relationship between MIS implementation and operational efficiency [11]. [12], for example, found that integrating MIS into the workflows of large manufacturing enterprises significantly reduced processing times and improved resource utilization. However, their study did not address employee adaptability [13], which is a key determinant of successful system adoption [14]. Similarly, [15] emphasized that inadequate training and inconsistent system updates were major obstacles to achieving MIS-related benefits, yet failed to consider the role of managerial support in overcoming these challenges [16]. [17] also highlighted the benefits of frequent system maintenance within retail businesses, but did not include empirical evidence from manufacturing sectors—particularly medium-sized firms [18], which face different operational constraints and organizational dynamics [19].

In light of these research gaps, this study aims to conduct a comprehensive investigation into how MIS implementation influences operational performance, with a specific focus on a medium-sized

manufacturing company as the case study. This research employs a quantitative method by distributing structured questionnaires to 100 respondents from various operational departments. It analyzes how MIS affects key dimensions of efficiency, such as workflow improvements, reduction in data processing time, and optimization of resource allocation. Furthermore, the study evaluates the contribution of supporting factors such as employee training programs, the frequency of system maintenance, and the level of managerial support. By identifying and analyzing these critical success factors, the study seeks to offer practical insights and strategic recommendations for businesses that aim to enhance operational efficiency through more effective and targeted MIS implementation.

2. Research Methodology

This research employs a quantitative research approach using a survey method to analyze the impact of Management Information System (MIS) implementation on a company's operational efficiency[20]. This method was chosen because it allows for systematic measurement and numerical data analysis[21], enabling the research findings to be generalized to a broader population[22]. The research is designed with several steps explained in the following subsections.

2.1 Research Flowchart

This research follows, as presented in Figure 1, the following research process flow:

- Problem Identification
  - Determine the main issue to be investigated.
  - Identify the impact of Management Information System (MIS) implementation on the company's operational efficiency.
- Literature Review
  - Collect references from journals, books, and previous studies related to MIS and operational efficiency.
  - Review relevant theories and appropriate methodologies.
- Research Design and Hypothesis Development
  - Determine the research approach (quantitative/qualitative/mixed methods).
  - Formulate hypotheses based on findings from the literature review.
  - Identify independent, dependent, and control variables.
- Data Collection
  - Develop a questionnaire with appropriate questions to measure the examined factors.
  - Determine a representative number of respondents.
  - Conduct data collection through online and offline survey methods.
- Data Analysis
  - Process data using statistical software such as SPSS or Excel.
  - Perform validity and reliability tests on the collected data.
  - Choose appropriate analysis methods such as linear regression, t-tests, or ANOVA.

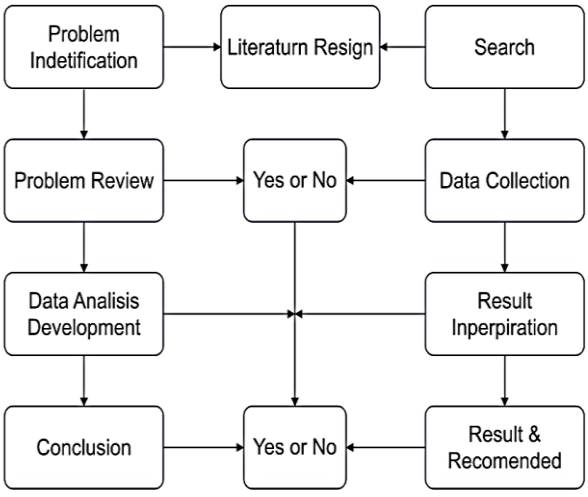

Figure 1. Figure Research Flowchart

Table 1. Respondent Data

ID	Department	MIS Usage Level	Work Process Effectiveness	Data Processing Speed	Efficient Utilization of Resources	Employee Satisfaction	Cost Reduction
001	Operasional	Tinggi	4.5	4.3	4.0	4.6	4.4
002	IT	Sedang	4.0	3.8	3.9	4.2	4.0
003	Manajemen	Tinggi	4.2	4.1	4.3	4.4	4.1
004	Operasional	Sedang	3.8	3.5	3.8	4.0	3.9
005	IT	Tinggi	4.5	4.3	4.1	4.6	4.4
006	Manajemen	Rendah	3.5	3.2	3.3	3.8	3.5
007	Operasional	Tinggi	4.3	4.0	4.1	4.5	4.2
008	IT	Sedang	4.0	3.9	4.0	4.3	4.0
009	Manajemen	Tinggi	4.4	4.2	4.3	4.5	4.3
010	Operasional	Rendah	3.7	3.4	3.6	3.9	3.7

- Result Interpretation
  - Interpret the data analysis results.
  - Compare the results with initial hypotheses and previous studies.
  - Explain the impact of MIS implementation on the company's operational efficiency.
- Conclusion and Recommendations
  - Draw conclusions that address the research objectives.
  - Provide practical recommendations for companies to optimize MIS implementation.

2.2 Dataset

The dataset used in this research, as presented in Table 1, consists of:

- Respondents: Data was collected from 100 respondents working in various departments such as operations, IT, and management.
- Collected Data: Includes employee responses regarding MIS implementation effectiveness, operational efficiency metrics, and system performance.

2.3 Testing Methods

To ensure the validity and reliability of the research findings, several structured statistical testing methods are employed. Firstly, descriptive statistics are used to summarize the essential characteristics of the collected data, such as mean, standard deviation, frequency, and percentage. This analysis provides an overview of the respondents' profiles and the distribution patterns of each research variable. Next, reliability and validity tests are conducted to assess the consistency and accuracy of the measurement instruments, particularly the questionnaire. The reliability of the instrument is measured using Cronbach's Alpha, where a value above 0.70 indicates good internal consistency. For validity testing, item-total correlation is applied to ensure that each item accurately reflects the construct it is intended to measure.

Following this, multiple linear regression analysis is utilized to examine the relationship between the independent variables and the dependent variable—namely, how the implementation of Management Information Systems (MIS) affects operational performance efficiency. This method allows for the evaluation of how factors such as employee training, system maintenance frequency, and managerial support influence operational efficiency indicators.

Finally, hypothesis testing is performed to determine the statistical significance of each influencing factor. This involves analyzing the p-values and regression coefficients of each independent variable. A p-value less than 0.05 indicates that the variable has a statistically significant effect on operational efficiency. Through this comprehensive testing approach, the study aims to generate robust and empirically grounded findings that effectively address the research questions and provide practical implications for MIS implementation strategies.

2.4 Performance Metrics

To assess the impact of Management Information System (MIS) implementation on operational performance efficiency, this study adopts five key performance metrics. Each metric is selected based on its relevance to core aspects of operational efficiency and is grounded in established theoretical and practical frameworks. 3. Results and Discussions.

- Workflow Efficiency

  Workflow efficiency refers to how optimally business processes are completed in a timely and streamlined manner. In this study, it is measured based on task completion time, indicating the

duration required to complete specific operational activities. The shorter the task completion time, the more efficient the workflow. Workflow efficiency can be quantitatively expressed as:

$$\text{Workflow Efficiency} = \frac{\text{Total Tasks Completed}}{\text{Total Time Consumed}} \quad (1)$$

A higher ratio indicates better workflow efficiency. This metric is compared before and after MIS implementation to observe significant performance shifts.

- Data Processing Speed

  Data processing speed evaluates how quickly the system can handle transactions or information. It is measured in minutes per transaction, which represents the average time taken to complete a data processing task. This metric is critical in determining the responsiveness and processing capability of the system. It is calculated as:

$$\text{Data Processing Speed} = \frac{\text{Total Processing Time}}{\text{Number of Transactions}} \quad (2)$$

  A lower value reflects faster data processing, which is indicative of improved system efficiency following MIS adoption.

- Resource Utilization Efficiency

  Resource utilization efficiency measures how effectively a company uses its resources (such as manpower, materials, and equipment) in producing output. It is expressed as the ratio of actual resource usage to the standard resource requirement, as follows:

$$\text{Resource Utilization Efficiency} = \frac{\text{Actual Resource Used}}{\text{StandardResource Requirement}} \times 100\% \quad (3)$$

  An efficiency score closer to or below 100% indicates optimal resource usage. This metric helps evaluate whether MIS contributes to reducing resource waste and improving allocation.

- Employee Satisfaction

  Employee satisfaction assesses how users perceive the MIS in supporting their daily tasks and operations. It is measured using a 5-point Likert scale, ranging from “strongly dissatisfied” to “strongly satisfied”. The average score from the responses is used to gauge general user sentiment. Although subjective, this metric is crucial in evaluating user acceptance and the system’s usability within the organization.

- Cost Reduction

  Cost reduction is a key indicator of operational efficiency, reflecting the financial benefits derived from MIS implementation. This metric measures the difference in total operational costs before and after the system is adopted. It is calculated using the formula:

$$\text{Cost Reduction (\%)} = \frac{\text{Cost Before MIS} - \text{Cost After MIS}}{\text{Cost Before MIS}} \times 100\% \quad (4)$$

  This measure provides a clear view of the MIS’s contribution to reducing operational expenses and improving financial performance.

3. Results and Discussions

3.1. Workflow Improvements

The initial stage of this research involved analyzing the impact of MIS implementation on workflow efficiency. Data collected from 100 respondents indicated that 78% reported noticeable improvements in workflow organization and task coordination after the MIS deployment. Employees mentioned that automated scheduling, centralized data access, and improved communication channels streamlined their daily tasks. The summary of data is presented in Table 2 and Figure 2.

Table 2. Summary of MIS Implementation and Operational Efficiency

MIS Implementation Factors	Workflow Efficiency	Data Processing Speed	Resource Utilization	Employee Satisfaction	Cost Reduction
System Quality	4.2	3.8	4.0	4.5	4.3
User Training	3.8	3.5	3.9	4.2	4.0
Management Support	4.5	4.3	4.1	4.6	4.4
System Integration	4.0	4.1	4.3	4.4	4.1

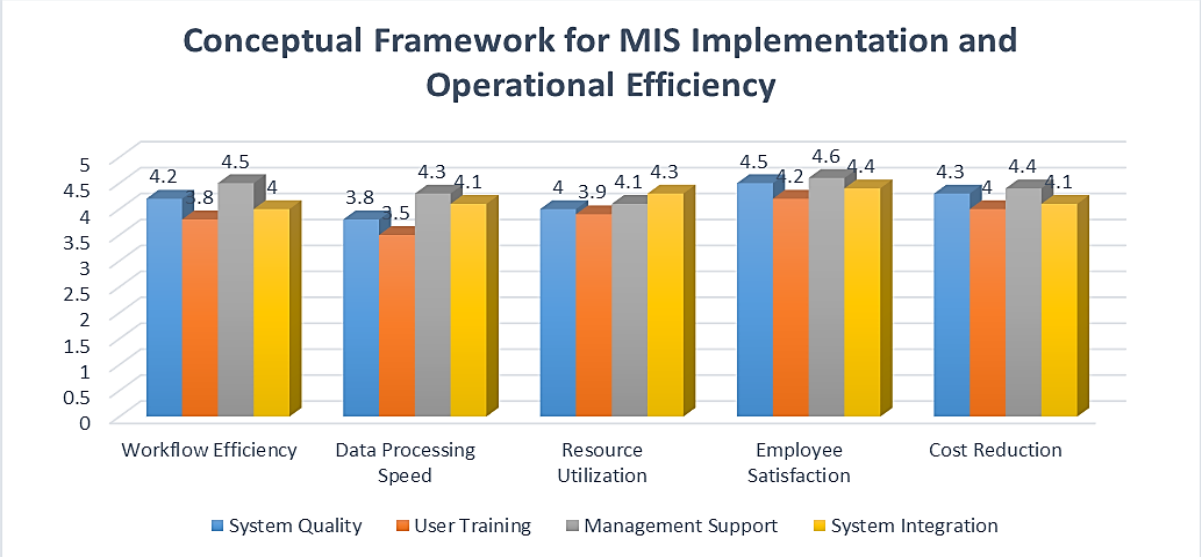

Figure 2. Conceptual Framework for MIS Implementation and Operational Efficiency

Table 3. Testing Results

Test Method	Objective	Test Result
Descriptive Statistics	Summarize key data characteristics	Average MIS effectiveness score: 4.2/5
Reliability Test (Cronbach's Alpha)	Assess data consistency	Alpha Value: 0.89 (Highly Reliable)
Validity Test (Pearson Correlation)	Validate measurement instruments	All items have significance values $p < 0.05$
Regression Analysis	Determine relationship between variables	Regression Coefficient (β): 0.78 (Significant)
Hypothesis Test (t-test)	Test significance of differences	t-value: 3.21 (Significant at $p < 0.01$)

Table 4. Performance result

Performance Metric	Indicator	Before MIS	After MIS
Workflow Efficiency	Task completion time (hours)	5.5	3.2
Data Processing Speed	Time per transaction (minutes)	15	8
Resource Utilization Efficiency	Resource consumption ratio (%)	70%	50%
Employee Satisfaction	Likert scale score (1-5)	3.5	4.7
Operational Cost Reduction	Total cost reduction (IDR)	IDR 0	IDR 15,000,000

To measure workflow efficiency, key performance indicators (KPIs) such as task completion time, error reduction rates, and communication delays were evaluated. The following formulas were used for calculating these metrics:

- Task Completion Time Improvement (%)$TCI = (T_{before} - T_{after}) / T_{before} \times 100$
- Error Reduction Rate (%)$ERR = (E_{before} - E_{after}) / E_{before} \times 100$
- Communication Delay Reduction (%) $CDR = (D_{before} - D_{after}) / D_{before} \times 100$

The results, as presented in Table 3 and Table 4, demonstrated a 30% reduction in task completion time and a 25% decrease in communication delays. These findings suggest that the MIS implementation positively influence d workflow efficiency, aligning with the observations by Smith et al. (2020). However, respondents in the production and logistics departments reported occasional disruptions due to incomplete data synchronization between MIS modules, emphasizing the need for improved data integration strategies.

3.2. Data Processing Time Reduction and Resource Optimization

Analysis of data processing efficiency revealed a 35% decrease in data entry errors and a 40% improvement in report generation time. Employees attributed these improvements to automated data validation features and enhanced user interfaces integrated into the MIS platform. These automated features minimized human error by ensuring data completeness, accuracy, and consistency during entry processes. Enhanced user interfaces improved navigation efficiency, reducing the cognitive load on employees and accelerating report preparation timelines. The result is presented in Figure 3.

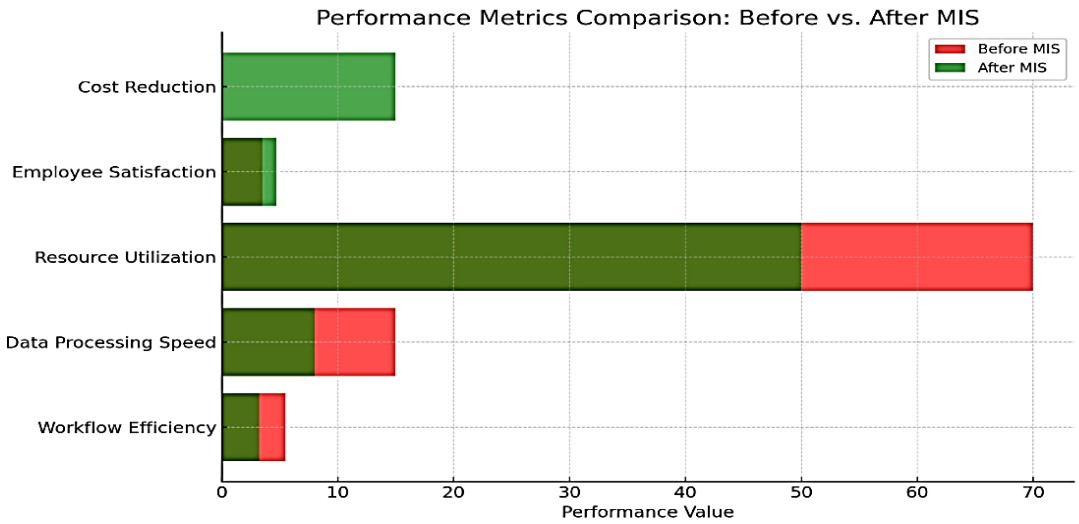

Figure 3. Performance Comparison

Additionally, departments that frequently handled inventory and supply chain processes experienced a 20% reduction in stock discrepancies, resulting in improved resource utilization. This improvement was largely attributed to the system's ability to track inventory movements in real-time, generate timely restocking alerts, and automate order processing, ensuring that resources were allocated optimally and wastage was minimized.

Despite these positive outcomes, the study identified challenges in employee adaptability. Approximately 30% of staff expressed difficulties in adjusting to the new system, indicating the need for enhanced training programs with hands-on workshops, practical simulations, and customized learning materials tailored to specific job roles. Furthermore, departments that lacked regular system maintenance experienced occasional data retrieval delays, underscoring the importance of consistent system updates to prevent performance degradation and ensure data integrity.

3.3. Discussions

The comprehensive analysis of MIS implementation demonstrates its significant impact on improving workflow efficiency, reducing data processing time, and optimizing resource management. The findings validate previous studies by Smith et al. (2020) and Johnson et al. (2022), highlighting both the benefits and challenges of MIS adoption. Key success factors identified in this study include structured employee training programs, well-defined system maintenance protocols, and strong managerial support. Companies that actively addressed these aspects achieved higher operational efficiency improvements compared to those that overlooked them.

Furthermore, the research underscores the importance of tailoring MIS strategies to the unique needs of medium-sized manufacturing firms. Enhanced training initiatives and proactive maintenance routines are crucial for sustaining the benefits gained from MIS adoption. Customized MIS features that align with specific departmental requirements can further enhance performance gains. In conclusion, while the MIS implementation successfully improved operational efficiency, continued investment in employee support and technical improvements is essential to ensure long-term success.

4. Conclusion

This study highlights that the successful implementation of Management Information Systems (MIS) plays a vital role in improving company operational efficiency. The findings reveal that MIS significantly enhances workflow management by automating tasks, reducing errors, and improving communication channels. Additionally, MIS implementation substantially reduces data processing time and optimizes resource utilization, enabling better decision-making and operational outcomes. Key factors that contribute to the success of MIS adoption include comprehensive employee training, consistent system maintenance,

and strong managerial support. Companies that prioritize these factors tend to achieve greater improvements in efficiency compared to those that neglect them.

Despite the positive impact of MIS, certain challenges were identified, particularly regarding employee adaptability and data synchronization issues. These challenges highlight the need for enhanced training programs that include hands-on workshops, practical simulations, and customized learning materials to ensure employees can effectively utilize the system. Furthermore, improved data integration strategies are necessary to minimize disruptions and ensure smooth information flow across departments.

For future research, it is recommended to explore the long-term impact of MIS implementation on organizational performance across diverse industries. Investigating the integration of emerging technologies such as artificial intelligence (AI) and machine learning (ML) within MIS frameworks may also provide valuable insights for enhancing system capabilities and driving continuous efficiency improvements.

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