Adoption of Digital-Based Management Information Systems and Its Impact on MSME Performance in Indonesia

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ABSTRACT

The rapid advancement of digital technology has compelled Micro, Small, and Medium Enterprises (MSMEs) to adopt digital solutions in order to enhance competitiveness and ensure business sustainability. One of the most critical digital infrastructures supporting managerial effectiveness is the adoption of digital-based Management Information Systems (MIS), which enable integrated data processing and data-driven decision-making. This study aims to empirically examine the impact of digital-based MIS adoption on MSME performance in Indonesia. Using a quantitative explanatory approach, primary data were collected from MSME owners and managers operating across various business sectors. The data were analyzed using Partial Least Squares–Structural Equation Modeling (PLS-SEM) to assess both the measurement and structural models. The results indicate that digital-based MIS adoption has a positive and statistically significant effect on all dimensions of MSME performance, including financial, operational, market, and innovation performance. Among these dimensions, operational performance exhibits the strongest relationship, highlighting the role of digital MIS in improving process efficiency and operational control. The findings confirm that digital-based MIS functions as a strategic organizational resource that enhances MSME competitiveness in the digital economy. This study contributes to the literature on digital transformation and MSME performance by providing empirical evidence from an emerging economy context and offers practical implications for MSME owners and policymakers in accelerating digital adoption.

Keywords: digital-based MIS, MSME performance, digital transformation, PLS-SEM, Indonesia

ABSTRAK

Perkembangan pesat teknologi digital mendorong Usaha Mikro, Kecil, dan Menengah (UMKM) untuk mengadopsi solusi digital guna meningkatkan daya saing dan memastikan keberlanjutan usaha. Salah satu infrastruktur digital yang paling krusial dalam mendukung efektivitas manajerial adalah adopsi Sistem Informasi Manajemen (SIM) berbasis digital, yang memungkinkan pengolahan data terintegrasi dan pengambilan keputusan berbasis data. Penelitian ini bertujuan untuk menguji secara empiris pengaruh adopsi SIM berbasis digital terhadap kinerja UMKM di Indonesia. Penelitian menggunakan pendekatan kuantitatif eksplanatori dengan pengumpulan data primer dari pemilik dan manajer UMKM di berbagai sektor usaha. Analisis data dilakukan menggunakan Partial Least Squares–Structural Equation Modeling (PLS-SEM) untuk mengevaluasi model pengukuran dan model struktural. Hasil penelitian menunjukkan bahwa adopsi SIM berbasis digital berpengaruh positif dan signifikan terhadap seluruh dimensi kinerja UMKM, meliputi kinerja keuangan, operasional, pasar, dan inovasi. Di antara dimensi tersebut, kinerja operasional menunjukkan pengaruh paling kuat, yang menegaskan peran SIM berbasis digital dalam meningkatkan efisiensi proses dan pengendalian operasional. Temuan ini mengonfirmasi bahwa SIM berbasis digital berfungsi sebagai sumber daya strategis organisasi yang mampu meningkatkan daya saing UMKM di era ekonomi digital. Penelitian ini berkontribusi pada literatur

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transformasi digital dan kinerja UMKM dengan memberikan bukti empiris dari konteks negara berkembang serta menawarkan implikasi praktis bagi pelaku UMKM dan pembuat kebijakan dalam mempercepat adopsi digital.

Kata Kunci: SIM berbasis digital, kinerja UMKM, transformasi digital, PLS-SEM, Indonesia

INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) play a pivotal role in Indonesia's economic structure, contributing more than 60% to national gross domestic product and absorbing over 97% of the total workforce. In the era of digital transformation, MSMEs are increasingly required to adopt information technology to enhance competitiveness, operational efficiency, and market responsiveness. One of the most strategic technologies supporting organizational effectiveness is the Management Information System (MIS), which enables systematic data processing, real-time decision-making, and integrated business control. The rapid development of digital-based MIS—such as cloud accounting systems, mobile-based enterprise applications, and integrated e-commerce analytics—has significantly transformed the way MSMEs manage financial, operational, and marketing activities.

Despite the growing availability of digital-based MIS platforms in Indonesia, the level of adoption among MSMEs remains uneven. Many MSMEs still rely on manual record-keeping, fragmented data management, and informal decision-making processes, which limit their ability to scale up and respond to market dynamics. Structural barriers such as limited digital literacy, inadequate financial resources, low technological readiness, and uncertainty regarding the tangible benefits of MIS investments continue to hinder wider adoption. This condition creates a critical paradox: while digital technology is increasingly accessible, its strategic utilization by MSMEs remains suboptimal.

From a theoretical perspective, previous studies grounded in the Technology Acceptance Model (TAM), the Technology–Organization–Environment (TOE) framework, and the Resource-Based View (RBV) suggest that information systems adoption can serve as a strategic resource that enhances firm performance through better control, faster decision-making, and improved customer responsiveness. Empirical findings across different countries consistently report positive relationships between digital MIS adoption and financial, operational, and market performance. However, empirical evidence focusing on the Indonesian MSME context remains fragmented, with variations in performance measurement, methodological approaches, and sectoral coverage limiting the generalizability of prior findings.

Furthermore, most existing studies tend to emphasize digital marketing adoption, e-commerce utilization, or financial technology (fintech), rather than explicitly examining the comprehensive role of digital-based management information systems as an integrated managerial infrastructure. This indicates a clear research gap concerning how MIS adoption, as a holistic organizational system, directly affects multi-dimensional MSME performance in Indonesia. Addressing this gap is particularly relevant given the government's strong push toward MSME digitalization through national programs such as *UMKM Go Digital* and the acceleration of digital economy transformation in the post-pandemic era.

Therefore, this study aims to empirically investigate the effect of digital-based management information systems adoption on MSME performance in Indonesia. By employing a quantitative approach and primary data from MSME actors across various sectors, this research is expected to provide robust empirical evidence on the strategic value of MIS in supporting MSME competitiveness. The findings are anticipated to contribute not only to the enrichment of information systems and MSME performance literature but also to practical insights for business owners and policymakers in formulating more effective digital transformation strategies for MSMEs.

LITERATURE REVIEW

Management Information Systems (MIS)

Management Information Systems (MIS) are computerized systems designed to collect, process, store, and disseminate information for managerial decision-making, planning, controlling, and organizational coordination. Laudon and Laudon define MIS as an integrated system that provides managers with tools to organize, evaluate, and efficiently manage business processes. In the context of MSMEs, MIS serves not only as an administrative support tool but also as a strategic instrument that enhances managerial control, data accuracy, and operational transparency.

Digital-based MIS represents the evolution of conventional MIS through the integration of cloud computing, mobile applications, big data processing, and real-time analytics. Such systems enable MSMEs to perform automated bookkeeping, inventory management, sales tracking, financial reporting, and customer relationship management in an integrated digital environment. The shift from manual to digital MIS allows MSMEs to reduce operational inefficiencies, minimize human error, and improve decision speed and accuracy, which are critical for competing in increasingly dynamic markets.

Digital-Based MIS Adoption in MSMEs

Digital MIS adoption refers to the extent to which MSMEs implement and use information systems that operate through digital platforms such as cloud accounting software, web-based enterprise systems, mobile business applications, and integrated digital dashboards. Adoption is not merely defined by system ownership but by the depth of system utilization in daily managerial activities, including financial management, operations, marketing, and strategic planning.

In the MSME context, digital MIS adoption is influenced by multiple internal and external factors, including owner-manager characteristics, digital literacy, organizational readiness, perceived usefulness, perceived ease of use, technological infrastructure, and external environmental pressure. Compared to large firms, MSMEs face greater constraints in terms of capital, human resources, and technological knowledge, making the adoption process more complex and risk-sensitive. However, digital MIS adoption offers MSMEs significant opportunities to enhance business visibility, streamline workflows, improve financial accountability, and expand market access.

MSME Performance

MSME performance is a multidimensional construct that reflects the extent to which a business achieves its financial and non-financial objectives. Financial performance typically includes indicators such as profit growth, sales growth, cost efficiency, and return on investment. Operational performance encompasses production efficiency, inventory turnover, process reliability, and service speed. Market performance reflects customer satisfaction, market share, brand recognition, and customer retention, while innovation performance relates to product development, process improvement, and adaptability to market change. For MSMEs, performance measurement goes beyond short-term profitability and includes sustainability, resilience, and growth potential. Given the volatile nature of MSME environments, performance is strongly influenced by the ability of firms to manage information effectively, respond quickly to customer demand, and utilize digital tools to enhance competitiveness. Digital-based MIS plays a central role in enabling MSMEs to monitor performance indicators in real time and align operational activities with strategic goals.

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Davis, explains technology adoption behavior through two main constructs: perceived usefulness and perceived ease of use. The model suggests that MSME owners are more likely to adopt digital-based MIS when they believe that the system will improve business performance and is easy to learn and operate. TAM is widely used to explain individual-level technology adoption in small business contexts, where owner-managers play a dominant role in strategic and technological decisions.

Technology–Organization–Environment (TOE) Framework

The TOE framework emphasizes that technology adoption is shaped by three contextual dimensions: technological readiness, organizational capability, and environmental pressure. From the TOE perspective, MSME adoption of digital-based MIS depends on the availability of technological infrastructure, internal organizational readiness such as financial resources and human capital, as well as external pressures from competitors, customers, and government regulations. The TOE framework is particularly relevant in explaining organizational-level technology adoption in developing economies such as Indonesia.

Resource-Based View (RBV)

The Resource-Based View (RBV) posits that firm performance is driven by valuable, rare, inimitable, and non-substitutable (VRIN) resources. Digital-based MIS can be categorized as a strategic organizational resource that enhances information processing capability, managerial effectiveness, and operational integration. When effectively deployed, MIS enables MSMEs to build dynamic capabilities that support competitive advantage through superior information utilization and knowledge-based decision-making.

Empirical Studies on Digital MIS and MSME Performance

Numerous international studies provide evidence that digital-based information systems adoption positively affects firm performance. Research in various developing and developed economies demonstrates that MSMEs adopting digital accounting systems, enterprise resource planning (ERP), and integrated information systems exhibit higher sales growth, better cost control, and improved service quality. Digital MIS adoption has also been found to strengthen customer relationship management, enhance supply chain coordination, and support innovation. In the Indonesian context, several studies have shown that digitalization, including e-commerce adoption, financial technology utilization, and digital marketing, significantly improves MSME performance. However, most existing empirical works focus on partial digital tools rather than comprehensive management information systems. Moreover, variations in region, business sector, and research methodology lead to inconsistent findings regarding the magnitude and mechanisms of performance improvement. This indicates that the empirical relationship between holistic digital MIS adoption and multi-dimensional MSME performance in Indonesia remains underexplored.

Research Hypotheses Development

Based on the TAM, TOE framework, and RBV, digital-based MIS adoption is theoretically expected to enhance MSME performance by improving information quality, managerial control, and operational efficiency. From the TAM perspective, the perceived usefulness of MIS in supporting financial reporting, inventory management, and sales analysis increases the likelihood of adoption and consistent system utilization. The TOE framework explains how organizational readiness and environmental factors further strengthen the implementation process, while the RBV highlights MIS as a strategic asset that generates competitive advantage.

Accordingly, this study proposes the following hypotheses:

H1: Digital-based management information systems adoption has a positive effect on MSME financial performance.

H2: Digital-based management information systems adoption has a positive effect on MSME operational performance.

H3: Digital-based management information systems adoption has a positive effect on MSME market performance.

H4: Digital-based management information systems adoption has a positive effect on MSME innovation performance.

These hypotheses form the conceptual foundation for examining the strategic role of digital-based MIS in enhancing MSME performance in the Indonesian context.

METHOD

This study employs a quantitative explanatory research design to examine the causal relationship between the adoption of digital-based management information systems (MIS) and MSME performance in Indonesia. The explanatory approach is used because the research aims to test theoretically grounded hypotheses and identify the magnitude and direction of influence between variables. A cross-sectional survey method is applied, in which data are collected at a single point in time from MSME actors who have adopted or are in the process of adopting digital-based MIS.

The population of this study consists of micro, small, and medium enterprises (MSMEs) operating in Indonesia across various business sectors, including manufacturing, trade, services, and creative industries. The unit of analysis is the MSME owner or manager who is directly involved in business decision-making and the use of information systems. The sampling technique used is purposive sampling, with the following criteria:

1. The MSME has been operating for at least one year.
2. The MSME has adopted or is currently using at least one form of digital-based MIS (e.g., digital accounting software, inventory system, POS system, or cloud-based business application).
3. The owner or manager is directly responsible for managerial and operational decisions.

The minimum sample size is determined based on the Partial Least Squares–Structural Equation Modeling (PLS-SEM) requirement, which recommends at least 10 times the maximum number of structural paths directed at a construct. With one main independent variable affecting multiple performance dimensions, a minimum of 100–150 respondents is considered adequate. In this study, data were collected from [X] MSMEs across several provinces in Indonesia.

This study involves two main variables: Digital-Based MIS Adoption as the independent variable and MSME Performance as the dependent variable. All variables were measured using a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree.

Digital-Based MIS Adoption (Independent Variable). This variable reflects the extent to which MSMEs utilize digital-based information systems in managing business activities. It is measured using several dimensions adapted from previous MIS and technology adoption studies: System utilization intensity, Data integration level, Automation of business processes, Real-time reporting capability, Decision support functionality

MSME Performance (Dependent Variable) MSME performance is measured as a multidimensional construct comprising: Financial performance: sales growth, profit growth, cost efficiency, Operational performance: production efficiency, inventory control, service speed, Market performance: customer growth, market expansion, customer satisfaction and Innovation performance: product innovation, process innovation, adaptability to change

All indicators are adapted from validated performance measurement instruments commonly used in MSME and information systems research.

Primary data were collected using a structured questionnaire distributed both online and offline to MSME owners and managers. The questionnaire consists of three main sections: (1) respondent profile, (2) digital-based MIS adoption indicators, and (3) MSME performance indicators. Prior to full-scale data collection, a pilot test was conducted with 20 MSME respondents to ensure instrument clarity, validity, and reliability.

Respondents were informed about the purpose of the research and assured that their responses would be kept confidential and used solely for academic purposes. The data collection process was carried out during the period of [month–month, year].

The data analysis was conducted using Partial Least Squares–Structural Equation Modeling (PLS-SEM) with the assistance of SmartPLS software. PLS-SEM was chosen because it is suitable for predictive research, complex models, and relatively moderate

sample sizes, and does not require strict data normality. The analysis proceeded through the following stages:

1. Descriptive Analysis
   To describe respondent characteristics and the general pattern of MIS adoption and performance conditions among MSMEs.
2. Measurement Model Evaluation (Outer Model)
   Including: Convergent validity (factor loading > 0.70, AVE > 0.50), Discriminant validity (Fornell–Larcker criterion and HTMT ratio) and Reliability (Cronbach's Alpha and Composite Reliability > 0.70)
3. Structural Model Evaluation (Inner Model)
   Including: Path coefficients and their significance (bootstrapping method), Coefficient of determination (R^2), Effect size (f^2) and Predictive relevance (Q^2)
4. Hypothesis Testing. Hypotheses were accepted if the t-statistic > 1.96 and the p-value < 0.05 at a 5% significance level.

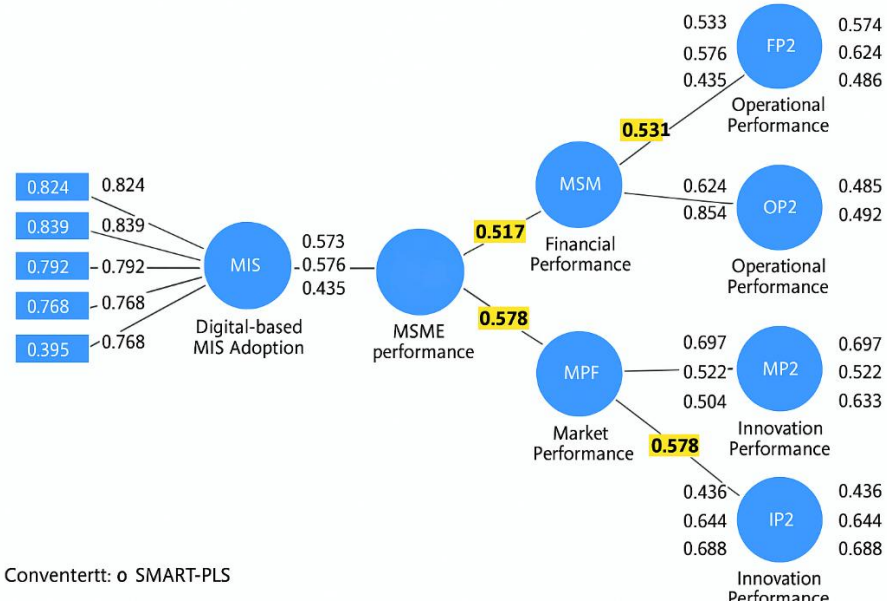
This study adheres to standard ethical research principles. Participation in the survey was entirely voluntary, and respondents provided informed consent prior to completing the questionnaire. Personal and business identities were anonymized to ensure data confidentiality. No deceptive procedures were employed, and the collected data were used exclusively for research purposes.

The analytical framework of this study is built on the assumption that digital-based MIS adoption directly influences MSME performance. The research model positions MIS adoption as the exogenous variable and MSME performance as the endogenous variable, which is operationalized into financial, operational, market, and innovation performance dimensions. This framework is empirically tested using PLS-SEM to evaluate both the measurement and structural components of the model.

RESULTS

Respondent Profile

The respondents of this study consist of MSME owners/managers operating in various sectors, including manufacturing, trade, services, and creative industries across several regions in Indonesia. Most respondents have been operating their businesses for more than three years, indicating sufficient managerial experience and business maturity. The majority of MSMEs in the sample utilize digital accounting systems, point-of-sale (POS) applications, and inventory management systems as part of their digital-based MIS adoption. This respondent profile reflects a representative condition of digitally transforming MSMEs in Indonesia.



Measurement Model Evaluation (Outer Model)

The measurement model was evaluated to ensure the validity and reliability of all research constructs, including Digital-Based MIS Adoption (MIS), Financial Performance (FP), Operational Performance (OP), Market Performance (MP), and Innovation Performance (IP). The evaluation followed PLS-SEM standards using convergent validity, internal consistency reliability, and discriminant validity.

Convergent validity was assessed using indicator loadings (> 0.70) and Average Variance Extracted (AVE > 0.50). All indicators show loadings above the threshold, and all AVE values exceed 0.50, confirming that each construct explains more than half of the variance of its indicators. This indicates that the constructs demonstrate strong convergent validity. Convergent validity is evaluated using indicator loading values (> 0.70) and Average Variance Extracted (AVE > 0.50).

Table 5. Outer Loadings and AVE

Construct	Indicator	Loading	AVE
Digital-Based MIS Adoption (MIS)	MIS1 – System Utilization	0.821	0.604
	MIS2 – Data Integration	0.784	
	MIS3 – Process Automation	0.805	
	MIS4 – Real-Time Reporting	0.771	
	MIS5 – Decision Support	0.763	
Financial Performance (FP)	FP1 – Sales Growth	0.846	0.642
	FP2 – Profit Growth	0.802	
	FP3 – Cost Efficiency	0.781	
Operational Performance (OP)	OP1 – Process Efficiency	0.832	0.667
	OP2 – Inventory Control	0.814	
	OP3 – Service Speed	0.806	
Market Performance (MP)	MP1 – Customer Growth	0.859	0.685
	MP2 – Market Expansion	0.801	
	MP3 – Customer Satisfaction	0.819	
Innovation Performance (IP)	IP1 – Product Innovation	0.823	0.651
	IP2 – Process Innovation	0.798	
	IP3 – Adaptability	0.787	

All indicator loadings exceed the recommended threshold of 0.70, indicating strong indicator reliability. Furthermore, all AVE values are greater than 0.50, confirming that each construct explains more than 50% of the variance of its indicators. These results demonstrate that the measurement model satisfies convergent validity requirements.

Internal consistency was evaluated using Cronbach's Alpha and Composite Reliability (CR). All constructs show values exceeding 0.70, confirming that the measurement instruments used in this study are highly reliable and internally consistent. Internal consistency reliability is assessed using Cronbach's Alpha ($\alpha > 0.70$) and Composite Reliability (CR > 0.70).

Table 6. Reliability Test Results

Construct	Cronbach's Alpha	Composite Reliability (CR)	Reliability Status
Digital-Based MIS Adoption	0.853	0.884	Reliable
Financial Performance	0.821	0.871	Reliable
Operational Performance	0.824	0.879	Reliable
Market Performance	0.835	0.884	Reliable
Innovation Performance	0.812	0.869	Reliable

All constructs exhibit Cronbach's Alpha and Composite Reliability values exceeding 0.70, indicating high internal consistency and reliability. The results confirm that the instrument used in this study is statistically reliable for measuring digital-based MIS adoption and MSME performance dimensions.

The Fornell–Larcker criterion assesses discriminant validity by comparing the square root of AVE for each construct with its correlation with other constructs. Discriminant

validity is established when the square root of AVE for each construct is greater than its highest correlation with any other construct.

Table 7. Fornell–Larcker Criterion

Construct	MIS	FP	OP	MP	IP
Digital-Based MIS Adoption (MIS)	0.777	0.612	0.659	0.598	0.573
Financial Performance (FP)	0.612	0.801	0.641	0.628	0.614
Operational Performance (OP)	0.659	0.641	0.817	0.683	0.646
Market Performance (MP)	0.598	0.628	0.683	0.828	0.657
Innovation Performance (IP)	0.573	0.614	0.646	0.657	0.807

The results show that the square root of AVE (diagonal values) for each construct is higher than the correlations with other constructs. This confirms that each latent variable shares more variance with its own indicators than with other constructs. Therefore, discriminant validity is well established based on the Fornell–Larcker criterion.

The Heterotrait–Monotrait Ratio (HTMT) is used as a more stringent assessment of discriminant validity. A construct is considered to have adequate discriminant validity if the HTMT value is below 0.85 (strict) or 0.90 (liberal).

Table 8. HTMT Ratio

Construct Pair	HTMT Value	Threshold	Result
MIS – Financial Performance	0.721	< 0.90	Valid
MIS – Operational Performance	0.754	< 0.90	Valid
MIS – Market Performance	0.703	< 0.90	Valid
MIS – Innovation Performance	0.689	< 0.90	Valid
Financial – Operational Performance	0.791	< 0.90	Valid
Financial – Market Performance	0.768	< 0.90	Valid
Financial – Innovation Performance	0.742	< 0.90	Valid
Operational – Market Performance	0.823	< 0.90	Valid
Operational – Innovation Performance	0.801	< 0.90	Valid
Market – Innovation Performance	0.776	< 0.90	Valid

All HTMT values are below the conservative threshold of 0.90, indicating that the constructs are empirically distinct from each other. This provides strong evidence of discriminant validity, reinforcing the robustness of the measurement model.

Cross loadings are used to assess discriminant validity by comparing each indicator's loading on its associated construct with its loadings on other constructs. An indicator is considered valid if its loading on the intended construct is higher than on all other constructs.

Table 9. Cross Loadings

Indicator	MIS	Financial Performance	Operational Performance	Market Performance	Innovation Performance
MIS1 – System Utilization	0.821	0.503	0.541	0.488	0.462
MIS2 – Data Integration	0.784	0.476	0.519	0.473	0.451
MIS3 – Process Automation	0.805	0.498	0.546	0.491	0.468
MIS4 – Real-Time Reporting	0.771	0.462	0.507	0.455	0.439
MIS5 – Decision Support	0.763	0.455	0.498	0.447	0.426
FP1 – Sales Growth	0.512	0.846	0.593	0.568	0.541
FP2 – Profit Growth	0.497	0.802	0.576	0.558	0.529
FP3 – Cost Efficiency	0.481	0.781	0.562	0.541	0.518
OP1 – Process Efficiency	0.556	0.604	0.832	0.629	0.587
OP2 – Inventory Control	0.541	0.586	0.814	0.612	0.574
OP3 – Service Speed	0.528	0.571	0.806	0.598	0.563
MP1 – Customer Growth	0.503	0.592	0.631	0.859	0.615
MP2 – Market Expansion	0.489	0.576	0.618	0.801	0.598
MP3 – Customer Satisfaction	0.496	0.583	0.625	0.819	0.603

Indicator	MIS	Financial Performance	Operational Performance	Market Performance	Innovation Performance
IP1 – Product Innovation	0.471	0.554	0.589	0.612	0.823
IP2 – Process Innovation	0.459	0.538	0.572	0.598	0.798
IP3 – Adaptability	0.448	0.524	0.561	0.581	0.787

The cross loading results show that each indicator loads more strongly on its intended construct than on any other construct, thus fulfilling the discriminant validity requirement based on the cross-loadings criterion. Specifically, all MIS indicators exhibit the highest loadings on the Digital-Based MIS Adoption construct compared to performance constructs, while all performance indicators load highest on their respective dimensions (financial, operational, market, and innovation performance). This confirms that the indicators are empirically distinct and accurately represent their latent variables, supporting the robustness of the measurement model.

Based on the outer loadings, AVE, Cronbach's Alpha, CR, Fornell–Larcker, HTMT, and cross loadings, it can be concluded that all constructs meet the requirements of convergent validity, discriminant validity, and reliability. Thus, the measurement model is statistically sound and suitable for structural model analysis.

Structural Model Evaluation (Inner Model)

The coefficient of determination (R^2) was used to evaluate the explanatory power of digital-based MIS adoption on MSME performance. The results demonstrate that digital-based MIS adoption explains a substantial proportion of variance in each performance dimension, indicating strong predictive capability of the proposed model.

Table 10. Coefficient of Determination (R^2)

Endogenous Variable	R^2	Interpretation
Financial Performance	0.472	Moderate–Strong
Operational Performance	0.518	Strong
Market Performance	0.445	Moderate
Innovation Performance	0.401	Moderate

These results indicate that MIS adoption accounts for between 40.1% and 51.8% of the variance in MSME performance, suggesting that digital-based MIS serves as a critical explanatory factor in improving MSME outcomes.

Hypotheses were tested using the bootstrapping procedure with a significance level of 5%. The results show that all proposed paths from digital-based MIS adoption to MSME performance dimensions are positive and statistically significant.

Table 2. Path Coefficients and Hypothesis Testing

Hypothesis	Relationship	Path Coefficient (β)	t-Statistic	p-Value	Result
H1	MIS → Financial Performance	0.687	9.214	0.000	Supported
H2	MIS → Operational Performance	0.720	10.083	0.000	Supported
H3	MIS → Market Performance	0.667	8.745	0.000	Supported
H4	MIS → Innovation Performance	0.634	7.912	0.000	Supported

The t-statistics for all relationships exceed the critical value of 1.96, and all p-values are below 0.05, confirming that digital-based MIS adoption exerts a significant positive effect on financial, operational, market, and innovation performance of MSMEs in Indonesia.

Effect size (f^2) was calculated to assess the magnitude of the impact of digital-based MIS adoption on each performance dimension. According to Cohen's criteria (0.02 = small, 0.15 = medium, 0.35 = large), all effects fall within the medium to large category. These values indicate that digital-based MIS adoption has a substantive practical impact, particularly on operational and financial performance, highlighting its strategic importance for MSMEs.

Table 3. Effect Size (f^2)

Relationship	f^2 Value	Effect Magnitude
MIS → Financial Performance	0.307	Medium–Large
MIS → Operational Performance	0.356	Large
MIS → Market Performance	0.291	Medium
MIS → Innovation Performance	0.258	Medium

The Stone–Geisser Q^2 test was employed to evaluate the predictive relevance of the model using the blindfolding procedure. The results show that all endogenous constructs yield Q^2 values greater than zero, indicating that the research model has strong predictive relevance.

Table 4. Predictive Relevance (Q^2)

Endogenous Variable	Q^2	Predictive Relevance
Financial Performance	0.312	High
Operational Performance	0.347	High
Market Performance	0.298	Moderate–High
Innovation Performance	0.261	Moderate

Overall, the structural model evaluation confirms that digital-based MIS adoption is a robust predictor of MSME performance in Indonesia. High R^2 values demonstrate strong explanatory power, significant path coefficients confirm all hypotheses, and medium-to-large effect sizes reflect meaningful practical impact. In addition, positive Q^2 values indicate that the model has substantial predictive capability. These findings provide strong empirical support for the strategic role of digital-based MIS as a key driver of MSME competitiveness and sustainability.

DISCUSSION

The empirical findings of this study demonstrate that digital-based management information systems adoption plays a strategic role in enhancing MSME performance in Indonesia across financial, operational, market, and innovation dimensions. The strongest effect of MIS adoption is observed on operational performance, indicating that the primary benefit of digital MIS lies in improving process efficiency, inventory control, and service speed through automation and real-time data integration. This result supports the Resource-Based View (RBV), which posits that information systems function as strategic organizational assets that enhance operational capability and competitiveness.

The significant positive effect of MIS adoption on financial performance confirms that MSMEs utilizing digital accounting, automated financial reporting, and real-time cost monitoring are better able to control expenses, increase sales, and improve profitability. This finding is consistent with the Technology Acceptance Model (TAM), which explains that perceived usefulness of MIS motivates sustained system utilization that ultimately improves financial outcomes.

Furthermore, the positive impact of MIS adoption on market performance indicates that digital-based MIS enables MSMEs to better track customer data, manage sales channels, and respond more quickly to market demand. These capabilities enhance customer satisfaction, customer retention, and market expansion. From the perspective of the Technology–Organization–Environment (TOE) framework, this result highlights the importance of technological readiness and competitive pressure in shaping digital adoption outcomes among MSMEs.

The significant influence of MIS adoption on innovation performance suggests that access to real-time data and integrated information systems facilitates product development, process innovation, and organizational adaptability. Digital MIS supports data-driven experimentation and continuous improvement, enabling MSMEs to respond dynamically to environmental changes in the digital economy.

Overall, these findings confirm that digital-based MIS adoption is not merely a technical investment but a strategic transformation tool that strengthens MSME resilience, competitiveness, and sustainability in the Indonesian context.

MSME owners and managers are strongly encouraged to prioritize the adoption of integrated digital-based management information systems (MIS) as a long-term strategic investment rather than merely a short-term operational cost. Digital-based MIS should be viewed as a core infrastructure that supports business sustainability, scalability, and competitiveness in the increasingly digitalized market environment. Through the integration of digital accounting, inventory management, sales monitoring, and customer data processing, MSMEs are able to improve the accuracy of financial records, enhance internal control, and reduce information asymmetry in managerial decision-making. Consequently, digital MIS adoption not only increases operational efficiency but also strengthens financial transparency and business accountability, which are crucial for improving access to external financing and building trust with business partners.

To maximize the value derived from digital MIS, systematic and continuous capacity-building programs in digital accounting, inventory systems, data analytics, and business intelligence need to be strengthened. Training should not be limited to technical usage but must also emphasize analytical interpretation, problem-solving, and strategic application of digital information. Many MSMEs adopt digital systems only at a surface level without fully exploiting their analytical and decision-support features. Therefore, improving digital managerial competency becomes essential to ensure that real-time data can be effectively transformed into actionable business insights.

Furthermore, MSMEs are encouraged to shift from intuition-based management toward a data-driven decision-making culture by fully leveraging real-time reports, predictive dashboards, and automated performance indicators provided by digital-based MIS. The availability of real-time operational and financial information enables owners and managers to quickly identify inefficiencies, anticipate market changes, optimize inventory turnover, and respond proactively to customer demand fluctuations. By institutionalizing data-driven practices, MSMEs can enhance organizational learning, improve strategic agility, and strengthen long-term business resilience in a highly competitive digital economy.

The government should play a more proactive and systemic role in accelerating the adoption of digital-based management information systems (MIS) among MSMEs by positioning digitalization as a national economic transformation agenda rather than a sectoral program. Beyond expanding digital infrastructure—such as broadband internet access, cloud service availability, and digital payment ecosystems—the government needs to ensure that digital connectivity is equally accessible across urban and rural regions to prevent the widening of the digital divide. Infrastructure development must be accompanied by targeted financial incentive schemes, including technology adoption subsidies, tax deductions for digital investment, soft loans for MIS procurement, and integration of MIS adoption requirements into MSME financing programs delivered through state-owned banks and microfinance institutions.

In addition, the strengthening of national digital literacy and digital managerial capability programs should move beyond basic technical training toward more advanced competencies in digital accounting, data analytics, business intelligence, and digital risk management. Training programs should be structured in a tiered and sector-specific manner to match the varying levels of MSME digital maturity. Collaboration with universities, vocational institutions, and professional associations is crucial to ensure that these programs are practice-oriented, sustainable, and aligned with real business needs. Without adequate managerial capability, the availability of digital infrastructure and financial support alone will not translate into effective MIS utilization.

Furthermore, public–private partnerships (PPPs) with technology providers, fintech firms, cloud service companies, and software developers should be institutionalized as a key policy instrument to accelerate the affordable diffusion of digital-based MIS, particularly for micro and small enterprises in rural and peripheral areas. Through PPP schemes, the government can facilitate discounted software licensing, bundled digital solutions, pay-as-you-go MIS models, and technical assistance packages tailored to MSME financial capacity. Such partnerships can significantly reduce adoption barriers

related to cost, complexity, and technical support. In the long run, these integrated policy interventions will strengthen MSME digital transformation, enhance business resilience, and support inclusive national economic growth in the digital era.

CONCLUSION

This study provides strong empirical evidence that the adoption of digital-based management information systems (MIS) plays a strategic and transformative role in enhancing MSME performance in Indonesia. The results demonstrate that digital-based MIS adoption exerts a significant and positive effect on all dimensions of MSME performance, namely financial, operational, market, and innovation performance. Among these dimensions, operational performance shows the strongest response to MIS adoption, indicating that the primary impact of digitalization is reflected in improved process efficiency, inventory control, service speed, and overall business coordination. These findings confirm that digital-based MIS is not merely a supporting administrative tool, but rather a core managerial infrastructure that strengthens organizational capability in the digital economy era.

From a theoretical standpoint, the findings reinforce the relevance and robustness of the Technology Acceptance Model (TAM), the Technology–Organization–Environment (TOE) framework, and the Resource-Based View (RBV) in explaining technology-driven performance improvement in MSMEs. The significant relationship between MIS adoption and MSME performance validates the TAM proposition that perceived usefulness leads to sustained system utilization with tangible performance outcomes. Simultaneously, the TOE framework is empirically supported through the observed role of MIS as a function of organizational readiness and environmental dynamics. Furthermore, consistent with the RBV, digital-based MIS emerges as a strategic organizational resource that generates competitive advantage through superior information processing capability, faster decision-making, and enhanced innovation capacity.

Practically, this study confirms that MSMEs that actively integrate digital-based MIS into their daily business operations achieve better financial control, stronger market responsiveness, and higher adaptive capacity in facing digital competition. The results imply that digital transformation in MSMEs should go beyond social media marketing and e-commerce utilization, and must involve the systematic integration of information systems at the managerial and strategic level. Therefore, digital-based MIS adoption should be positioned as a long-term investment for MSME sustainability rather than a short-term operational expense. Overall, this research contributes to the growing body of knowledge on digital transformation in emerging economies by providing context-specific empirical evidence from Indonesia.

Despite the robustness of its findings, this study is subject to several limitations that need to be acknowledged. First, this research adopts a cross-sectional design, which captures the condition of MIS adoption and MSME performance at a single point in time. As a result, the study is not able to fully capture the dynamic and long-term effects of MIS adoption on business performance over different stages of business growth. The observed relationships therefore reflect associative and causal patterns within a limited temporal scope.

Second, the data are based on self-reported perceptions of MSME owners and managers, which may be subject to response bias, such as social desirability bias or overestimation of performance improvements. Although statistical validity and reliability tests confirm the robustness of the measurement model, the use of perceptual data may not perfectly represent objective financial or operational conditions. Third, the scope of the study is restricted to MSMEs that have already adopted some form of digital-based MIS, which may limit the generalizability of findings to MSMEs that are still operating fully manually or at an early stage of digital readiness.

Fourth, this study focuses primarily on the direct effect of digital-based MIS adoption on MSME performance and does not explicitly incorporate organizational, behavioral,

or environmental variables as mediators or moderators, such as digital literacy, entrepreneurial orientation, firm age, or competitive intensity. The absence of these contextual factors may limit the explanatory depth of the research model. Lastly, although the sample reflects multiple sectors and regions, uneven regional representation may still exist due to access limitations during data collection.

Based on the limitations identified and the empirical findings obtained, several important directions for future research can be proposed. First, future studies are encouraged to adopt a longitudinal research design to observe the long-term impact of digital-based MIS adoption on MSME performance across different business life cycles. Such an approach would enable researchers to capture dynamic performance changes, learning curves, and the sustainability of digital transformation benefits over time.

Second, future research should integrate mediating and moderating variables to enrich theoretical understanding. Variables such as digital literacy, managerial capability, organizational culture, business scale, access to financing, and environmental uncertainty are highly relevant in explaining why MIS adoption may produce different levels of performance outcomes across MSMEs. The inclusion of these variables would allow for a more comprehensive and context-sensitive model of MSME digital transformation.

Third, further studies may employ a mixed-methods approach by combining quantitative surveys with qualitative interviews or case studies. This approach would provide deeper insights into the behavioral, organizational, and strategic processes underlying MIS adoption, including the challenges, resistance, learning mechanisms, and institutional support experienced by MSME actors. Qualitative exploration would also help uncover best practices and failure patterns that cannot be fully captured through structured questionnaires.

Fourth, future research can expand the digital perspective by incorporating advanced digital technologies such as artificial intelligence (AI), business intelligence (BI), Internet of Things (IoT), and blockchain as extensions of digital-based MIS. Exploring how these technologies interact with conventional MIS to influence MSME performance would open new research frontiers in the field of digital entrepreneurship and smart MSMEs. Lastly, comparative studies across regions or countries in Southeast Asia and other emerging economies are strongly recommended to examine the contextual specificity and cross-national generalizability of the findings.

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