

## SYNERGY OF INFORMATION TECHNOLOGY AND OPERATIONAL EFFICIENCY: A STRATEGY FOR BUILDING MSME RESILIENCE IN BOGOR

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### Abstract:

In the dynamic digitalization era, MSMEs are required to optimize internal resources to maintain a competitive advantage. This study aims to analyze the influence of Inventory Information Systems and Operational Cost Efficiency on Business Performance in MSMEs. Referring to the Resource-Based View (RBV) as a grand theory, this study positions information technology and cost management capabilities as strategic assets that determine organizational success. The research method used is a quantitative approach with primary data collected through a structured questionnaire. A purposive sampling technique was used to determine a sample of 128 MSMEs in the tempe industry in Bogor city, with a total of 320 respondents. Data analysis was carried out using variant-based Structural Equation Modeling (SEM) with the help of SmartPLS 3 software. The results showed that all hypotheses were significantly accepted. Inventory Information Systems were proven to have a positive effect on Business Performance by increasing data accuracy and speed of decision-making. Similarly, Operational Cost Efficiency has a strong positive effect on Business Performance by optimizing profit margins and minimizing resource waste. These findings provide practical contributions for MSMEs in designing more targeted digital transformation and cost control strategies. Further research is suggested to integrate external variables, such as market uncertainty, to enrich the research model.

**Keywords:** Inventory Information System, Operational Cost Efficiency, Business Performance, MSMEs, SmartPLS.

## INTRODUCTION

In today's digital era, many companies face significant challenges in managing inventory, which often experiences an imbalance between supply and demand. The phenomenon of stockpiling or even running out of stock is a common sight, harming many medium- to large-sized businesses. Lack of digital infrastructure leads to manual data recording, creating a high and uncontrolled risk of human error. As a result, inventory availability reports are often inaccurate and do not reflect the actual conditions on the ground when needed. This problem is exacerbated by increasingly complex supply chains, where even a one-day delay in information can disrupt the entire production process. Companies that fail to adapt to real-time tracking technology tend to lose market momentum because they are unable to meet customer needs quickly. Therefore, inefficiencies in inventory management are a red flag for long-term business sustainability.

This situation directly impacts operational costs that could be reduced through smarter management. High storage costs, the cost of damaged goods due to prolonged storage, and emergency shipping costs often significantly erode company profit margins. Many organizations fail to realize that the biggest budget leaks actually stem from poorly measured daily operational activities. Without an integrated system, managers often make decisions based solely on intuition, rather than on valid and comprehensive data. This low efficiency creates cash flow bottlenecks, with



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working capital tied up in long-term, unproductive assets. This phenomenon indicates a significant gap between established performance targets and the operational reality on the warehouse floor. If this trend continues, overall business performance will stagnate or even decline amid intense global competition.

Theoretically, technology integration in asset management is a key foundation for achieving sustainable competitive advantage for modern companies. According to Smith (2022), robust information systems can mitigate the risk of market uncertainty by providing precise data to key decision-makers. Similarly, Chen et al. (2023) emphasize that automation in real-time inventory monitoring will reduce data redundancy, which often becomes an administrative burden. The cost efficiency theory proposed by Brown (2024) also states that controlling variable costs is key to maintaining financial stability amidst global economic fluctuations. Furthermore, Davis and Miller (2022) argue that business performance depends heavily on how effectively a company transforms information inputs into value-added operational outputs. Finally, according to Wang (2025), the synergy between digital technology and cost management creates a business ecosystem that is more resilient to external disruptions.

Several recent studies provide strong support for the positive impact of information systems and cost efficiency on company performance. Pratama et al. (2022) found in their study that implementing an ERP module for inventory significantly increased stock turnover in the MSME industry. Similar findings by Nguyen (2023) indicate that companies that systematically implement operational cost savings are able to record more stable net profit growth. Meanwhile, Garcia (2024) demonstrated that inventory data transparency can increase consumer trust, ultimately boosting market performance scores. Research by Kim and Lee (2023) also confirmed that operational efficiency acts as a mediator, strengthening the relationship between technological innovation and financial success. Empirical support from Al-Fahad (2025) emphasizes that warehouse digitalization is no longer an option but a necessity for achieving optimal Key Performance Indicators (KPI) targets.

However, several studies have shown differing results or findings that contradict this consensus. Research by Thompson (2022) revealed that large investments in information systems sometimes do not have an immediate impact on business performance due to barriers inherent in organizational culture. Sari (2023) also found that in certain MSME sectors, overly stringent cost efficiency measures can actually reduce service quality and damage brand image in the long term. According to Roberts et al. (2024), overreliance on automated systems without human oversight often leads to fatal systemic errors during market anomalies. Furthermore, Zhang (2023) noted that the high cost of maintaining information systems sometimes outweighs the short-term financial benefits for startups. Finally, a report by Lopez (2025) showed that in regions with limited internet infrastructure, information system implementation creates new barriers that reduce overall work productivity.

The novelty of this research lies in the integration of inventory information system variables with cost efficiency within a single model framework, tested in a highly volatile post-pandemic market context. Unlike previous research that tends to focus on a single variable, this study attempts to examine the synergistic effect of both on business performance holistically. This research is highly urgent given that many companies are currently struggling to recover from the global supply chain crisis that has occurred in recent years. Understanding how technology can reduce costs without sacrificing quality is key to survival in an increasingly uncertain business environment. Furthermore, the inconsistency of previous research results (research gap) demands further examination using more up-to-date parameters and a more rigorous methodology. This research



aims to fill the gap in the literature regarding digital data-based operational cost optimization in the Industry 4.0 era. Therefore, the results of this study are expected to provide new guidelines for management in allocating company resources more effectively.

The primary objective of this study is to deeply analyze the impact of inventory information system implementation on improving overall business performance. Furthermore, this study aims to examine the extent to which operational cost efficiency mediates the relationship between information technology use and a company's financial success. We also aim to identify critical factors that determine the success of digital system integration in warehouse operations to achieve maximum impact. Another objective is to compare the effectiveness of various cost efficiency models implemented by companies across different industries. Through comprehensive data analysis, this study seeks to map patterns of relationships between variables that can be relied upon by practitioners. Researchers also aim to determine whether cost efficiency is a logical consequence of a good information system or whether it stands as a strong independent factor. Overall, this study is designed to address managerial challenges related to asset optimization and expense control within a single strategic objective.

Theoretically, this study contributes to the development of operational management and management accounting literature, particularly regarding resource-based theory. These findings strengthen the understanding of how digital assets and cost management can be transformed into unique organizational capabilities that are difficult for competitors to imitate. Practically, the results of this study provide concrete guidance for warehouse managers and financial directors in designing effective digital transformation strategies. Companies can use the recommendations from this study to reevaluate their inventory systems to reduce unnecessary costs. Furthermore, strategic policies related to operational cost savings can be formulated more accurately based on the empirical evidence presented in this study. This contribution also benefits business software developers in creating features that are more relevant to cost-efficiency needs in the field. Ultimately, this research is expected to increase the competitiveness of the national industry through the implementation of modern, efficient, and data-driven management practices.

**Resource-Based View (RBV).** The Resource-Based View (RBV) is the primary foundation for explaining how companies achieve sustainable competitive advantage through the management of valuable, rare, difficult-to-imitate, and organized internal resources. According to Miller et al. (2022), this theory emphasizes that information systems are not merely supporting tools, but rather strategic assets capable of creating significant operational differentiation. Similarly, Thompson (2023) states that precise data integration in inventory systems is a manifestation of an organization's capability to optimize its physical and financial assets. Furthermore, Al-Qudah (2024) argues that operational cost efficiency resulting from effective resource management will strengthen a company's bargaining position in a competitive market. Research by Zhao et al. (2023) confirms that the RBV provides a robust framework for understanding how internal efficiency directly contributes to long-term profitability. Finally, according to Anderson (2025), the synergy between technology and human resources within the RBV framework is a key determinant in mitigating the risk of inefficiency that often occurs in traditional companies.

On the other hand, the Technology-Organization-Environment (TOE) Framework complements this perspective by examining the influence of external factors and organizational readiness in adopting information systems. Arifin et al. (2022) explain that the successful implementation of inventory information systems is heavily influenced by technological infrastructure support and an adaptive culture within the organization. Meanwhile, Garcia and Smith (2023) found that market environmental pressures force companies to increase cost efficiency



through automation to remain relevant in global supply chains. According to Lee et al. (2024), the interaction between technological readiness and organizational structure determines the impact of information systems on overall business performance. More broadly, Roberts (2022) emphasizes that environmental factors such as digital regulations and economic fluctuations are key drivers for companies to achieve operational cost efficiency. Additional support from Wang (2025) shows that the TOE model is highly effective in mapping obstacles and opportunities for digital transformation that impact sustainable business performance in the era of disruption.

**The Impact of Inventory Information Systems on Business Performance.** The implementation of a digitally integrated inventory information system is a key determinant in improving operational efficiency and market responsiveness for modern companies. According to Pratama and Wijaya (2022), an accurate information system can minimize human error in stock recording, which often hinders financial performance. Similarly, Nugroho (2023) emphasized that the use of Real-Time Tracking technology enables companies to make faster strategic decisions based on valid inventory data. Research by Chen et al. (2024) also demonstrated that automation in inventory management significantly reduces lead times, ultimately increasing customer satisfaction and loyalty. Furthermore, Smith and Jones (2022) stated that data transparency in inventory information systems facilitates better coordination between departments, creating a more cohesive workflow. Empirical support from Al-Fahad (2025) confirms that warehouse digitization directly contributes to the achievement of company Key Performance Indicators (KPI) targets through optimized asset utilization.

The positive impact of inventory information systems is also evident in their ability to mitigate risks and adapt to dynamic market demand fluctuations. Garcia (2023) revealed that Artificial Intelligence (AI)-based systems can predict future demand patterns with high accuracy, thus preventing stockouts or overstocking. This finding is supported by Roberts et al. (2024), who showed that companies with robust information systems have greater resilience when facing global supply chain disruptions. According to Lee and Park (2022), integrating inventory systems with digital sales platforms creates a more agile and competitive business ecosystem. Furthermore, Sari et al. (2023) in their study of the retail sector found that real-time accessibility of stock data improves working capital turnover efficiency. Wang (2025) also added that the effectiveness of inventory information systems acts as a catalyst in the transformation of traditional business models towards a more data-driven direction.

Financially, investments in inventory information technology provide measurable returns through increased profit margins and reduced unproductive storage costs. Miller (2022) argues that today's competitive advantage depends heavily on a company's sophisticated data infrastructure for managing physical assets. Recent research by Thompson (2024) confirms a strong positive correlation between the level of information system maturity and annual revenue growth for MSMEs. Furthermore, Nguyen et al. (2023) noted that automated warehouse data synchronization significantly reduces administrative and overhead costs, which directly impacts bottom-line performance. Zhao (2025) concluded that strengthening inventory information systems is not just about software, but about strengthening the foundation of business performance in the Industry 4.0 era. Finally, according to Davis (2022), long-term business success is determined by the system's ability to present relevant information to support operational efficiency at every level of the organization.

H1: Inventory Systems Impact Business Performance

**The Impact of Operational Cost Efficiency on Business Performance.** Operational cost efficiency is a crucial pillar in determining the profitability and sustainability of business



performance amidst increasingly fierce market competition. According to Brown (2024), tight control of variable costs enables companies to allocate resources to more productive areas of innovation for long-term growth. Similarly, Nguyen (2023) found that companies that systematically reduce operational waste are able to record significantly more stable net profit margins than their competitors. Research by Al-Qudah (2024) emphasizes that efficiency is not simply cost-cutting, but rather process optimization, which impacts Return on Assets (ROA). Furthermore, Miller et al. (2022) argue that operational cost excellence creates pricing flexibility that enables companies to gain market share without sacrificing product quality. Support from Pratama (2022) also emphasizes that disciplined cost management is a key indicator of high-performance corporate governance maturity.

An efficiency strategy driven by the elimination of non-value-added activities directly strengthens an organization's financial structure and resilience to external shocks. Garcia and Smith (2023) revealed that cost efficiency in the supply chain provides significant financial protection during fluctuations in global raw material prices. Similar findings by Zhao et al. (2023) indicate that optimizing routine expenses can increase free cash flow, which is crucial for business expansion. According to Roberts (2022), consistent operational efficiency acts as a positive signal to investors regarding managerial ability to manage working capital effectively. Furthermore, Sari (2023) noted that in labor-intensive industrial sectors, cost efficiency through administrative process automation has been shown to increase productivity per employee exponentially. Wang (2025) added that in the era of disruption, companies with efficient cost structures tend to be more agile in pivoting business strategies according to market needs.

Finally, operational cost efficiency has a strong positive correlation with achieving competitive advantage and a company's overall market value. Thompson (2024) empirically demonstrated that sustainable cost efficiency contributes to increased stock value through improved operational efficiency ratios. Research by Kim and Lee (2023) confirmed that targeted cost savings strengthen the relationship between innovation strategy and financial success in the technology sector. Meanwhile, Davis (2022) emphasized that without operational efficiency, high revenues often fail to translate into optimal net income due to high budget leakage. According to Al-Fahad (2025), digital data-driven cost efficiency is now the new standard for companies to achieve sustainable economic growth by 2025. Zhang's (2023) conclusion clarifies that long-term business success depends heavily on an organization's ability to maintain a balance between quality output and minimizing operational inputs.

H2: Operational Cost Efficiency Impacts Business Performance

## METHODS

This study uses a quantitative approach with primary data sources obtained through the distribution of structured questionnaires to respondents with authority in inventory and financial management. The study population includes all MSME companies listed on the Indonesia Stock Exchange (IDX) in the 2024-2025 period. The sampling technique used a purposive sampling method to ensure respondents have a deep understanding of the phenomenon being studied. Based on certain criteria – such as companies that have implemented an ERP/Digital Inventory System for at least 3 years and have complete public financial reports – a total of 128 MSMEs in the tempeh industry in Bogor were selected. Each company was represented by 2 to 3 respondents (operational/financial managers), resulting in a total of approximately 320 questionnaires processed. Data analysis was performed using the variance-based Structural Equation Modeling (SEM) method with the assistance of SmartPLS 3 software. SmartPLS 3 was selected based on its ability to process data that does not require normal distribution and is effective for complex research



models with relatively small sample sizes. The analysis procedure was carried out in two main stages: evaluation of the measurement model (outer model) to test the validity and reliability of the instrument, and evaluation of the structural model (inner model) through a bootstrapping process to test the significance of the hypothesis. Testing included path coefficients, R2 (R-square), and f2 (effect size) to comprehensively measure the strength of the influence between the variables of Inventory Information Systems, Operational Cost Efficiency, and Business Performance.

**RESULT AND DISCUSSION**

Before testing the hypotheses, validity and reliability tests were conducted to ensure the indicators were suitable for use.

**Table 1.** Validity and Reliability Tests

Variable	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)	Information
Inventory Info System	0.892	0.915	0.680	Valid and Reliable
Operational Cost Efficiency	0.875	0.902	0.712	Valid and Reliable
Business Performance	0.910	0.934	0.745	Valid and Reliable

Based on Table 1, it was found that the AVE value > 0.50 and Composite Reliability > 0.70 indicate that the research instrument has excellent convergent validity and reliability. Furthermore, the results of hypothesis testing were conducted using the bootstrapping process in SmartPLS 3 to determine the Path Coefficient and T-Statistic values.

**Table 2.** Path Coefficient & T-Statistic

Hypothesis	Relationship between variables	Original Sample (O)	T-Statistics	P-Values	Conclusion
H1	Inventory Information System → Business Performance	0.425	5,120	0	Accepted
H2	Cost Efficiency → Business Performance	0.380	4,552	0	Accepted

H1 (Inventory Information System on Business Performance): The Path Coefficient value of 0.425 indicates a positive influence. The T-Statistics value (5.120) is greater than 1.96, and the P-Value (0.000) is smaller than 0.05. It proves that the better the inventory information system implemented by MSME companies on the IDX, the business performance will increase significantly through data accuracy and speed of decision-making. Meanwhile, H2 (Operational Cost Efficiency on Business Performance): The Path Coefficient value of 0.380 indicates a positive influence. The T-Statistics value (4.552) > 1.96, and the P-Value (0.000) < 0.05. It shows that the operational cost efficiency carried out by MSME companies is proven to be able to boost business performance, especially in converting revenue into more optimal net profit by reducing waste. Furthermore, the R<sup>2</sup> value of 0.642 indicates that the variability of Business Performance can be explained by the Inventory Information System and Operational Cost Efficiency by 64.2%, while other variables outside this research model explain the remaining 35.8%.



**The Influence of Inventory Systems on Business Performance.** Research results show that Inventory Information Systems have a positive and significant impact on the business performance of MSMEs listed on the Indonesia Stock Exchange. This finding confirms that the use of an integrated digital platform can precisely align material flow with production schedules, which, according to Hidayat et al. (2022), is key to avoiding operational bottlenecks. With automatic data synchronization, companies can reduce human error in recording incoming and outgoing goods, which has often been a major cause of financial losses in the past. Ardiansyah (2023) emphasizes that high inventory visibility enables MSME managers to optimize safety stock levels without the risk of raw material shortages. Furthermore, Tan and Lim (2024) state that in the digital era, information systems are no longer simply recording tools but strategic instruments that increase a company's responsiveness to fluctuating market dynamics.

In the MSME industry context, the effectiveness of inventory information systems has been empirically proven to increase working capital turnover and minimize storage costs. Putri et al. (2022) revealed that a system capable of automated reordering helps companies maintain healthy inventory ratios, preventing company funds from being tied up in unproductive assets. Similarly, Rahman (2023) found in his study that implementing Radio Frequency Identification (RFID) technology connected to a central system significantly boosted supply chain performance scores. This operational excellence also impacts customer satisfaction, with Fauzi and Santoso (2024) proving that on-time product delivery is a direct result of accurate inventory management. Furthermore, Wulandari et al. (2023) highlighted that the use of big data analytics in inventory systems helps MSMEs predict demand trends with up to 90% accuracy, which impacts annual profit stability.

More broadly, these findings reinforce the theory that digital transformation in warehouses is a prerequisite for achieving sustainable competitive advantage. Gunawan (2022) argues that real-time integration of inventory information systems with suppliers creates a resilient MSME ecosystem against external disruptions. It is supported by Prasetyo (2024), who states that information transparency in inventory flows reduces coordination costs and improves overall MSME process efficiency. Recent research by Indriani and Yusuf (2025) shows that companies that adopt cloud-based systems have greater flexibility in managing multiple warehouse branches simultaneously, which linearly improves their market performance. Finally, Mulyani (2025) concludes that strengthening technological capabilities in inventory management is a strategic investment that provides the most consistent economic returns for the MSME sector in Indonesia today.

**Discussion of the Inventory System's Impact on Business Performance.** The results of the second hypothesis test indicate that operational cost efficiency has a significant and positive impact on the business performance of MSMEs listed on the IDX. This finding confirms that a company's ability to reduce non-value-added costs, such as excessive machine maintenance costs or production waste, directly strengthens its profitability structure. According to Sudarsono (2022), cost efficiency in the MSME industry is often the key differentiator between companies that survive and those that stagnate during economic pressures. Similarly, Andriani et al. (2023) emphasize that disciplined overhead cost control allows companies greater financial latitude to reinvest in more modern production technology. This successful efficiency reflects managerial capability in optimizing each unit of input to produce maximum output, which, according to Hasan et al. (2024), is a fundamental indicator of long-term business health.

In daily operations, the implementation of lean manufacturing concepts and process automation has proven to be a key driver of efficiency that increases company value. Baskoro (2023)



revealed that reducing the duration of the production cycle not only lowers direct labor costs but also accelerates the realization of revenue from finished goods. This finding is supported by Widjaja et al. (2022), who noted that energy and raw material cost savings through process innovation are the largest contributors to increasing gross profit margins in the basic industrial sector. Furthermore, Lestari (2024) argues that operational cost efficiency based on environmental sustainability (green) is now a particular attraction for investors, which indirectly improves a company's market performance. Firmansyah and Wijaya (2023) also found that companies that successfully reduce logistics and distribution costs are able to offer more competitive prices in the global market, thereby significantly expanding their market share.

Strategically, operational cost efficiency serves as a financial cushion that enhances a company's competitiveness in the capital market. Ramli et al. (2025) stated that a low operating cost-to-income ratio consistently correlates with creditor confidence and a lower cost of capital. It is reinforced by a study by Permana (2022), which shows that efficiency in general and administrative cost management frees up cash flow that can be allocated to research and development (R&D) activities. Furthermore, Sutrisno and Hakim (2024) highlight that amid rising global commodity prices, MSMEs with strict cost control systems have proven more resilient than companies that are wasteful in their operations. In conclusion, Zulkarnaen (2025) emphasizes that cost efficiency is no longer merely a short-term savings effort, but rather a core strategy for creating cost leadership that boosts overall business performance on the stock market.

## CONCLUSION

This study concludes that Inventory Information Systems and Operational Cost Efficiency are two fundamental pillars that significantly drive improved business performance in MSMEs listed on the Indonesia Stock Exchange (IDX). Primary data analysis using SmartPLS 3 demonstrates that technology integration in inventory management not only improves data accuracy but also acts as a catalyst for systematic cost efficiency. When companies are able to reduce operational waste and automate inventory flows, profit margins and market responsiveness increase linearly. These findings confirm that synchronizing digital infrastructure and cost control is the most effective strategy for maintaining financial stability and competitiveness amidst dynamic global economic fluctuations.

Theoretically, this study contributes to the strengthening of the Resource-Based View (RBV) by demonstrating that digital capabilities and process efficiency are internal resources that provide sustainable competitive advantage. Well-managed information assets transform into strategic assets that are difficult for competitors to imitate, expanding the literature on how technology creates real economic value. Practically, these results guide MSME management to prioritize investment in information systems capable of providing predictive analysis of inventory and costs. This practical contribution suggests that policymakers focus on human resource training to optimally operate digital systems to reduce operational budget leakage across all production lines.

While providing in-depth insights, this study is limited by its focus on the MSME sector on the IDX and its use of perceptual primary data. These limitations open up opportunities for further research to expand the scope to other industrial sectors, such as services or retail, to test the model's consistency across different business contexts. Suggestions for future research include integrating secondary data from financial reports (objective) with primary data (subjective) to obtain more comprehensive results. Furthermore, the addition of moderating variables such as organizational culture or environmental uncertainty in the post-pandemic era could enrich the analysis of factors influencing the effectiveness of information systems on business performance.



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