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Evaluation of the Effect of Decision Support Systems on the Quality of Managerial Decisions in MSME Companies in Indonesia

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ABSTRACT

This study evaluates the impact of Decision Support Systems (DSS) on managerial decision quality in Indonesian Micro, Small, and Medium Enterprises (MSMEs), focusing on retail, food production, and textile sectors. Through a mixed-methods approach combining quantitative analysis of 150 MSMEs and qualitative interviews with 75 business owners, the research demonstrates significant improvements post-DSS implementation. Key findings include a 59.6% reduction in decision latency for micro-enterprises, 22.4% higher inventory turnover in retail businesses, and 18.3% improved margin stability in food production. The study identifies critical success factors such as Bahasa Indonesia interface localization (adoption rate 88%) and mobile-first design (SUS score 82.4/100), while highlighting infrastructure and digital literacy as persistent barriers. Comparative analysis reveals the solution outperforms previous implementations in developing markets, achieving break-even 40% faster. The research contributes both practical frameworks for DSS deployment in resource-constrained environments and theoretical extensions to technology acceptance models, emphasizing "localization readiness" as a novel adoption dimension. These findings provide policymakers and business support organizations with evidence-based strategies for accelerating digital transformation in Indonesia's MSME sector, which constitutes 99% of the nation's businesses. Future research directions include longitudinal impact assessment and AI-voice integration for ultra-micro enterprises.

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1. INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) contribute significantly to Indonesia's economy, representing 99% of all businesses and employing 97% of the workforce [1]. However, many MSMEs face challenges in making strategic decisions due to limited access to data analytics and market insights [2]. The rapid digital transformation in Southeast Asia has created opportunities for MSMEs to adopt Decision Support Systems (DSS) to enhance their decision-making processes [3]. This study evaluates the impact of DSS implementation on the quality of managerial decisions in Indonesian MSMEs, focusing on how technology can bridge the gap between traditional practices and data-driven strategies.

The quality of managerial decisions directly affects business performance, particularly in competitive markets [4]. Previous research by [5] demonstrated that DSS could improve decision accuracy by 27% in retail

businesses, while [6] found a 33% reduction in operational costs for manufacturing SMEs using predictive analytics. However, these studies primarily focused on developed economies, leaving a research gap regarding DSS effectiveness in Indonesia's unique MSME landscape, characterized by informal business structures and limited technological infrastructure [7]. This study addresses this gap by examining DSS adoption in various Indonesian MSME sectors.

The theoretical framework combines Simon's decision-making model [8] with Technology Acceptance Model (TAM) principles [9] to assess how DSS influences decision quality. We define decision quality through three dimensions: timeliness (speed of decision-making), accuracy (alignment with business goals), and consistency (reliability across similar scenarios) [10]. These metrics provide a comprehensive evaluation framework tailored to MSME operations, where resource constraints often necessitate efficient decision processes [11].

Methodologically, this research employs a mixed-methods approach, combining quantitative analysis of business performance metrics with qualitative interviews of 50 MSME owners across five Indonesian provinces. The study focuses on four key business functions where DSS is commonly applied: inventory management, pricing strategy, customer segmentation, and financial planning [12]. Field data was collected over 12 months (January-December 2023) to account for seasonal business variations in the Indonesian market [13].

This research makes three key contributions: (1) empirical evidence of DSS effectiveness in Indonesia's MSME context, (2) identification of implementation barriers specific to developing economies, and (3) a practical framework for DSS adoption scaled to resource-limited businesses. The findings aim to guide policymakers in designing digital transformation programs and help MSME owners understand the tangible benefits of DSS investment [14]. As Indonesia pushes toward Industry 4.0, this study provides timely insights into how small businesses can leverage technology for competitive advantage [15].

2. METHOD

This study employed a mixed-methods research design combining quantitative performance analysis and qualitative stakeholder interviews to evaluate Decision Support System (DSS) effectiveness in Indonesian MSMEs. The methodology was structured into four sequential phases conducted over 12 months (January-December 2023), encompassing 150 MSMEs across five provinces (West Java, Central Java, East Java, Bali, and North Sumatra) representing diverse business sectors.

Phase 1: Sample Selection and Characterization

The research utilized stratified random sampling to select participants from three MSME categories: micro (annual turnover <2 billion IDR), small (2-50 billion IDR), and medium enterprises (50-300 billion IDR). Each stratum comprised 50 businesses from retail, food production, and textile industries - sectors representing 68% of Indonesia's MSME landscape according to [1]. Participant businesses were required to have operated for ≥3 years and implemented basic digital tools (e.g., accounting software), but no prior DSS experience.

Phase 2: DSS Implementation Framework

A lightweight DSS architecture was deployed featuring:

a. Data Integration Layer: Connected existing business data (sales records, inventory logs) via API to a centralized platform
b. Analytics Module: Implemented three decision-support tools: Demand forecasting (ARIMA model), Break-even analysis, and Customer segmentation (k-means clustering)
c. User Interface: Mobile-first dashboard designed for low digital literacy users, available in Bahasa Indonesia

Phase 3: Data Collection Protocol

Quantitative metrics were tracked pre- and post-implementation: Decision latency (time from problem identification to action), Inventory turnover ratio, Gross margin fluctuation, and Customer retention rate.

Qualitative data came from: Semi-structured interviews with 75 owners/managers (45-60 minutes each), Focus group discussions with 15 industry experts, and System usability surveys (SUS scale) completed by 120 end-users.

Phase 4: Analytical Approach

Quantitative data analysis used: Paired t-tests (α=0.05) to compare pre/post-DSS performance and Multiple regression to identify success predictors.

Qualitative data underwent: Thematic analysis (NVivo 12) for interview transcripts and Sentiment analysis of open-ended survey responses.

Validation Measures

To ensure reliability: Pilot tested with 20 non-sample MSMEs, Triangulated findings across data sources, and Maintained 85%+ inter-coder agreement for qualitative coding

Table 1. Methodological Overview

Component	Specification
Sample Size	150 MSMEs (50 micro, 50 small, 50 medium)
DSS Tools	Demand forecasting, Break-even analysis, Customer segmentation
Data Types	Operational metrics (quantitative), Interviews (qualitative)
Analysis	Statistical testing, Thematic coding

This rigorous approach enabled comprehensive assessment of DSS impact while accounting for Indonesia's unique MSME operational contexts and technological constraints. The methodology's scalability allows adaptation to other emerging economies facing similar digital transformation challenges.

3. RESULTS AND DISCUSSION

Quantitative Performance Improvements

The DSS implementation demonstrated statistically significant enhancements across all measured business metrics ($p<0.01$). Micro-enterprises exhibited the most pronounced improvements, with decision latency decreasing from 5.2±1.8 days to 2.1±0.7 days (59.6% reduction). Inventory turnover ratios increased by 22.4% in retail sectors, while food production MSMEs achieved 18.3% higher gross margin stability. These findings corroborate [5]'s Asian retail study but reveal 31% greater latency reduction in Indonesia's context, attributable to the localized UI design and Bahasa Indonesia support.

Decision Quality Enhancement

Three key dimensions of decision quality showed marked improvement:

a. Timeliness: 73% of participants reported faster responses to market changes
b. Accuracy: 68% reduction in inventory overstocking incidents
c. Consistency: 81% decreased variance in pricing strategies

The demand forecasting module proved particularly effective for textile businesses during seasonal demand fluctuations, preventing 42% of potential stockouts. This aligns with [12]'s functional analysis but extends its applicability to Indonesia's informal supply chains.

Adoption Barriers and Facilitators

Despite measurable benefits, qualitative data revealed implementation challenges:

a. Digital Literacy: 39% of micro-enterprise users required >3 training sessions
b. Infrastructure: Limited internet bandwidth in rural areas caused 12% data sync failures

Successful adoption correlated strongly with two factors:

a. Owner-manager's technology self-efficacy ($r=0.72$, $p=0.003$)
b. Mobile-first design satisfaction (SUS score=82.4/100)

Sector-Specific Impacts

Table 2. DSS Effectiveness by Sector

Sector	Key Improvement	Unique Benefit
Retail	28% faster restocking	Dynamic pricing adoption
Food	19% waste reduction	Supplier negotiation leverage
Textile	31% order accuracy	Trend anticipation

Comparative Analysis

The results surpass [6]'s manufacturing SME findings in three aspects:

a. Faster ROI: Break-even achieved in 4.2 months vs. 6.8 months
b. Higher Usability: 88% daily usage rate vs. 67%
c. Broader Functionality: Integrated financial planning tools

Theoretical Implications

The study validates Simon's bounded rationality theory [8] in developing economies by showing how DSS mitigates cognitive limits through: Automated data aggregation, Visual trend representation, and Scenario simulation

However, it extends TAM [9] by identifying "localization readiness" as a new perceived usefulness dimension for Indonesian MSMEs.

Practical Recommendations

Three implementation strategies emerged as critical:

a. Phased Rollout: Start with single function (e.g., inventory)
b. Peer Learning: Utilize successful adopters as champions
c. Offline Capabilities: Essential for connectivity-limited areas

Limitations

The 12-month study period couldn't assess long-term effects, and the sample excluded ultra-micro enterprises (<10 employees). Future work should incorporate: Mobile payment integration, Local language voice interfaces, and Government policy impact analysis

This comprehensive evaluation demonstrates that appropriately designed DSS can significantly enhance decision-making quality in Indonesia's MSME sector, provided implementation addresses local infrastructure and literacy constraints. The findings offer a replicable framework for DSS deployment in similar emerging markets.

4. CONCLUSION

This study demonstrates that Decision Support Systems (DSS) significantly enhance managerial decision quality in Indonesian MSMEs across key dimensions of timeliness, accuracy, and consistency. The implemented DSS solution achieved measurable improvements, including a 59.6% reduction in decision latency for micro-enterprises and 22.4% higher inventory turnover in retail sectors, validating the technology's potential to transform traditional business practices. Particularly noteworthy was the system's effectiveness in Indonesia's unique operational context, where localized design elements like Bahasa Indonesia interface and mobile-first architecture drove adoption rates surpassing those reported in developed markets. The research confirms that DSS can mitigate cognitive limitations inherent in small business environments while revealing critical implementation insights - notably the importance of phased deployment and offline functionality for connectivity-challenged regions. While the study focused on three key sectors, the framework shows adaptability to other MSME categories, provided customization for specific operational workflows.

The findings carry important implications for multiple stakeholders. For MSME owners, the results provide empirical evidence of DSS value propositions, particularly in inventory optimization and demand forecasting. For policymakers, the identified adoption barriers highlight the need for parallel digital literacy programs alongside technology infrastructure development. Academically, this work extends established theories of bounded rationality and technology acceptance to Indonesia's developing economy context, introducing "localization readiness" as a new adoption factor. Future research should explore longitudinal effects of DSS usage and investigate integration with emerging technologies like AI-powered voice interfaces for ultra-micro enterprises. As Indonesia accelerates its digital economy vision, this study offers both a practical implementation blueprint and a compelling case for targeted DSS investments in the MSME sector, ultimately contributing to broader goals of business resilience and inclusive economic growth.

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