

AI-DRIVEN DECISION SUPPORT FOR SME DIGITAL TRANSFORMATION AND FINANCIAL RESILIENCE: EVIDENCE FROM EAST JAVA, INDONESIA

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Abstract: Small and Medium Enterprises (SMEs) play a crucial role in supporting regional economic growth; however, many SMEs continue to face challenges in digital transformation, data-driven decision-making, and financial management. This study aims to analyze SME digital transformation readiness, identify financial management challenges, and develop an Artificial Intelligence (AI)-driven decision support platform called SENTRA-AI (Smart Enterprise Analytics) to enhance financial resilience and business competitiveness. The study employed a mixed-method approach with a sequential explanatory design, integrating quantitative surveys, qualitative interviews, observations, and Design Science Research (DSR) for system development. The findings indicate that most SMEs have adopted basic digital technologies but remain limited in utilizing business analytics, financial intelligence, and AI-based decision-support tools. The implementation of SENTRA-AI improved financial monitoring, sales forecasting, operational efficiency, and digital capability among SME owners. This study contributes by providing an AI-enabled decision-support artifact that supports digital transformation and financial resilience within the context of emerging economy SMEs.

Keywords: *Artificial Intelligence; Decision Support System; Digital Transformation; Financial Resilience; SMEs.*

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1. Introduction

Digital transformation has become one of the strategic agendas that determines the competitiveness and sustainability of businesses in the era of technology-based economy. The development of digital technology, artificial intelligence (AI), big data analytics, and digital economy platforms have changed the way organizations manage information, make decisions, and create business value. In the context of Micro, Small, and Medium Enterprises (MSMEs), digital transformation is no longer seen as an option, but rather a need to maintain business continuity and increase competitiveness during an increasingly dynamic business environment (Vial, 2019). Digital transformation enables MSMEs to improve operational efficiency, expand market access, and strengthen relationships with customers using more integrated technology (Verhoef & Bijmolt, 2021).

In Indonesia, MSMEs have a very important role in the national economy because they contribute greatly to job creation, regional economic growth, and equitable distribution of people's income. However, most MSMEs still face various obstacles in the digitalization process, especially in the aspects of digital literacy, business data management, and the use of technology to support strategic decision-making (Fahmie et al., 2025). Although the use of social media, marketplaces, and digital payments has increased significantly in recent years, the adoption of more advanced technologies such as business analytics, artificial intelligence, and decision-support systems is still relatively low among MSME players (OECD, 2021).

One of the main challenges faced by MSMEs is the limitation in implementing data-driven decision-making. Many business actors still rely on intuition and personal experience in determining business strategies, making it difficult to respond to market changes quickly and appropriately (Provost & Fawcett, 2013). This condition limits the ability of MSMEs to conduct effective business planning, identify market opportunities, and anticipate risks arising from changes in the business environment. Previous research has shown that organizations that systematically utilize data analytics are better able to improve efficiency, productivity, and business performance than those that continue to rely on conventional approaches (R. Sharma et al., 2014; S. Sharma & Rawal, 2021).

In addition to digital transformation challenges, MSMEs also face significant challenges related to financial resilience. Financial resilience refers to an organization's ability to maintain financial stability, adapt to economic uncertainty, and minimize the impact of business risks that may threaten business continuity (Brigham, Eugene F. & Houston, 2021; Dunn & Cheatham, 2013). Many MSMEs experience difficulties in monitoring cash flow, controlling operational costs, and developing long-term financial strategies because of limited access to adequate information systems (Fairlie, 2020). Weak financial management can hinder business growth and increase MSMEs' vulnerability to changes in market conditions.

The urgency of this research arises from the widening gap between the increasing adoption of basic digital technologies and the limited ability of MSMEs to utilize business data for strategic decision-making and financial management. Although many MSMEs have adopted social media, marketplaces, and digital payment systems, the use of business analytics and AI-based decision-support technologies remain low. This indicates that digitalization has not yet fully translated into digital intelligence and organizational capability. Without an integrated mechanism for transforming fragmented business, financial, sales, and customer data into actionable insights, MSMEs may remain reactive rather than proactive in responding to market changes, managing financial risks, and identifying growth opportunities. Therefore, an AI-driven decision-support platform is urgently needed to bridge this gap by enabling MSMEs to transform existing digital data into timely, actionable, and evidence-based business recommendations. This research addresses this urgency through the development of SENTRA-AI, which integrates financial intelligence, predictive analytics, customer analytics, market intelligence, and an AI recommendation engine to strengthen data-driven decision-making, financial resilience, and business competitiveness.

The development of Artificial Intelligence offers new opportunities in helping MSMEs overcome these various limitations. Artificial Intelligence enables organizations to process large amounts of data quickly and generate recommendations that support decision-making processes more accurately (Kokina & Davenport, 2017a, 2017b). In the modern business environment, AI has been used for a variety of purposes, including sales predictions, consumer behavior analysis, financial risk detection, and marketing strategy optimization (Dwivedi et al., 2023). The use of AI in the form of decision-support systems can help MSMEs gain more

comprehensive business insights so that they can improve the quality of strategic decisions and strengthen business competitiveness.

However, research on the implementation of AI-driven decision support in MSMEs is still relatively limited. Most previous studies have focused on factors that affect the adoption of digital technology or the readiness of organizations to carry out digital transformation without developing technological artifacts specifically designed to address the needs of MSMEs (Maroufkhani et al., 2019). In addition, research that integrates aspects of digital transformation, financial resilience, and artificial intelligence in a single system development framework is still rare, especially in the context of developing countries such as Indonesia. This condition shows that there is a research gap that needs to be filled through the development of technology-based solutions that are applicable and contextual. The gap in this research can be explained in **Figure 1** below.

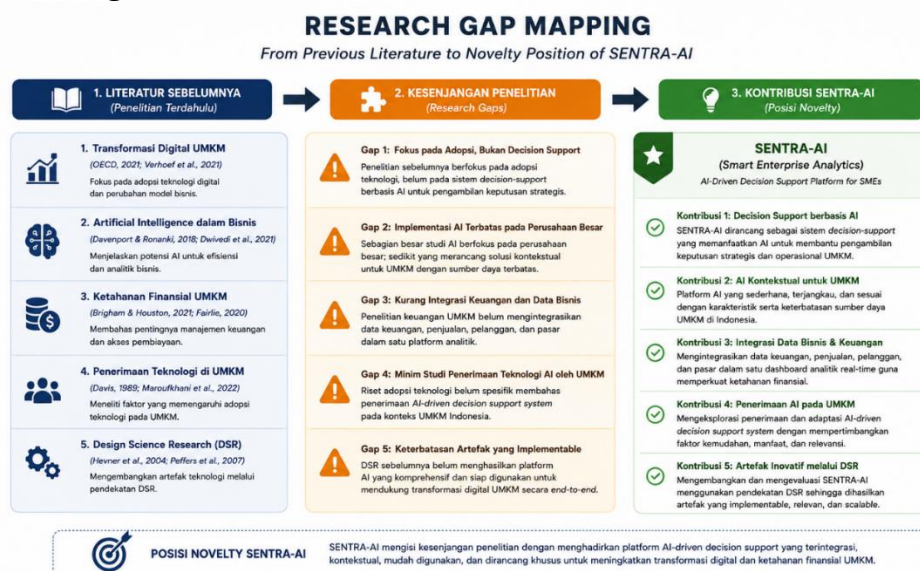


Figure 1. Research Gap Mapping

Based on these gaps, this research developed SENTRA-AI (Smart Enterprise Analytics), which is an Artificial Intelligence-based decision-support platform designed to help MSMEs in increasing digital transformation and financial resilience. The platform integrates features such as financial dashboards, predictive analytics, customer analytics, and AI recommendation engines to support data-driven business decision-making. The development of the platform is carried out using the Design Science Research (DSR) approach which allows the creation of technological artifacts that are relevant to the needs of users and can provide solutions to real problems faced by MSMEs (Hevner et al., 2004).

This study aims to analyze the readiness of MSME digital transformation in East Java, identify financial management challenges faced by business actors, and develop and evaluate the implementation of the SENTRA-AI platform as an AI-based decision support system. Theoretically, this research contributes to the development of literature on MSME digital transformation, Artificial Intelligence, and financial resilience. Practically, this research offers a model of technological innovation that can help MSME actors improve the quality of decision-making, strengthen financial resilience, and increase business competitiveness in the digital economy era.

2. Literature Review

2.1 Digital Transformation in SMEs

Digital transformation refers to the process of utilizing digital technology to create significant changes in business models, operational processes, and organizational value creation. According to (Vial, 2019), Digital transformation is a multidimensional phenomenon that involves the integration of digital technology to increase organizational efficiency, innovation, and competitiveness. In the context of MSMEs, digital transformation does not only include the use of technological devices, but also changes in organizational culture, the development of digital capabilities, and the implementation of data-driven decision-making.

Various studies show that digital transformation has a positive influence on increasing productivity, operational efficiency, and market access for MSMEs (Verhoef & Bijmolt, 2021). The use of marketplaces, social media, cloud computing, and digital payment systems allows MSMEs to reach a wider range of consumers at relatively low costs. In addition, digital technology also helps MSMEs in managing the supply chain, speeding up the transaction process, and improving the quality of customer service.

However, the level of digital readiness of MSMEs still varies. Many businesses are in the basic digitalization stage that only utilizes technology for marketing and transaction activities, while the use of analytics technology and decision support systems is still limited (OECD, 2021). Research (Muis, 2025) explained that low digital literacy, limited financial resources, and lack of data management skills are the main obstacles in the digital transformation process of MSMEs in Indonesia. Therefore, an approach is needed that can help MSMEs optimize the use of digital technology to support the business decision-making process more strategically.

2.2 Artificial Intelligence in Business Decision-Making

Artificial Intelligence (AI) is a technology that allows computer systems to perform tasks that generally require human intelligence, such as learning, prediction, analysis, and decision-making. In the modern business environment, AI has evolved to become one of the key technologies that support data-driven decision-making processes (Kokina & Davenport, 2017a).

The use of AI in business includes various applications, such as predictive analytics, customer behavior analysis, recommendation systems, fraud detection, and business intelligence. Research results (Dwivedi, Hughes, et al., 2021; Dwivedi, 2023) states that AI can improve an organization's ability to identify patterns, predict market trends, and generate strategic recommendations quickly and accurately. As such, AI can help organizations reduce uncertainty in decision-making and improve the effectiveness of business strategies.

In the MSME sector, the implementation of AI is still in the early stages compared to large companies. Studies conducted (Maroufkhani et al., 2019) found that limited resources, low digital competence, and perceived technological complexity are factors hindering AI adoption. Nevertheless, the development of cloud technology and service-based platforms (Software as a Service) has opened opportunities for MSMEs to leverage AI at a more affordable cost. Therefore, the development of AI-driven decision support systems is a potential solution in helping MSMEs benefit from artificial intelligence technology without requiring large technology investments.

2.3 Financial Resilience of SMEs

Financial resilience refers to an organization's ability to maintain financial stability, adapt to changes in the business environment, and recover from economic disruptions. This concept

is even more important in the context of MSMEs because small businesses generally have limited capital, access to financing, and risk management capacity compared to large companies (Brigham, Eugene F. & Houston, 2021). Research conducted (Fairlie, 2020) shows that many MSMEs are experiencing significant financial stress due to economic uncertainty and changes in consumer behavior. These challenges are increasing when business actors do not have an adequate financial monitoring system to support decision-making. As a result, many MSMEs have difficulty managing cash flow, controlling operational costs, and conducting long-term business planning.

In a modern perspective, financial resilience is not only determined by the ability to obtain funding, but also by the organization's ability to utilize financial information and analytics effectively. Further, the study (Provost & Fawcett, 2013) Explains that the use of data analytics can help organizations improve the quality of financial planning and identify business risks early. Therefore, the integration of financial analytics and Artificial Intelligence in decision support systems has the potential to increase the financial resilience of MSMEs through the provision of more accurate and real-time information.

2.4 Technology Acceptance in SME Context

The success of technology implementation is greatly influenced by the level of user acceptance of technology. One of the most widely used theories to explain technology adoption behavior is the Technology Acceptance Model (TAM) developed by (Venkatesh & Davis, 2000). This model explains that the two main factors that affect the acceptance of technology are perceived usefulness and perceived ease of use. Perceived usefulness refers to the user's level of confidence that a technology will improve their performance, while perceived ease of use describes the extent to which a technology is considered easy to use. In the context of MSMEs, these two factors have a significant influence on the decision of business actors to adopt digital technology (Maroufkhani et al., 2019). Previous research has shown that many MSME actors tend to be reluctant to adopt technology that is considered complicated and requires large investments. Therefore, the development of AI-based systems for MSMEs must pay attention to the aspects of ease of use and relevance to the business needs of users. Thus, platforms designed using a user-centered design approach have a greater chance of being accepted and used sustainably by business actors.

2.5 Design Science Research (DSR)

Design Science Research (DSR) is a research approach that focuses on creating innovative artifacts to solve real problems faced by organizations. Research (Hevner et al., 2004) explained that DSR aims to produce scientific contributions through the development and evaluation of artifacts that can be in the form of models, methods, systems, or frameworks. The DSR approach consists of several main stages, namely problem identification, solution design, artifact development, demonstration, evaluation, and communication of research results. In contrast to explanatory research that focuses on testing theory, DSR emphasizes the creation of solutions that can be applied practically. Therefore, DSR is very suitable for use in research that develops technology-based systems such as AI-driven decision support systems. Meanwhile, (Peppers et al., 2007) states that DSR allows researchers to come up with innovative solutions that not only have academic value but also provide real benefits to users. In this study, the DSR approach is used to develop SENTRA-AI as a platform that can support digital transformation and financial resilience of MSMEs using Artificial Intelligence.

2.6 Conceptual Framework

Based on a literature review, this study proposes a conceptual framework that explains the relationship between AI-driven decision support, digital transformation, and the financial resilience of MSMEs. Artificial Intelligence plays a supporting role as a supporting technology that generates data-driven insights and recommendations. The use of AI-based decision support systems is expected to improve the quality of business decision-making, strengthen the digital readiness of MSMEs, and improve the organization's ability to manage financial risks. The conceptual framework of this research can be explained in **Figure 2** below.

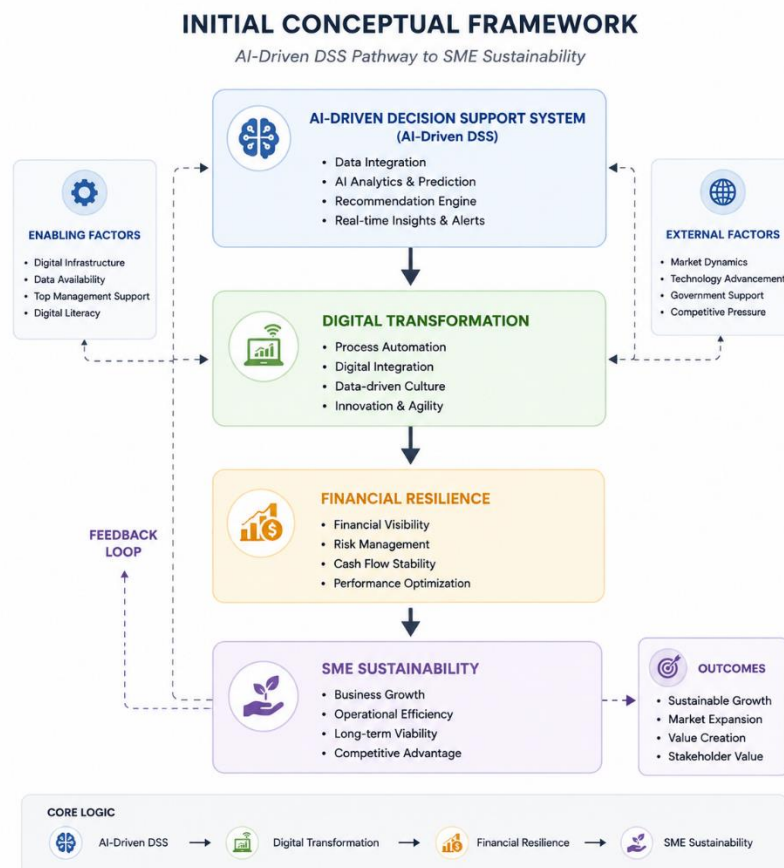


Figure 2. Initial Conceptual Framework

In this framework, digital transformation readiness and technology acceptance play a role as factors that affect the effectiveness of the implementation of AI-driven decision support. Meanwhile, improving the quality of decision-making and the use of financial analytics is expected to contribute to increasing the financial resilience and competitiveness of MSMEs. This conceptual framework is the basis for the development of the SENTRA-AI platform and the evaluation of its implementation in MSMEs in East Java.

2.7 Research Hypothesis

Based on the theory and results of previous research, this study develops several hypotheses as follows:

H1: AI-Driven Decision Support has a positive effect on Digital Transformation Readiness in MSMEs.

H2: AI-Driven Decision Support has a positive effect on Financial Resilience in MSMEs.

H3: Digital Transformation Readiness has a positive effect on Financial Resilience in MSMEs.

H4: Perceived Usefulness has a positive effect on the acceptance of the use of the SENTRA-AI platform.

H5: Perceived Ease of Use has a positive effect on the acceptance of the use of the SENTRA-AI platform.

H6: The acceptance of the use of the SENTRA-AI platform has a positive effect on the effectiveness of business decision-making.

H7: The effectiveness of business decision-making has a positive effect on increasing the competitiveness and sustainability of MSMEs.

The hypothesis was developed to explain how the use of Artificial Intelligence through the SENTRA-AI platform can support digital transformation, improve the quality of business decisions, and strengthen the financial resilience of MSMEs in facing digital economy challenges.

3. Research Method

3.1 Research Design

This research uses a qualitative approach with the aim of gaining a deep understanding of the needs of MSME digital transformation, financial management challenges, and the development of Artificial Intelligence-based decision support systems through the SENTRA-AI (Smart Enterprise Analytics) platform. The qualitative approach was chosen because it allows researchers to comprehensively explore the phenomenon based on the experience, perception, and needs of MSME actors in dealing with changes in the digital business environment. According to (Creswell, 2014), qualitative research is effectively used to understand complex social and organizational phenomena through the interpretation of the meanings given by participants to their experiences.

In addition to using a qualitative approach, this study adopts Design Science Research (DSR) as the main methodological framework in the development of technological artifacts. DSR was chosen because it is oriented towards the creation of innovative solutions that can be used to solving real problems faced by the organization (Hevner et al., 2004). In this study, the artifact developed is the SENTRA-AI platform which is designed to assist MSMEs in making data-based decisions, increasing digital readiness, and strengthening business financial resilience.

3.2 Research Setting and Participants

The research was carried out in the Micro, Small, and Medium Enterprises (MSMEs) sector operating in several regions of East Java, including Surabaya, Sidoarjo, Malang, Gresik, Mojokerto, and Jombang. The region was chosen because it has high MSME activity and shows significant digitalization developments in recent years. The data of the respondents in this study can be seen in **Table 1**.

Table 1. Respondent Profile

Characteristics	Category	Frequency (n)	Percentage (%)
Gender	Male	28	56.0
	Female	22	44.0
Age	< 30 years	8	16.0
	31–40 years	19	38.0
	41–50 years	15	30.0
	> 50 years	8	16.0
Educational Background	High School	20	40.0
	Diploma	8	16.0
	Bachelor's Degree	18	36.0
	Postgraduate Degree	4	8.0
Business Sector	Food & Beverage	18	36.0
	Retail & Trade	12	24.0
	Creative Industry	8	16.0
	Services	7	14.0
	Manufacturing	5	10.0
Business Age	< 3 years	10	20.0
	3–5 years	16	32.0
	6–10 years	15	30.0
	> 10 years	9	18.0
Number of Employees	1–5 employees	24	48.0
	6–10 employees	14	28.0
	11–20 employees	8	16.0
	> 20 employees	4	8.0
Digital Platform Utilization	Social media	50	100.0
	Marketplace	42	84.0
	Digital Payment	39	78.0
	Accounting Software	18	36.0
	Business Analytics Tools	9	18.0

The study participants were selected using a purposive sampling technique by considering the suitability of the respondents' characteristics to the research objectives. Participant criteria include: (1) owners or managers of MSMEs who have been actively running a business for at least two years, (2) have used digital technology in business activities, such as social media, marketplaces, or digital payments, and (3) are willing to participate in the interview process and evaluation of the system prototype. In addition to MSME actors, the research also involves MSME facilitators, digital business practitioners, and academics as supporting informants to gain a broader perspective on the implementation of digital transformation and Artificial Intelligence in the small business sector.

3.3 Data Collection Techniques

Data collection is carried out through several techniques to increase the depth of information and validity of the research. The main technique used is in-depth interviews with MSME actors and supporting informants. The interviews were conducted in a semi-structured manner to explore information about digital transformation experiences, barriers to technology use, financial management practices, and the need for Artificial Intelligence-based decision support systems. The technical data collection in this study can be seen in **Table 2** below.

Table 2. Data Collection Techniques

Data Collection Technique	Participants / Sources	Purpose	Expected Output
In-depth Interviews	SME owners, SME mentors, digital business practitioners	To explore digital transformation experiences, financial management practices, and AI adoption needs	Insights on business challenges, digital readiness, and user requirements
Observation	Selected SMEs in East Java	To observe business operations, financial recording practices, and digital technology utilization	Contextual understanding of SME business processes
Document Analysis	Financial records, sales reports, digital transaction data, government reports	To identify business performance indicators and existing digital practices	Supporting evidence and data triangulation
Focus Group Discussion (FGD)	SME representatives, academics, technology experts	To validate system requirements and discuss platform development priorities	Refined system requirements and feature recommendations
Prototype Demonstration	SME users participating in the study	To introduce and test the SENTRA-AI prototype in a real business context	Initial user experience and system usability feedback
User Evaluation and Feedback	SME owners and business managers	To assess system usefulness, usability, effectiveness, and relevance	Evaluation results for system improvement
Field Notes	Research observations and interactions	To record contextual findings during data collection and implementation activities	Qualitative supporting data
Literature Review	Academic journals, reports, policy documents	To establish theoretical foundations and identify research gaps	Conceptual framework and research design inputs

In addition to interviews, the study also uses direct observation of MSME business activities to understand how digital technology is used in daily operations. Observations were made on the process of financial recording, transaction management, digital marketing activities, and decision-making patterns carried out by business actors. The observation results were recorded in the form of field notes which were then used as supporting data in the analysis process.

The research also utilizes documentation as a secondary data source. The documents analyzed included simple financial statements, digital transaction data, business operational records, and policy documents related to the digitization of MSMEs. Documentation was used to strengthen the findings of interviews and observations through the data triangulation process. At the artifact development stage, the researcher conducted a prototype demonstration and user evaluation session on the SENTRA-AI platform. Participants were given the opportunity to use the system prototype and provide feedback on the features, ease of use, benefits of the system,

and suitability of the system with their business needs. This information is used as a basis for iterative improvements to the platform.

3.4 Development Process of SENTRA-AI

The development of the SENTRA-AI platform follows the stages of Design Science Research proposed by (Hevner et al., 2004; Peffers et al., 2007). The first stage is problem identification, which is the process of identifying problems faced by MSMEs related to digital transformation, financial management, and business decision-making. This stage is carried out through interviews and field observations.

The second stage is objective definition, which is formulating the purpose of system development based on user needs. The results of the analysis show the need for a system that can provide real-time business monitoring, sales predictions, customer analysis, and strategic recommendations based on Artificial Intelligence.

The third stage is design and development, namely the design of system architecture, user interface, database, and AI recommendation engine. At this stage, a SENTRA-AI prototype was developed which integrates Financial Intelligence, Sales Analytics, Customer Analytics, Market Intelligence, and AI Recommendation System modules.

The fourth stage is demonstration, which is the implementation of prototypes in several MSMEs that are research participants. Users are asked to try out the main features of the system and provide feedback on its effectiveness and ease of use.

The last stage is evaluation, which is the process of assessing the quality of artifacts and the benefits of the system for users. The evaluation was carried out using the DSR Evaluation Analysis approach which focuses on aspects of the usefulness, relevance, effectiveness, and contribution of the system to solving problems faced by MSMEs.

3.5 Data Analysis Techniques

Data analysis was carried out through two main stages, namely thematic analysis and Design Science Research Evaluation Analysis. In the first stage, the data from interviews, observations, and documentation were transcribed and analyzed using thematic analysis to identify the main themes that emerged from the participants' experiences and perceptions. The analysis process is carried out through the stages of open coding, categorization, theme development, and interpretation. This technique is used to understand the challenges of digital transformation, technology adoption behavior, user needs, and perception of the SENTRA-AI platform.

Furthermore, the evaluation of the artifacts was carried out using DSR Evaluation Analysis. This evaluation aims to assess the extent to which the SENTRA-AI platform can answer user needs and solve previously identified problems. Evaluation criteria include usability, utility (usability of the system), effectiveness (effectiveness in supporting decision-making), and relevance (suitability to the needs of MSMEs). The results of the evaluation are analyzed qualitatively based on user feedback and are used as a basis for continuous system improvements.

Through a combination of thematic analysis and DSR Evaluation Analysis, this research not only produces a deep understanding of the digital transformation of MSMEs but also produces relevant and applicable technological artifacts in supporting the strengthening of financial resilience and competitiveness of MSMEs in the digital economy era.

4. Results and Discussion

4.1 Results

SME Digital Transformation Readiness

The results of the study show that most MSMEs in East Java have started the digital transformation process using various basic technologies such as social media, marketplaces, and digital payment systems. The use of social media is the most dominant form of digitalization because it is considered easy to use, cheap, and effective in reaching a wider range of consumers. In addition, the marketplace has also become the main marketing and sales channel for most business actors, especially in the culinary, trade, and creative products sectors. The level of transformation readiness is shown in **Table 3** below

Table 3. SME Digital Transformation Readiness

Dimension	Indicator	Mean Score (1–5)	Readiness Level
Digital Infrastructure	Internet accessibility	4.35	High
	Availability of digital devices	4.12	High
	Digital connectivity reliability	3.98	Moderate–High
Digital Adoption	Technology		
	Social media utilization	4.68	Very High
	Marketplace utilization	4.25	High
	Digital payment utilization	4.18	High
	Accounting software utilization	2.95	Moderate
Digital Competency	Business analytics utilization	2.42	Low
	Basic digital literacy	4.05	High
	Data management capability	3.15	Moderate
	Data analytics capability	2.58	Low
Strategic Orientation	Digital		
	Digital-based decision making	2.76	Low
	Technology investment commitment	3.28	Moderate
AI Readiness	Innovation readiness	3.75	Moderate–High
	Awareness of AI technology	3.42	Moderate
	Interest in AI adoption	4.10	High
	Capability to use AI tools	2.35	Low

Nevertheless, the level of digital readiness of MSMEs still shows a significant gap between operational digitalization and strategic digitalization. Most business actors still use technology for promotional activities and transactions but have not yet utilized technology to support business decision-making. The use of accounting software, analytics dashboards, customer relationship management (CRM), and Artificial Intelligence-based systems is still relatively low. This condition shows that most MSMEs are still in the digital adoption stage, not yet reaching the digital intelligence stage that allows data-based decision-making.

The results of the interviews revealed that the low utilization of analytics technology is influenced by the limitations of digital literacy, lack of understanding of the benefits of business data, and limited resources to adopt more complex technologies. Most businesses admit that they don't yet have a system that integrates sales data, customer data, and financial data into one easy-to-use platform. These findings indicate a strong need for a digital system that can simplify the business analysis process for MSMEs.

Financial Management Challenges

In addition to the challenges of digitalization, research also found that financial management is one of the main problems faced by MSMEs. Most business actors still do financial recordings manually or use simple spreadsheets. This practice causes difficulties in monitoring cash flow, evaluating financial performance, and long-term business planning. The results of observations show that many MSMEs have not consistently separated personal finance and business finance. This condition results in business actors experiencing difficulties in accurately measuring business profitability. In addition, most respondents admitted that they did not have a system that could provide financial information in real-time, so the decision-making process was often done based on intuition and personal experience.

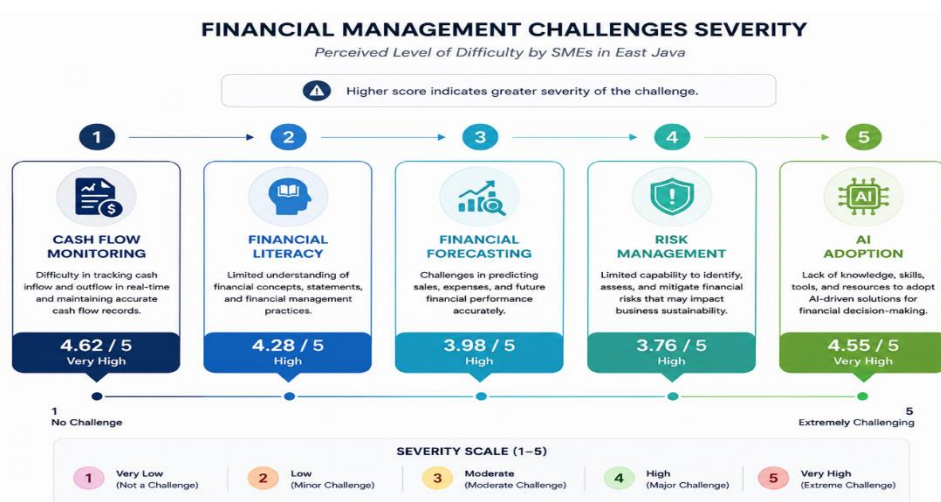


Figure 3. Financial Management Challenges Severity

Other findings show that the ability to make sales predictions and financial planning is still relatively low. Most MSMEs do not have analytical tools that are able to identify market demand trends or predict sales changes in each period. As a result, business actors often face problems of excess stock, lack of inventory, and errors in determining marketing strategies. This condition shows that strengthening the financial resilience of MSMEs requires the support of an information system that can produce financial and business insights quickly and accurately.

Development of SENTRA-AI Platform

Based on the results of identifying user needs, this study developed SENTRA-AI (Smart Enterprise Analytics), which is an Artificial Intelligence-based decision-support platform specifically designed to support the needs of MSMEs. The development of the platform is carried out using the Design Science Research (DSR) approach which allows the process of designing and evaluating the system to be carried out iteratively based on user input.

The SENTRA-AI architecture is built using a multilayer system approach that integrates multiple business data sources into one unified platform. This system consists of several main modules, namely Financial Intelligence, Sales Analytics, Customer Analytics, Market Intelligence, AI Recommendation Engine, and Reporting System. The integration between the modules allows users to get a comprehensive view of the business situation in real-time.

The Financial Intelligence module was developed to help users monitor cash flow, profitability, operating expenses, and the financial health of the business. The Sales Analytics

module functions to analyze sales performance and predict sales trends using a predictive analytics approach. Meanwhile, Customer Analytics is used to understand customer behavior and identify potential market segments that can be targeted by marketing.



Figure 4. Dashboard Prototype SENTRA-AI

One of the key features of SENTRA-AI is the AI Recommendation Engine which can generate data-driven business recommendations. The system analyzes historical data and business trends to provide advice on stock management, promotional strategies, product development, and financial management. In addition, the platform is also equipped with an interactive dashboard that visually displays key performance indicators so that it is easy for users to understand.

Implementation Results

The implementation stage was carried out through demonstrations and prototype evaluations to several MSME actors who participated in the research. The results of the implementation showed that users responded positively to the ease of use and benefits of the system in supporting daily business activities.

Most users stated that the SENTRA-AI dashboard helps them understand business conditions faster than conventional recording methods that have been used. Simple, easy-to-understand data visualization allows users to monitor sales performance, financial conditions, and customer activity in one integrated view.

The AI Recommendation Engine feature also received a positive response. Users assess the recommendations generated by the system to be relevant to their business needs, especially in the aspects of stock management, promotion strategies, and sales planning. In addition, some business actors reveal that the system helps them recognize business patterns that were previously difficult to identify manually.

From a digital readiness perspective, the implementation of the platform also increases user awareness of the importance of business data management. Business actors are beginning to understand that transaction data and customer data can be used as a basis for more objective and measurable decision-making. These results show that SENTRA-AI not only functions as an analytical tool, but also as a digital learning medium for MSME actors.

4.2 Discussion

AI as a Catalyst for SME Digital Transformation

The findings of the study show that Artificial Intelligence (AI) plays a catalyst that accelerates the digital transformation of MSMEs through improving data processing capabilities, business analysis, and information-based decision-making. Prior to the implementation of SENTRA-AI, most MSME actors only utilized digital technology in operational activities such as marketing through social media and transactions through marketplaces. However, after using AI-based platforms, business actors begin to use business data as a basis for determining business strategies. These findings reinforce the view (Vial, 2019) which states that digital transformation is not only about the adoption of technology but also changes in the way organizations create value and make decisions.

This research also shows that AI helps reduce resource limitations which have been the main obstacle to MSME digital transformation. Unlike large companies that have access to data analysts and complex information systems, MSMEs often face limited competencies and digital infrastructure. The presence of the SENTRA-AI platform allows the analytics process to be carried out automatically so that users can gain business insights without the need for high technical skills. These findings are in line with research (Dwivedi, Ismagilova, et al., 2021) which confirms that AI has the potential to democratize access to analytics technology and improve the quality of decision-making at various organizational scales.

AI-Based Decision Support and Financial Resilience

The results of the study show that AI-based decision support systems have made a significant contribution to strengthening the financial resilience of MSMEs. The Financial Intelligence and AI Recommendation Engine features help users obtain information about the financial condition of the business in real-time, allowing for faster and more accurate decision-making. These findings support the view (Provost & Fawcett, 2013) which states that leverage data analytics have a better ability to identify risks and formulate more effective business strategies.

In addition to improving the quality of financial monitoring, the use of AI also helps business actors make sales predictions and business planning more systematically. Prior to the implementation of the system, most respondents relied on intuition in determining sales strategies and inventory management. After using the platform, users get data-driven recommendations that help them anticipate changes in market demand and manage resources more efficiently. These results expand on the findings (Fairlie, 2020) which emphasizes the importance of financial resilience in maintaining the sustainability of MSMEs in uncertain economic conditions. This research shows that financial resilience is not only influenced by access to sources of financing, but also by the ability of organizations to utilize information and technology to support the decision-making process.

Technology Acceptance and SME Adaptation

The findings of the study show that the level of user acceptance of the SENTRA-AI platform is influenced by the perception of ease of use and perceived benefits of the system. Most participants stated that the simple dashboard view and easy-to-understand data visualization helped them access business information more effectively. These results support the Technology Acceptance Model (TAM) developed by (Venkatesh & Davis, 2000), which explains that perceived usefulness and perceived ease of use are the main determinants in technology adoption.

This study also found that the process of technology adaptation in MSMEs is not only determined by technical factors, but also by the relevance of the system to the business needs of users. Business actors show a tendency to accept technology if the technology can provide direct benefits in solving the problems they face. These findings are in line with research (Maroufkhani et al., 2019) which shows that the success of technology implementation in MSMEs is greatly influenced by the suitability of technology with organizational needs. Thus, the user-centered design approach applied in the development of SENTRA-AI is an important factor in increasing the acceptance rate and sustainability of the use of the system.

Contribution of Design Science Research to SME Innovation

This research shows that Design Science Research (DSR) is an effective approach in producing technological innovations that are relevant to user needs. Through the stages of problem identification, design, development, demonstration, and evaluation, the SENTRA-AI platform is developed based on the real needs faced by MSME actors. This approach allows researchers to produce artifacts that not only have academic contributions but also provide practical benefits to users.

These findings support the argument (Hevner et al., 2004) that DSR serves as a research paradigm that bridges the gap between theory and practice. In this study, DSR is not only used to develop technological systems, but also to understand user needs and evaluate the effectiveness of the resulting solutions. In addition, the use of DSR allows the process of refining the system to be carried out iteratively based on user feedback, resulting in a more adaptive and contextual platform. This contribution is important because most previous research has focused more on testing factors that influence technology adoption without producing artifacts that can be used directly by MSMEs.

Implications for SME Sustainability and Competitiveness

The results of the study show that the integration of Artificial Intelligence into the decision support system has broad implications for the sustainability and competitiveness of MSMEs. With the ability to generate real-time business insights, the SENTRA-AI platform helps businesses improve the quality of decision-making, optimize the use of resources, and strengthen their adaptability to market changes. These findings support the perspective of Dynamic Capability Theory which emphasizes the importance of an organization's ability to integrate, build, and reconfigure resources to deal with a dynamic environment (Teece, 2018). From a business sustainability perspective, the use of AI allows MSMEs to develop more proactive strategies in dealing with business risks and economic uncertainty. Additionally, the ability to analyze customer behavior and market trends helps businesses identify growth opportunities that were previously difficult to identify. Thus, the use of AI not only increases operational efficiency, but also strengthens the innovation capacity and competitive ability of MSMEs in the long run.

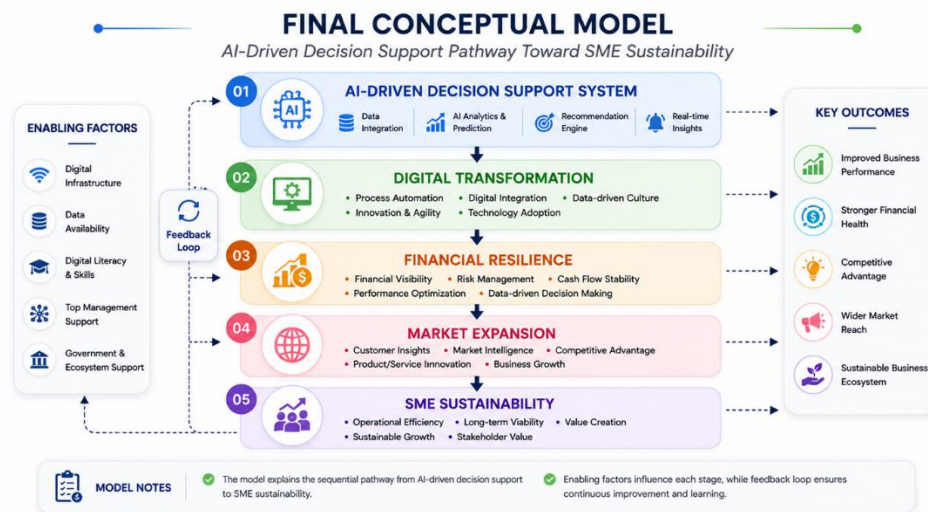


Figure 5. Final Conceptual Model

Comparison with Previous Studies and Research Novelty

This research has several contributions that distinguish it from previous research. Most previous studies have focused on factors influencing the adoption of digital technologies (Maroufkhani et al., 2019), digital transformation of MSMEs (Verhoef & Bijmolt, 2021), or the implementation of Artificial Intelligence in the organization in general (Dwivedi, Hughes, et al., 2021). However, the research generally does not develop technological artifacts specifically designed to support the digital transformation and financial resilience of MSMEs.

Table 4. Comparison with Previous Studies

Authors	Research Focus	Context	Method	Main Findings	Research Gap	Contribution of This Study
(Venkatesh & Davis, 2000)	Technology Acceptance Model (TAM)	Information Systems	Quantitative	Perceived usefulness and perceived ease of use influence technology adoption	Did not examine AI adoption in SMEs	Extends technology acceptance discussion to AI-driven decision support for SMEs
(Kokina & Davenport, 2017b)	Artificial Intelligence in Business	Large Organizations	Conceptual Study	AI improves business analytics and decision-making	Focused primarily on large enterprises	Develops AI application specifically for SME decision support

Authors	Research Focus	Context	Method	Main Findings	Research Gap	Contribution of This Study
(Fairlie, 2020)	SME Financial Resilience	Small Businesses	Quantitative	Financial resilience is critical for business survival during uncertainty	Did not integrate AI and digital transformation perspectives	Links financial resilience with AI-enabled decision support systems
(Verhoef & Bijmolt, 2021)	Digital Transformation	Various Industries	Literature Review	Digital transformation enhances organizational performance	Limited focus on SMEs and decision-support systems	Examines digital transformation readiness among SMEs in East Java
(Dwivedi, Hughes, et al., 2021)	Artificial Intelligence Adoption	Multiple Sectors	Multidisciplinary Review	AI creates opportunities for innovation and efficiency	Lack of practical AI artifacts for SMEs	Develops an implementable AI-based platform for SME management
(Maroufkhani et al., 2019)	Technology Adoption in SMEs	SMEs	Systematic Review	SME technology adoption influenced by organizational and technological factors	Focuses on adoption factors rather than technology development	Produces an operational AI artifact tailored to SME needs
(Muis, 2025)	SME Development Challenges	Indonesia	Policy and Economic Analysis	SMEs face digital capability and competitiveness challenges	No AI-driven solution proposed	Provides a contextual AI solution for Indonesian SMEs

Authors	Research Focus	Context	Method	Main Findings	Research Gap	Contribution of This Study
This Study (2026)	AI-Driven Decision Support for SME Digital Transformation and Financial Resilience	SMEs in East Java, Indonesia	Qualitative + Design Science Research (DSR)	Development and evaluation of SENTRA-AI platform integrating AI analytics, financial intelligence, market intelligence, and recommendation engine	Addresses fragmented research on AI, digital transformation, and financial resilience	Introduces SENTRA-AI as an AI-driven decision-support artifact that strengthens digital transformation, financial resilience, market expansion, and SME sustainability

Table 7 demonstrates that previous studies have largely examined digital transformation, technology acceptance, Artificial Intelligence adoption, and financial resilience as separate research domains. Although these studies have contributed significantly to the understanding of SME development and technology adoption, few have developed practical AI-based decision-support artifacts specifically designed for SMEs. Furthermore, existing studies rarely integrate digital transformation, financial resilience, and market expansion within a single analytical framework.

This study addresses these limitations by developing and evaluating the SENTRA-AI platform through a Design Science Research approach. Unlike previous studies that primarily focus on technology adoption determinants, this research contributes an implementable AI-driven decision-support system that supports data-driven decision-making, financial resilience, and business sustainability. Consequently, the study provides theoretical, methodological, technological, and practical contributions to the growing literature on AI-enabled SME transformation in emerging economies.

Relation to the Research Hypotheses

The findings of this study provide empirical support for the relationships proposed in the research hypotheses. The results demonstrate that the implementation of the SENTRA-AI platform can contribute to digital transformation, financial management, technology acceptance, and the effectiveness of business decision-making among MSMEs.

Regarding **H1**, which proposes that AI-driven decision support has a positive effect on digital transformation readiness, the findings support this hypothesis. Before implementing SENTRA-AI, most MSMEs primarily used digital technologies for operational activities such as social media marketing, marketplace transactions, and digital payments, while the utilization of business analytics and AI remained low. The implementation of SENTRA-AI encouraged business actors to utilize business, sales, customer, and financial data as inputs for decision-making. This indicates that AI-driven decision support can facilitate a transition from basic digital adoption toward more strategic and data-driven digital transformation. This finding is

consistent with Vial (2019), who emphasizes that digital transformation involves changes in how organizations use digital technologies to create value and make decisions.

H2 proposes that AI-driven decision support has a positive effect on financial resilience. The findings support this hypothesis because the Financial Intelligence module enables MSME actors to monitor cash flow, profitability, and operational expenses, while the AI Recommendation Engine provides recommendations for financial and business management. The system therefore helps business actors obtain more timely information about their financial conditions and anticipate potential risks. This finding reinforces the argument of Fairlie (2020) that financial resilience is important for MSMEs facing economic uncertainty and that improved information can strengthen their ability to respond to financial challenges.

The findings also support **H3**, which proposes that digital transformation readiness positively affects financial resilience. The results indicate that MSMEs with greater access to digital tools and improved capabilities in managing and analyzing business data are better positioned to monitor financial conditions and support business planning. The integration of financial and operational information within SENTRA-AI enables digital capabilities to be translated into practical financial insights. Thus, digital transformation is not merely a technological process but can contribute to the ability of MSMEs to manage financial risks and maintain business continuity.

For **H4**, which proposes that perceived usefulness positively affects acceptance of the SENTRA-AI platform, the findings provide support for the hypothesis. Most participants perceived the platform as useful because it enabled them to understand business conditions more quickly, monitor sales and financial performance, and obtain recommendations for stock management, promotion, and sales planning. The perceived practical benefits of the system encouraged users to accept and utilize the platform.

Similarly, **H5**, which proposes that perceived ease of use positively affects technology acceptance, is supported by the findings. Participants responded positively to the simple dashboard structure and easy-to-understand data visualization. The system reduced the complexity of interpreting business information, allowing MSME actors with different levels of digital competence to use the platform. This finding is consistent with the Technology Acceptance Model, which identifies perceived usefulness and perceived ease of use as important determinants of technology adoption (Venkatesh & Davis, 2000).

The findings further support **H6**, which proposes that acceptance of the SENTRA-AI platform positively affects the effectiveness of business decision-making. Users reported that the platform helped them understand business conditions faster and identify patterns that were previously difficult to recognize through manual analysis. In particular, the AI Recommendation Engine provided actionable recommendations related to inventory, promotion, sales planning, and financial management. These findings suggest that technology acceptance is translated into decision-making benefits when the system is perceived as relevant and easy to use.

Finally, the findings support **H7**, which proposes that effective business decision-making contributes positively to MSME competitiveness and sustainability. The implementation of SENTRA-AI enables business actors to use data and AI-generated insights to respond more proactively to market changes, manage resources, understand customer behavior, and identify business opportunities. These capabilities can strengthen the adaptability and competitiveness of MSMEs in a dynamic business environment. This finding is consistent with the Dynamic Capability Theory perspective proposed by Teece (2018), which emphasizes the importance of

an organization's ability to integrate and reconfigure resources in response to environmental changes.

Overall, the findings indicate that the seven hypotheses are conceptually supported by the evidence obtained from the implementation and evaluation of SENTRA-AI. The results suggest a sequential relationship in which AI-driven decision support strengthens digital transformation readiness and financial resilience, while perceived usefulness and ease of use encourage technology acceptance. Greater acceptance subsequently improves the effectiveness of business decision-making, which contributes to MSME competitiveness and sustainability. This relationship strengthens the central argument of this study that AI-driven decision support can function as a catalyst for transforming basic digital adoption into strategic digital capability and greater financial resilience among MSMEs.

5. Conclusion

This research aims to analyze the readiness of the digital transformation of MSMEs in East Java, identify financial management challenges faced by business actors, and develop an Artificial Intelligence-based decision-support platform called SENTRA-AI (Smart Enterprise Analytics). The results of the study show that most MSMEs have adopted basic digital technologies such as social media, marketplaces, and digital payment systems. However, the use of technology to support data-driven decision-making is still relatively limited. Most business actors still rely on experience and intuition in determining business strategies, while the use of analytical systems, financial intelligence, and Artificial Intelligence is still in the early stages.

The research also found that financial management is one of the main challenges faced by MSMEs. Limited cash flow monitoring, manual financial recording, and low financial planning ability are factors that can hinder business growth and sustainability. This condition shows that digital transformation needs to be supported by a system that can integrate business data and generate relevant information for decision-making.

In response to these needs, this research succeeded in developing SENTRA-AI as an AI-driven decision support platform that integrates financial intelligence, predictive analytics, customer analytics, market intelligence, and recommendation engine in one integrated system. The results of the implementation show that this platform can improve the ability of MSME actors to monitor business conditions, understand customer behavior, manage finances, and formulate more data-based business strategies. The findings of the study confirm that Artificial Intelligence can play a catalyst in accelerating digital transformation while strengthening the financial resilience of MSMEs.

Practical Implications

This research provides several practical implications for MSME actors, governments, and technology developers. For MSME actors, sentra-ai can be a tool in improving the quality of decision-making, strengthening financial management, and identifying market opportunities more effectively. For the government and MSME companion institutions, the results of this research can be the basis for designing a digital transformation program that not only focuses on technology adoption, but also on strengthening analytical capabilities and the use of Artificial Intelligence. Meanwhile, for technology developers, this study shows the importance of developing systems that are simple, easy to use, and in accordance with user needs so that the level of technology adoption can increase continuously.

Research Limitations

This research has several limitations that need to be considered. First, research was conducted on MSMEs in several regions of East Java so that the results of the study could not be fully generalized to all MSMEs in Indonesia. Second, the evaluation of the SENTRA-AI platform is still being carried out at the prototype stage so that the impact of long-term implementation on business performance cannot be measured comprehensively. Third, this study uses a qualitative approach so that the findings produced emphasize more on an in-depth understanding of phenomena than on measuring causal relationships between variables.

Future Research Directions

Further research is recommended to carry out the implementation and evaluation of SENTRA-AI on a broader scale by involving various MSME sectors and different geographical areas. In addition, future research can use a quantitative approach or mixed-method to test the influence of the use of AI-driven decision support on business performance, competitiveness, and sustainability of MSMEs in a more measurable manner. The development of more advanced machine learning-based features, integration with marketplaces and digital financial systems, as well as the exploration of data security and Artificial Intelligence ethics are also important research agendas to support the development of the MSME digital ecosystem in the future.

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