

Original Article

Artificial Intelligence Efficiency in Promoting the Digitalization of Keris Msmes in Sumenep

Ahmad Ghufrony^{1✉}, Syamsul Arifin², Fathorrohman³

^{1,2,3} Wiraraja University Madura, Sumenep, Indonesia

Correspondence Author: syamsularifin@wiraraja.ac.id ✉

Abstract:

Digital transformation has become a strategic necessity for Micro, Small, and Medium Enterprises (MSMEs) to enhance operational efficiency, competitiveness, and business sustainability in the digital economy era. One technology with considerable potential to support this process is Artificial Intelligence (AI). This study aims to examine the efficiency of AI utilization in accelerating the digitalization of keris craft MSMEs in Sumenep Regency, while also identifying the role of AI in business learning, decision making, and the enhancement of creativity rooted in local wisdom. The research adopts a qualitative approach, with data collected through in depth interviews involving eight informants, including MSME practitioners, community members, village government officials, and representatives of the MSME Office. The findings indicate that AI demonstrates substantial relevance and efficiency in supporting the digital transformation of keris MSMEs in Sumenep by improving operational efficiency, optimizing digital marketing strategies, strengthening supply chain management, and enhancing customer service quality. Furthermore, AI's learning and reasoning capabilities play a critical role in enabling MSMEs to conduct data-driven market analysis, production planning, risk management, and more rational strategic decision-making. From a creative perspective, AI functions as an innovative partner that facilitates product design development, keris personalization, and the strengthening of brand narratives, while preserving the integrity of local cultural identity. This study concludes that the integration of AI encompassing learning, reasoning, and creativity constitutes a strategic factor in reinforcing the digitalization and competitiveness of keris MSMEs in Sumenep, while simultaneously supporting business sustainability and the preservation of local cultural heritage within the framework of the digital economy.

Keywords: Artificial Intelligence; MSME Digitalization; Sumenep Keris Craft; Digital Economy; Local Wisdom.

Introduction

In the contemporary digital era, rapid advancements in information and communication technology have fundamentally transformed various economic sectors,

including Micro, Small, and Medium Enterprises (MSMEs). Digitalization has emerged as a critical instrument for enhancing operational efficiency, competitiveness, and sustainable growth of MSMEs ([Wilestari et al., 2023](#)). Alongside this transformation, Artificial Intelligence (AI) has gained increasing attention as a key technological enabler capable of accelerating and deepening digital transformation processes. The expansion of the digital economy and the development of smart industries further underscore the strategic role of AI in reshaping business models and organizational performance across sectors ([Kraus et al., 2022](#)).

Artificial Intelligence is conceptually understood as a computational system designed to replicate human cognitive capabilities, including learning, reasoning, decision making, and solution generation based on data analysis and contextual interpretation. Within the fields of computer science and new media studies, AI has been extensively applied to support digital platform operations, optimize content, and analyze user behavior within data driven media ecosystems ([Wingström et al., 2022](#)). Research in these domains highlights AI's function as a technological infrastructure that enhances both the efficiency and effectiveness of digital systems.

Empirical studies across strategic sectors further demonstrate the multifaceted role of AI. In higher education, AI has been analyzed from an implementation and practical alignment perspective, particularly in supporting adaptive learning systems, performance assessment, and personalized learning experiences ([Crompton & Burke, 2023](#)). These studies position AI not only as a technical tool but also as a data driven instrument for institutional decision making and policy formulation grounded in evidence based practices. Similarly, within the healthcare sector, AI related research increasingly emphasizes transparency, accountability, and ethical considerations, especially in addressing algorithmic bias and promoting fairness and equity in healthcare delivery ([Trocin et al., 2023](#)). In this context, AI functions as a clinical decision support system that must incorporate explainable AI mechanisms to ensure socially and professionally accountable outcomes.

In the manufacturing sector, AI is widely utilized to enhance efficiency and quality through automated inspection systems, quality control mechanisms, and supply chain optimization ([Sundaram, 2023](#)). AI enables real time processing of production data, early detection of defects, and predictive analysis of future operational needs, positioning it as a key driver of industrial transformation toward intelligent, adaptive, and sustainable systems. Likewise, in robotics research, AI serves as an integrative framework that coordinates perception, decision making, and action subsystems, enabling adaptive responses to complex and dynamic environments ([Ness et al., 2023](#)). These developments illustrate the growing maturity of AI as a technology capable of operating effectively in unstructured and uncertain contexts.

Despite the extensive adoption of AI across these sectors, research on AI implementation within the context of MSMEs remains relatively limited and is still considered an emerging field of inquiry. This gap is particularly evident in traditional and culturally embedded industries such as keris craft MSMEs in Sumenep. MSMEs possess distinctive characteristics, including limited financial and technological resources, small scale operations, reliance on tacit knowledge, and the predominance of traditional business practices. These characteristics necessitate AI approaches that are contextual, adaptive, and sensitive to local conditions rather than purely automation oriented.

Keris MSMEs in Sumenep face persistent challenges related to operational management, marketing, and overall business governance. AI driven digitalization offers

promising solutions to address these challenges through business process automation, advanced data analytics, and enhanced customer experience. As noted by Nosova et al. (2022), AI represents a form of software capable of making autonomous decisions and functioning even in situations that are not explicitly predefined by programmers. However, despite its potential advantages, the effectiveness and efficiency of AI implementation within keris MSMEs remain insufficiently understood. Fundamental questions therefore arise regarding the extent to which AI can improve MSME operational efficiency, the barriers faced in adopting AI technologies, and the tangible impacts of AI utilization on MSME growth and local economic development.

Accordingly, in-depth research is required to examine the role of AI in supporting the digitalization of keris MSMEs in Sumenep. This study seeks to explore how AI technologies can be strategically leveraged within the MSME context, identify existing challenges and opportunities, and provide evidence-based recommendations for effective AI adoption. Within this framework, AI is not viewed merely as an automation technology, but rather as a system of learning, reasoning, and creativity that enhances entrepreneurial capacity to respond to market dynamics, strengthen competitiveness, and foster innovation rooted in local wisdom. By formulating a conceptual framework tailored to the characteristics of keris MSMEs in Sumenep, this study aims to support business sustainability while preserving cultural values within the evolving digital economy.

Methods

This study adopts a qualitative research method. Qualitative research is concerned with explaining and interpreting social phenomena (Maxwell, 2020) and is considered a valuable approach for identifying causal relationships through in-depth understanding of social processes (Moretti et al., 2011). A qualitative approach was employed to gain a comprehensive understanding of the efficiency of Artificial Intelligence (AI) in promoting the digitalization of Micro, Small, and Medium Enterprises (MSMEs) in the Keris craft sector of Sumenep. This method was selected because it enables the researcher to explore perspectives, experiences, and insights from stakeholders who are directly involved in MSME activities and digital transformation initiatives.

Data was collected through in-depth interviews with informants representing various stakeholder groups. A total of eight respondents participated in this study and were categorized as follows:

Table 1 : Demographic information of the Informants

No	Informant Category	Number of Informants	Role in the Study
1	Community members	2	Provided perspectives from the general public regarding awareness, perceptions, and attitudes toward digitalization and the use of AI in MSM development
2	MSME operators	2	Offered empirical insights into business practices, the adoption of digital technologies, and the opportunities and challenges associated with their implementation in MSME operations
3	Village head	1	Contributed strategic perspectives on village-level policies, institutional support, and the role of local government in promoting MSM digitalization

4	MSME Offi representatives	3	Supplied information on policy formulation and implementation, assistance programs, and strategies for digital- and AI-based MSM development
Total		8	

Source: Processed Data (2025)

Each respondent was interviewed using a set of nine semi structured questions designed to elicit detailed information on the efficiency of AI in supporting and enhancing MSME digitalization processes. The interview questions addressed multiple dimensions, including AI adoption, its impact on operational efficiency, challenges encountered during implementation, and perceived benefits for MSMEs. Through these interviews, the study sought to develop a comprehensive understanding of how AI contributes to MSME digitalization and to identify factors influencing the effectiveness of AI adoption within the local context of the Keris Sumenep community. The diverse perspectives obtained are expected to provide in depth insights and inform the formulation of strategic recommendations for more effective MSME digitalization initiatives in the future.

Results

The Relevance of Artificial Intelligence in Supporting Keris MSMEs in Sumenep

Keris Micro, Small, and Medium Enterprises (MSMEs) play a significant role in contributing to local economic growth in Aeng Tongtong Village, which is recognized as the central hub of keris craftsmanship in Sumenep Regency. Nevertheless, the development of keris MSMEs in Sumenep has progressed at a relatively slow pace, primarily due to their limited capacity to penetrate global market competition. This condition is closely associated with the structural characteristics of keris MSMEs, which are predominantly family owned enterprises operating through traditional business practices and on a small scale ([Wardhana et al., 2019](#)). In addition, MSME activities in Sumenep tend to be seasonal in nature, further constraining business continuity and growth ([Mardhatillah & Ghufrony, 2024](#)).

Another contributing factor to the low competitiveness of keris MSMEs is the declining consumer interest in keris products, which are often perceived as less relevant to contemporary needs and market trends. This challenge is compounded by the increasing presence of alternative non-keris products in the market, intensifying competition and further weakening the market position of keris MSMEs in Sumenep.

As a result, keris MSMEs in Sumenep have experienced limited development and, in many cases, stagnation, which has ultimately led to declining production levels and a gradual erosion of their business sustainability. To address these challenges, the adoption of Artificial Intelligence (AI) technology emerges as a strategic intervention to accelerate the digitalization of keris MSMEs. Previous studies have indicated that AI offers substantial potential benefits for MSMEs in enhancing future business performance ([Lahamid et al., 2023](#)). The rapid advancement of AI technologies has generated significant impacts across various sectors, including MSMEs, by improving operational efficiency and strengthening business competitiveness in the digital era ([Verdiana & Fachir, 2023](#)). Through AI assisted systems, MSMEs are better positioned to adapt swiftly to technological changes and to develop more effective and resilient business processes.

From a practical perspective, AI technologies not only support daily operational activities but also serve as a catalyst for innovation. Through intelligent data analytics,

MSMEs are able to identify market trends, forecast demand, and explore opportunities for product and process innovation. Such innovation contributes to the development of more competitive products and enhances productivity throughout the production cycle ([Yogia et al., 2023](#)). Accordingly, AI adoption represents a new strategic direction for the development of keris MSMEs in Sumenep, aligning traditional craftsmanship with contemporary digital transformation.

The application of AI technologies provides a viable solution based on its core capabilities, including learning, reasoning, creativity, and self-correction (Pongtambing et al., 2023). The integration of AI within MSME operations constitutes a progressive step toward sustaining competitiveness and achieving sustainable business growth. Consequently, the role of AI in strategic management can be optimized to support the long-term development of keris MSMEs in Sumenep ([Lahamid et al., 2023](#)).

In practical terms, AI contributes to more effective marketing and sales strategies, addressing one of the primary challenges faced by MSMEs namely, reaching broader markets through efficient promotion. Additionally, AI enables more efficient inventory management by assisting MSMEs in monitoring stock levels, predicting demand, and minimizing waste. AI driven business process automation further supports MSMEs by reducing reliance on time consuming manual tasks and optimizing human resource utilization. Through automation, MSMEs can allocate greater focus to strategic activities such as product development, strategic planning, and the enhancement of customer service quality.

The Role of AI in Digital Learning for MSMEs

The machine learning capabilities embedded in Artificial Intelligence (AI) constitute a fundamental pillar in driving the digital transformation of Micro, Small, and Medium Enterprises (MSMEs). Machine learning enables systems to continuously process and analyze large volumes of data while identifying latent patterns that are not readily detectable through conventional analytical methods. In the context of keris MSMEs in Sumenep, this capability holds strategic value, as business activities that were previously conducted through traditional practices have begun to generate digital data traces through online transactions, social media interactions, and digital marketing platforms. AI leverages these data sources to develop a more comprehensive understanding of consumer behavior, market demand dynamics, and product preferences at a granular level ([Shetty & Reddy, 2025](#)).

The findings indicate that the application of machine learning based AI allows keris MSMEs in Sumenep to obtain more accurate and real-time market insights. By analyzing sales data, customer reviews, and consumer interaction patterns on social media, AI systems are able to identify trends in consumer interest related to specific keris types, design motifs, pricing strategies, and symbolic values perceived as attractive by the market. Such insights provide a robust foundation for MSME practitioners to refine product designs, define more precise market segmentation, and formulate marketing strategies that align with contemporary consumer characteristics. In this regard, digitalization is not merely understood as the adoption of digital tools, but rather as a data driven business learning process that facilitates more rational and measurable decision-making.

Beyond its contribution to marketing and consumer analysis, AI plays a significant role in optimizing supply chain management and production processes within MSMEs. AI systems can process historical sales data and demand trends to forecast future market

needs, enabling MSME operators to plan production more efficiently. This capability is particularly relevant for keris MSMEs in Sumenep, given that keris production requires careful planning of raw materials, production timelines, and artisan skills that cannot be mobilized instantaneously. With AI support, MSMEs are better able to optimize production schedules, manage raw material inventories accurately, and avoid overstocking or stock shortages that may increase operational costs (Pasupuleti et al., 2024). These findings demonstrate that AI implementation contributes directly to business efficiency and the sustainability of traditional craft production.

In the realm of digital marketing, the study reveals that AI enables MSMEs to implement more targeted and personalized marketing strategies. AI-based consumer data analysis assists MSME operators in designing marketing campaigns that correspond to customer characteristics and interests across social media, online marketplaces, and other digital platforms. AI systems are capable of identifying consumer behavior patterns, optimal interaction timing, and content types with high engagement potential. As a result, keris products from Sumenep gain broader visibility in digital markets while simultaneously establishing a stronger and more relevant brand image for targeted consumer segments. This level of marketing personalization also contributes to increased customer loyalty, as consumers perceive a more tailored and meaningful engagement aligned with their preferences.

The integration of AI into customer service represents an integral component of the digitalization process for keris MSMEs in Sumenep. AI based chatbots enable MSMEs to deliver responsive and consistent services without being constrained by limited human resources. These systems can address customer inquiries, provide product information, and handle complaints efficiently and accurately (Badghish & Soomro, 2024). The findings indicate that AI driven customer service not only enhances operational efficiency but also improves overall customer satisfaction. Prompt and informative interactions foster consumer trust and strengthen long-term relationships between MSMEs and their customers.

Overall, the findings affirm that AI, through its machine learning capabilities, functions as a primary catalyst in the digitalization of keris MSMEs in Sumenep. AI not only enhances operational efficiency and marketing effectiveness but also establishes a continuous business learning framework. By leveraging data optimally, traditional craft MSMEs can adapt to the demands of the digital market while preserving the cultural identity and local wisdom embedded in Sumenep keris products.

AI Reasoning Capabilities in Strengthening MSME Digitalization

Artificial Intelligence (AI) has increasingly emerged as a critical technology shaping competitive dynamics across nearly all sectors (Narne et al., 2024). Amid globalization and the rapid acceleration of digital transformation, digitalization has become a strategic necessity for Micro, Small, and Medium Enterprises (MSMEs) to survive, grow, and remain competitive in increasingly dynamic markets (Badghish & Soomro, 2024). For traditional craft-based MSMEs such as the keris industry in Sumenep, digitalization extends beyond the mere adoption of digital tools or production automation. It also encompasses the capacity of intelligent systems to support complex business decision-making processes. Within this context, the reasoning capability of AI represents a key element in strengthening MSME digital transformation.

AI reasoning refers to the system's ability to derive conclusions, solve problems, and generate recommendations through logical processing and multidimensional analysis of

information. Unlike descriptive data analysis, AI reasoning enables systems to understand causal relationships, consider multiple variables simultaneously, and simulate alternative decision scenarios. Interview findings involving local government representatives indicate that AI reasoning is perceived as having substantial potential to advance the digital transformation of keris MSMEs in Sumenep, particularly by enhancing the quality of business planning and strategic decision-making.

AI reasoning capabilities assist MSME operators in making more intelligent and data-driven business decisions. AI systems can process both historical and real time data to provide recommendations related to inventory management, production planning, and pricing strategies that are more competitive and responsive to market conditions. In practice, this AI driven support reduces MSMEs' reliance on intuition, which has traditionally dominated business management in craft-based enterprises. Instead, decision-making processes increasingly shift toward objective, measurable, and evidence-based analyses, thereby minimizing the risk of strategic errors.

In product development, AI reasoning plays a significant role in fostering innovation among keris MSMEs in Sumenep. By analyzing customer feedback, product reviews on digital platforms, and trends within the craft and creative economy sectors, AI systems are able to identify opportunities for developing designs, motifs, and product features that better align with contemporary market preferences. Notably, AI reasoning enables the integration of market demands with the cultural values and local wisdom inherent in Sumenep keris craftsmanship. As a result, product innovation does not lead to cultural homogenization but instead reinforces local identity within the digital marketplace.

AI reasoning also contributes substantially to business risk management. Research findings indicate that AI can analyze historical data, demand fluctuations, and market trends to predict potential risks affecting business sustainability, such as increases in raw material costs, shifts in consumer preferences, or market demand volatility ([Verma & Pandiya, 2024](#)). These predictive insights provide a solid foundation for keris MSMEs in Sumenep to develop more responsive and adaptive risk mitigation strategies. With AI reasoning support, MSME operators are not merely reactive to change but are better equipped to anticipate future uncertainties.

Beyond internal business operations, AI reasoning enhances the personalization of customer experience. By processing data on consumer interactions, preferences, and behavior across multiple digital channels, AI systems can recommend products that are most relevant to individual customers. The findings demonstrate that AI based personalization increases customer satisfaction, as consumers perceive a more tailored experience aligned with their needs and interests. Over time, this strategy contributes to stronger customer loyalty and enhanced brand value for keris MSMEs in Sumenep within the digital market.

From an organizational perspective, AI reasoning plays a critical role in improving operational efficiency through the optimization of business processes ([Sirait & Apriadi, 2025](#)). AI systems can identify inefficiencies within supply chains, production workflows, and resource allocation, and subsequently provide recommendations that enhance productivity. These findings suggest that AI adoption not only improves short term performance but also supports the long-term sustainability of traditional craft MSMEs.

Overall, AI reasoning capabilities constitute a strategic factor in strengthening the digitalization of keris MSMEs in Sumenep. AI functions not merely as a technical support tool, but as a decision-support system that transforms managerial thinking, business management practices, and market engagement strategies. By leveraging AI reasoning

effectively, keris MSMEs in Sumenep are better positioned to adapt to the digital economy while preserving cultural identity and local wisdom as distinctive competitive advantages.

AI Capabilities in Fostering MSME Creativity

The creative capabilities of Artificial Intelligence (AI) play a strategic role in driving the creative transformation of Micro, Small, and Medium Enterprises (MSMEs), particularly within traditional craft sectors such as the keris industry in Sumenep. Creativity in AI is not merely understood as a technical ability to generate design variations, but rather as the system's capacity to produce novel ideas, propose innovative solutions, and support human creative processes in ways that were previously unattainable through conventional approaches ([Zhang et al., 2025](#)). Within the MSME context, this capability creates new opportunities for innovation without undermining the cultural characteristics and local wisdom embedded in traditional products.

AI supports internal creative processes within MSMEs in a more efficient and structured manner. AI based design technologies enable rapid prototyping through digital simulations, allowing MSME practitioners to evaluate multiple design alternatives prior to entering the production stage. AI systems are also capable of offering creative suggestions during the product design process, such as recommending combinations of motifs, forms, or ornaments with high market appeal. These findings are consistent with informant perspectives indicating that AI utilization assists artisans in developing new design ideas while preserving the traditional values that define Sumenep keris craftsmanship.

Furthermore, AI plays a significant role in product design innovation for Sumenep keris MSMEs. Through deep learning algorithms and generative design approaches, AI can produce unique and aesthetically appealing design alternatives that align with evolving market preferences ([Wang et al., 2025](#)). AI systems analyze extensive collections of traditional keris design patterns, identify highly valued visual elements, and integrate them with contemporary design trends to generate novel variations. With AI driven creativity, MSMEs can introduce innovative keris collections, expand market segments, and maintain cultural identity simultaneously.

AI creativity also contributes substantially to product personalization. Research findings demonstrate that AI enables the development of keris products tailored to individual customer preferences. By processing data related to design tastes, symbolic values, and functional requirements, AI systems can recommend or even design keris pieces that are uniquely customized for each customer. This personalization approach not only enhances customer satisfaction but also creates exclusive and meaningful purchasing experiences. Over time, such strategies strengthen customer loyalty and increase the added value of Sumenep keris products in digital markets.

Beyond product design, AI creativity plays an important role in brand narrative and storytelling development. The findings indicate that AI assists MSMEs in crafting strong, authentic, and compelling brand narratives by integrating historical, cultural, and philosophical elements inherent in Sumenep keris. AI systems can synthesize diverse information sources to produce consistent and engaging product stories that are subsequently utilized in digital marketing content. Consistent with prior studies, generative AI has been extensively examined for its potential in creative design and storytelling processes ([Chen et al., 2025](#)). Strong brand narratives enable MSMEs to establish deeper emotional connections with customers while enhancing perceived brand value and market appeal at both national and global levels.

Overall, the findings affirm that AI's creative capabilities constitute a critical driver

in strengthening the competitiveness of traditional craft MSMEs. AI does not replace human creativity; rather, it functions as a creative partner that expands the scope of idea exploration and innovation. By strategically leveraging AI creativity, Sumenep keris MSMEs can develop innovative, personalized, and culturally rich products that are competitive in digital markets while ensuring the sustainability of local cultural heritage.

Conclusion

Based on the findings of this study, it can be concluded that the utilization of Artificial Intelligence (AI) demonstrates strong relevance in supporting the strengthening and digitalization of keris craft Micro, Small, and Medium Enterprises (MSMEs) in Sumenep. These enterprises have traditionally operated on a small, family-based scale and continue to face structural challenges, including limited competitiveness, restricted market access, and declining product relevance amid shifting modern consumer preferences. The results indicate that AI holds significant potential as a strategic solution for driving MSME digital transformation, not merely as an operational support tool, but as an intelligent system capable of enhancing efficiency, fostering innovation, and strengthening business competitiveness through real time analysis of sales data, consumer behavior, and market trends.

Furthermore, AI supports data driven business learning, facilitates more rational decision-making, and contributes to the optimization of supply chains, production processes, digital marketing strategies, and customer service delivery. From the perspectives of reasoning and creativity, AI functions as both a decision-support system and an innovative partner, assisting MSMEs in production planning, pricing strategies, risk management, and the development of keris products and designs that align with contemporary market demands while preserving cultural values and local wisdom. In addition, AI expands innovation opportunities through product personalization and the strengthening of brand narratives, which in turn enhance value creation and customer loyalty.

Overall, the integration of AI capabilities encompassing learning, reasoning, and creativity constitutes a strategic factor in reinforcing the digitalization and competitiveness of keris MSMEs in Sumenep. This integration not only supports business sustainability but also contributes to the preservation of local cultural heritage within the framework of the digital economy. Accordingly, future development efforts should prioritize inclusive and sustainable AI adoption, supported by appropriate policies and capacity-building initiatives, to ensure that AI implementation generates tangible benefits for the welfare of local communities.

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