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Implementation of Artificial Intelligence (AI)-Based E-Commerce to Enhance Digital Marketing for Fashion-Sector MSMEs in the Industry 5.0 Era: Systematic Literature Review 2022 – 2025

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Abstract: AI-driven e-commerce presents considerable prospects for Micro, Small, and Medium Enterprises (MSMEs) in the fashion industry to enhance digital marketing effectiveness and boost competitiveness in the era of Industry 5.0. Nonetheless, current research remains disjointed, with few studies bringing together AI, e-commerce, digital marketing proficiency, and MSME competitiveness into a cohesive model. This research conducts a systematic review of existing literature and outlines research trends on AI-driven e-commerce adoption among fashion-sector MSMEs from 2022 to 2025. We conducted a Systematic Literature Review (SLR) following the PRISMA 2020 protocol, supplemented by bibliometric analysis using VOSviewer. Of an initial 332 publications, 20 peer-reviewed journal articles met the criteria for qualitative synthesis. The results uncover primary research clusters focused on industry, AI technologies, MSME competitiveness, and the digital economy. Bibliometric mapping reveals a transition from adopting technology to implementing strategic AI applications that improve personalized marketing, customer relationship management, business performance, and sustainable competitiveness. Nonetheless, obstacles related to organizational preparedness, digital proficiency, infrastructure, and AI literacy continue to hinder implementation. This research adds value by synthesizing AI-powered e-commerce and identifying future research avenues aligned with the human-centered and sustainable principles of Industry 5.0.

Keywords: MSMEs, Digital marketing, AI, Industry 5.0

INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) have long been recognized as crucial catalysts for economic advancement, job generation, innovation, and social well-being in both developed and developing nations. By fostering entrepreneurship, boosting regional development, and strengthening economic stability in uncertain times, they extend beyond creating economic value. In Indonesia, MSMEs account for over 60 percent of gross domestic product (GDP) and make up almost 97 percent of the national labor force (Coordinating Ministry for Economic Affairs of the Republic of Indonesia, 2025). Nonetheless, the increasingly dynamic business landscape, characterized by globalization, digital disruption, changing consumer behavior, and technological innovation, has heightened competitive

pressures on MSMEs. Consequently, digital transformation has become an essential strategic objective instead of an optional business initiative.

Digital transformation for MSMEs goes beyond technology adoption; it represents a change in business paradigms, including business models, organizational processes, and human resource skills (Kurniawati et al., 2021). With an effective strategy, digitalization can boost competitiveness by improving productivity and efficiency while broadening market access through digital platforms. In the current digital age, digital marketing has emerged as a vital approach since it allows companies to connect with customers more efficiently via online platforms. By using business technologies like data analytics and digital marketing automation, organizations can increase brand awareness, improve targeting precision, and cultivate customer engagement (Rini Wijayaningsih et al., 2024).

Conversely, the embrace of e-commerce serves as a crucial element in boosting competitiveness, as it streamlines transactions, broadens markets, and enhances operational efficiency. With proper technological backing, e-commerce can seamlessly merge with a digital marketing approach, thus establishing a cohesive marketing and sales environment. This partnership among digital marketing, e-commerce, and business technology will allow businesses to create a customer experience that is increasingly personalized, quicker, and more pertinent. As per McKinsey & Company (2025), the digital habits that developed during the COVID-19 pandemic have become lasting, resulting in what they refer to as “sticky consumer behavior” which requires more advanced data-driven personalization tactics. Social media marketing has evolved from a simple passive communication platform into a sophisticated digital environment that actively affects consumer buying choices and preferences (Appel et al., 2020).

From a functional standpoint, AI applications in digital marketing comprise content customization, ad campaign enhancement, machine learning-driven product suggestions, and customer support automation via virtual agents. In Indonesia, research by Hapsari (2020) revealed that micro, small, and medium-sized enterprises (MSMEs) utilizing digital platforms like marketplaces and social media saw a notable rise in revenue compared to those that had not digitized their operations. Based on official statistics from 2024, the total number of MSMEs in Sidoarjo Regency was 153,288 business entities. MSMEs in Sidoarjo cover multiple sectors, including handicrafts, culinary arts, and fashion, and together showcase their products through the MSME Gallery to support the advancement of Sidoarjo’s MSMEs to the next level (Sholihah, 2026).

The fashion industry is among the sectors witnessing swift expansion in accordance with evolving trends and consumer tastes. AI technology significantly contributes to improving operational efficiency and boosting the fashion sector’s competitiveness in the worldwide market. Within this framework, artificial intelligence (AI) has emerged as a crucial factor influencing the development of today’s fashion industry. Through its capacity to swiftly and precisely analyze data, AI has induced substantial transformations throughout different phases of the fashion production and distribution cycle, ranging from design to marketing. Furthermore, AI technology facilitates product customization by examining consumer preferences derived from their past data, which in turn enhances customer loyalty to particular fashion labels. Predictive algorithms enable businesses to examine buying behaviors, spot new fashion trends, and anticipate future shifts in consumer tastes.

Nevertheless, numerous entrepreneurs have not managed to completely take advantage of these opportunities because of constraints in human resources, technological infrastructure, and insufficient understanding of the significance of digital literacy. This disparity presents significant difficulties for local business owners, especially when contending with global rivals who are more agile with technology. Indonesia, being a varied and fast-growing nation, has seen a notable increase in the quantity of MSMEs that play a vital role in its economy (Ardiansyah & Wahyono, 2021; Iskandar et al., n.d.; Supriandi, 2022). SMEs currently

encounter heightened competition, evolving customer demands, and the necessity to quickly adjust to stay pertinent in the digital environment (Apriyanti & Yuvitasari, 2021; Supandi et al., 2022; Tambunan et al., 2021; Wardhani et al., 2023). Hence, it is essential to comprehend how SMEs in Indonesia are adopting innovation strategies to improve competitiveness and stimulate growth in the digital age. Thus, it is essential to comprehend how AI has been applied in the realm of SMEs, the obstacles they encounter, and the strategic opportunities it presents within the concept of Society 5.0.

This research intends to perform a Systematic Literature Review (SLR) utilizing the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to investigate the Use of Artificial Intelligence (AI)-Driven E-Commerce to Improve Digital Marketing for MSMEs within the Fashion Industry during the Industry 5.0 Era: A Systematic Literature Review, 2022–2025. The findings of this research are anticipated to offer important scientific and practical knowledge for SME leaders, researchers, and policymakers in developing efficient and sustainable AI deployment strategies in the continuously changing landscape of the digital age.

METHOD

This research utilizes a systematic literature review to discover and integrate studies on the synergy between the use of Artificial Intelligence (AI)-driven e-commerce and digital marketing skills in boosting the competitiveness of MSMEs in the Industry 5.0 age. This approach allows researchers to guarantee that the integration of current discoveries is performed transparently and can be replicated (Page et al., 2021). This research adheres to the PRISMA guidelines to guarantee clarity and reduce bias in the selection of articles. PRISMA provides standardized protocols for systematic reviews (Saputro & Santoso, 2025). Additionally, we used VOSviewer to conduct a bibliometric analysis and illustrate keyword networks, author collaborations, and research patterns related to the use of artificial intelligence (AI) in improving the competitiveness of SMEs (Ilham Wijaya et al., 2025).

Thus, the combination of the Systematic Literature Review (SLR) method, PRISMA, and bibliometric analysis provides a comprehensive approach to systematically examining the synergy between the application of Artificial Intelligence (AI)-based e-commerce and digital marketing capabilities in enhancing the competitiveness of SMEs in the Industry 5.0 era, whilst mapping research developments in this field.

Research Questions:

RQ1: What are the most prevalent AI technologies being implemented in e-commerce for fashion-sector MSMEs, and what is their impact on digital marketing?

RQ2: What are the trends in publications and the intellectual framework of research on AI-commerce for fashion-sector MSMEs during the 2022–2025 period?

Protocol Development

1. Develop a search string tailored for Scopus to ensure coverage of relevant studies.
2. Set inclusion criteria:
 - a. Articles in Indonesian or English.
 - b. Articles from scientific journals indexed in Scopus or available on Google Scholar.
 - c. Discussing the E-commerce, Digital Marketing, Fashion Sector and MSMEs in Indonesia.
 - d. Possessing an accessible DOI.
 - e. Published between 2022 and 2026.
3. Set exclusion criteria:
 - a. Articles in the form of conference proceedings without peer review.

- b. Articles that do not directly discuss the E-commerce, Digital Marketing, Fashion Sector or MSMEs.
- c. Articles without full text.
- d. Duplicate articles across databases.

Data Collection Stage

Searching for data using Publish or Perish

1. Configure Publish or Perish to search the Scopus and Google Scholar databases.
2. Enter a search string and apply filters (date, document type, language). Keywords are combined using the Boolean operators AND and OR to retrieve relevant to the research topic. The publication range used is (2020-2026) as its relevancy to the current post-COVID-19 pandemic context.
((*"artificial intelligence"* OR *"AI"* OR *"machine learning"* OR *"deep learning"* OR *"generative AI"*)
AND (*"e-commerce"* OR *"ecommerce"* OR *"online retail"*)
AND (*"digital marketing"* OR *"social media marketing"*)
AND (*"SME"* OR *"UMKM"* OR *"small business"* OR *"fashion"* OR *"apparel"*))
AND (LIMIT-TO (PUBYEAR, 2022) OR LIMIT-TO (PUBYEAR, 2023) OR LIMIT-TO (PUBYEAR, 2024) OR LIMIT-TO (PUBYEAR, 2025))
3. Export the dataset in RIS or CSV format for further analysis.

The PRISMA Article Selection Process

The article selection process was carried out in accordance with the PRISMA 2020 guidelines, as follows:

1. Identification: Articles were identified through searches of the Scopus and Google Scholar databases.
2. Screening: Articles were screened based on their titles and abstracts.
3. Eligibility: Articles that passed the screening stage were analyzed in full.
4. Inclusion: Articles that met the criteria were included in the final analysis.

Bibliometric Analysis Using VOSViewer

In addition to qualitative analysis, this study utilizes bibliometric analysis using VOSviewer software to map the development of research on the Digital Marketing of MSMEs. The stages of bibliometric analysis include:

1. Importing article data from Scopus in RIS or CSV format.
2. Cleaning the data to remove duplicate keywords.
3. Keyword co-occurrence analysis to identify dominant research topics.
4. Network visualization to examine relationships between research topics.
5. Density visualization to assess the intensity of research.

The results of the VOSviewer visualizations were used to identify:

1. Research clusters.
2. Topic trends.
3. Relationships between concepts within research on E-commerce Adoption by MSMEs.

Data Analysis Techniques

The data obtained from the selected articles were analyzed using two approaches:

1. Thematic analysis (Content Analysis)
Used to identify:
 - a. Adapting Artificial Intelligence (AI)-Based E-Commerce in the Industry 5.0 Era
 - b. Digital Marketing Capabilities
 - c. Fashion Section

- d. MSME Competitiveness
- 2. Bibliometric Analysis
 - Used to identify:
 - a. Research clusters
 - b. Research topic trends

The analysis was conducted using VOSviewer to generate a network visualization illustrating the development of research on Artificial Intelligence (AI)-Based E-Commerce to Enhance Digital Marketing for Fashion-Sector MSMEs in the Industry 5.0 Era.

RESULTS AND DISCUSSION

Selection of Literature According to the PRISMA 2020 Guidelines

The PRISMA diagram in Figure 1 represents the systematic approach of our literature review, outlining the identification of studies, their screening, and the final selection. It improves methodological clarity and underscores the importance of the eighteen articles featured in our analysis. The identification phase involved looking for articles in the Scopus and Google Scholar databases using keywords associated with ecommerce, AI, digital marketing, the fashion industry, and MSMEs competitiveness in Indonesia. The first search produced 332 articles related to the research subject. After eliminating duplicates, 56 duplicate articles were found in the Scopus and Google Scholar databases; 26 articles were automatically excluded because they were not journal articles (such as editorials, book chapters, or reports), did not have a DOI, and were irrelevant to the digital marketing field for MSMEs in Indonesia. An additional 40 articles were eliminated since they did not pertain to the Indonesian context and concentrated on MSMEs in the fashion industry.

This resulted in 210 articles that moved on to the screening phase based on their abstracts and titles. At this point, 154 articles were discarded as they either did not specifically focus on the implementation of AI-commerce or were not pertinent to the context of digital marketing in Indonesia. Following this, a total of 56 articles were thoroughly examined to evaluate the appropriateness of the study. A sum of 28 articles was excluded due to lack of full accessibility, and 5 articles were removed because they did not focus on AI-commerce for improving digital marketing for fashion sector MSMEs in industry 5.0, lacked a clear research method, or did not present empirical data or policy analysis. In total, 20 articles that satisfied the inclusion criteria were located and utilized in the SLR analysis. The majority of these articles were released between 2022 and 2025, suggesting that studies on MSMEs in the industry 5.0 era have progressed quickly in recent years. The mapping analysis process following PRISMA guidelines is illustrated in Figure 1.

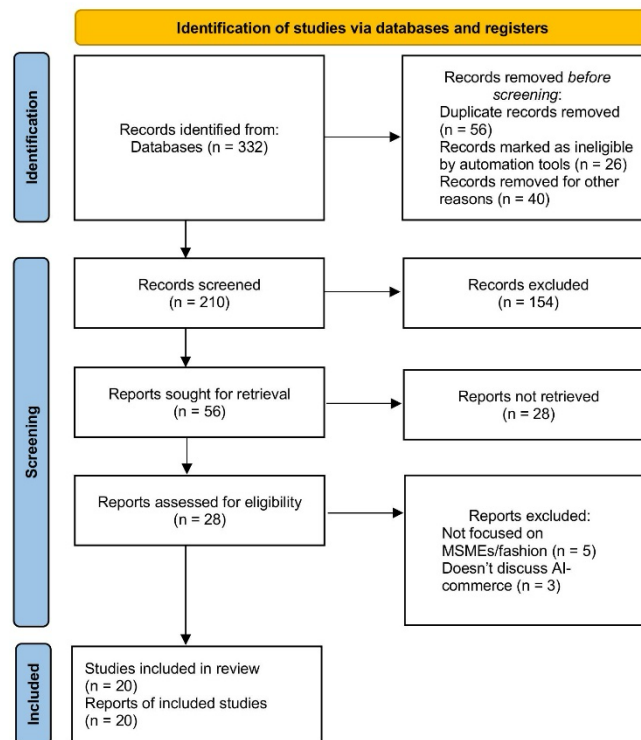


Figure 1. Results of the PRISMA-based literature review on the digital marketing of MSMEs fashion sector in Indonesia

In this Systematic Literature Review, a total of 20 journal articles fulfilled all inclusion criteria and were analyzed. The limited number of eligible studies suggests that empirical research that specifically combines Artificial Intelligence, e-commerce, digital marketing capabilities, MSMEs in the fashion sector, and Industry 5.0 is still restricted, even with the swift advancement of research in the Artificial Intelligence area. These results emphasize a notable research void and stress the necessity for additional studies on AI-enhanced digital marketing approaches for MSMEs within the fashion industry.

Bibliometric Network Analysis

The bibliometric mapping produced with VOSviewer displays a strongly interconnected research environment related to AI-driven e-commerce and digital marketing for MSMEs. The network visualization reveals five major thematic clusters, depicting the complex nature of contemporary research. Instead of being separate subjects, the clusters reveal significant connections between technological innovation, organizational capability, industrial transformation, and business performance.

The primary and most extensive cluster revolves around the keyword industry, functioning as the main node that links various related ideas, such as data, small business, fashion industry, textile, impact, future, and e-commerce adoption. The significance of this cluster suggests that contemporary research more frequently regards AI implementation as part of a larger industrial transformation instead of merely seeing it as technological adoption. The close connection between industry and data indicates that decision-making based on data has emerged as the cornerstone for AI-powered digital marketing strategies. Fashion-sector SMEs are progressively using customer analytics, predictive algorithms, and smart recommendation systems to enhance consumer interaction and optimize marketing effectiveness.

The second cluster emphasizes the competitiveness of MSMEs, indicated by terms like micro, small, medium, enterprises, business performance, practices, and COVID. The strong connection between these terms suggests that the adoption of AI is often linked to enhancements

in organizational performance. The majority of studies analyzed indicate beneficial effects of AI implementation on operational efficiency, customer satisfaction, sales performance, and market growth via digital platforms. Nonetheless, the bibliometric network indicates that organizational capability serves as a significant mediator between the adoption of technology and gaining a competitive edge. In other terms, AI technologies by themselves cannot enhance competitiveness without adequate digital skills and management preparedness.

The third cluster signifies technological advancements, including terms like machine learning, internet, e-commerce platform, challenge, and impact. This cluster shows that machine learning remains the primary AI technology MSMEs use for customer segmentation, personalized recommendation systems, chatbot services, sentiment analysis, and predictive marketing. Nonetheless, the concurrent emergence of the keyword challenge suggests that technology adoption still faces obstacles linked to insufficient digital literacy, financial resources, organizational capacity, and technological infrastructure, especially within small and micro businesses.

Another significant cluster emphasizes the digital economy framework using keywords like digital economy, SME, e-commerce, digital tool, and factor. These connections demonstrate that the adoption of AI is progressively seen as a component of a cohesive digital business ecosystem instead of a standalone technological advancement. Recent research highlights the collaboration among AI, digital marketing skills, customer relationship management, and platform-driven business structures to boost sustainable organizational competitiveness. This viewpoint is in strong harmony with Industry 5.0, which advocates for human-centric, resilient, and sustainable digital change.

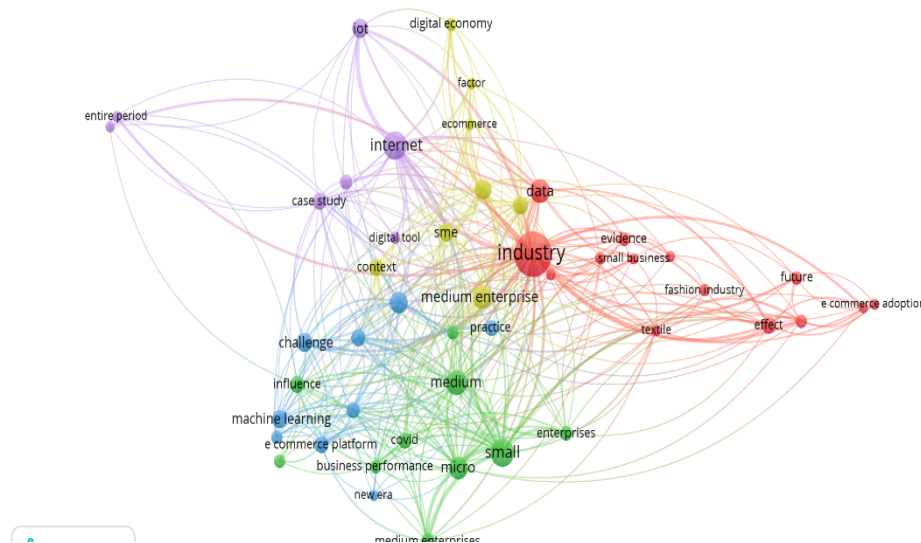


Figure 2. Network Visualization

Overlay Visualization Analysis

The overlay visualization offers significant insights into the chronological development of research subjects throughout the 2022–2025 publication timeframe. Previous research, indicated by blue nodes, primarily concentrated on fundamental subjects like the Internet, IoT, digital economy, case studies, and challenges. These publications mainly investigated how prepared organizations are for digital transformation and the early adoption of digital technologies by MSMEs.

In comparison, newer research, indicated by green and yellow nodes, focuses more on industry, data, e-commerce adoption, impact, and future trends. The rise of these keywords indicates a significant change in academic focus from technology adoption to assessing the organizational and strategic effects of AI implementation. Rather than just assessing if MSMEs utilize digital technologies, modern studies explore how AI enhances customer experience,

business intelligence, operational efficiency, marketing effectiveness, and sustainable competitiveness.

This development signifies the shift from Industry 4.0 to Industry 5.0. While Industry 4.0 focused mainly on automation and digitalization, Industry 5.0 combines human intelligence with artificial intelligence to produce sustainable value generation. As a result, AI is being increasingly viewed not just as a functional technology but also as a strategic asset that facilitates tailored marketing, joint innovation, and customer-focused business frameworks.

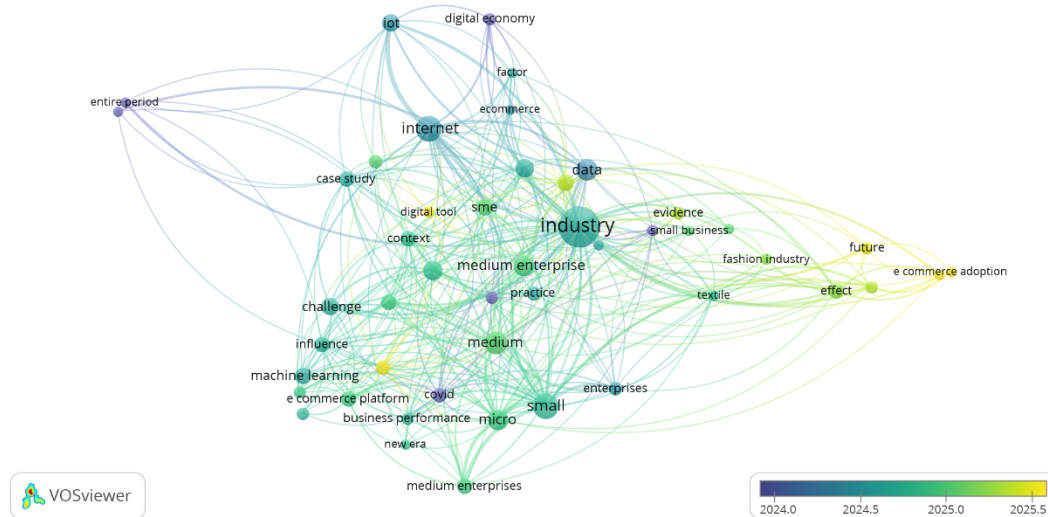


Figure 3. Overlay Visualization

Density Visualization Analysis

The density visualization shows the concentration of research topics based on the frequency of keywords. The most prominent area focuses on the keyword industry, with data, small, medium, micro, SME, and Internet following closely. This discovery validates that current research mainly explores industrial digital transformation and MSME competitiveness via AI-enhanced digital technologies.

Conversely, numerous concepts are still found in low-density regions, suggesting a somewhat restricted focus from researchers. Subjects like Generative AI, Explainable AI, virtual fitting, conversational commerce, omnichannel marketing, digital twins, AI ethics, and sustainable AI feature only slightly in the existing bibliometric network, even though they are becoming more significant in Industry 5.0. These underexplored themes offer promising avenues for future research as they hold substantial potential to enhance customer experience, personalization, sustainability, and organizational resilience among MSMEs in the fashion sector.

The density analysis indicates that while AI adoption has emerged as a leading research subject, studies continue to focus on operational execution rather than sophisticated intelligent applications that can foster sustainable competitive advantage. This discovery reinforces the

notion that upcoming studies must combine emerging AI technologies with digital marketing abilities in the wider Industry 5.0 framework.

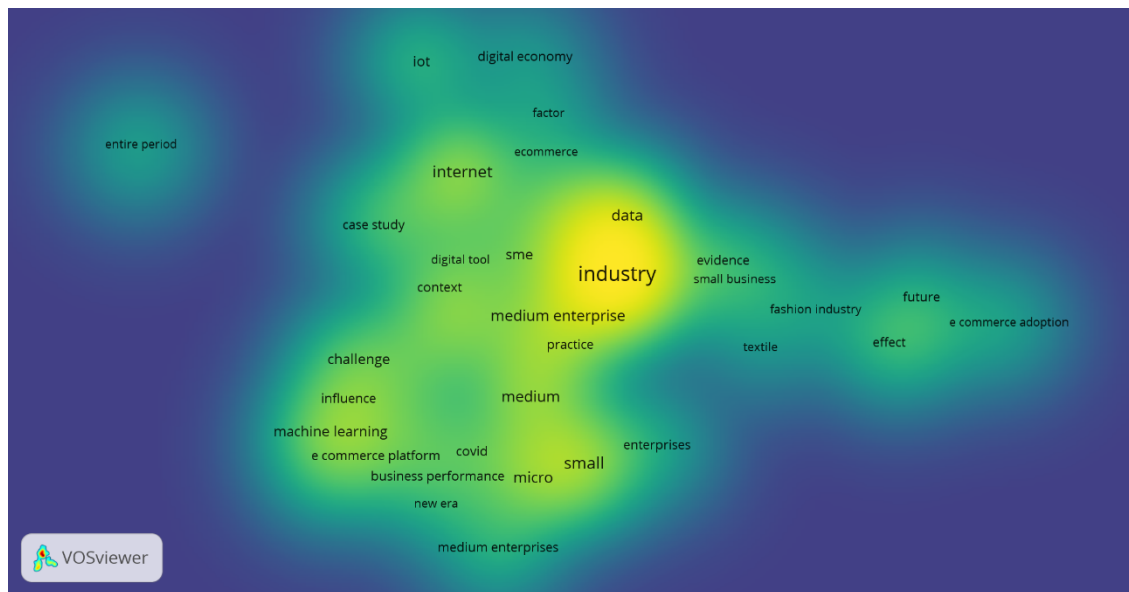


Figure 4. Density Visualization

Discussion

The combination of Systematic Literature Review results with bibliometric analysis offers extensive insights into the current research advancements related to AI-driven e-commerce adoption in fashion-sector MSMEs. The network visualization shows that industry, data, machine learning, and business performance act as key elements linking technological innovation with organizational competitiveness. In the meantime, the overlay visualization shows a slow shift from technology-based research to studies focused on strategic value generation, customer experience, and sustainable digital change.

Despite the rapid rise in publications from 2022 to 2025, the literature examined remains conceptually disjointed. Most research focuses on AI adoption, digital marketing, or e-commerce in isolation, while only a few explore the combined effects of these three elements within the Industry 5.0 context. As a result, empirical evidence showing how AI-powered e-commerce both boosts digital marketing capabilities and elevates MSME competitiveness remains limited.

This research helps to fill that void by showing that AI must be viewed not just as a technical advancement but as an organizational asset that enhances data-driven choices, tailored customer interactions, marketing automation, and sustainable business success. In the Industry 5.0 framework, effective AI deployment relies not just on technological preparedness but also on human skills, organizational development, ethical governance, and strategic integration throughout the digital business ecosystem. These results support the idea that upcoming research needs to prioritize creating cohesive AI-driven marketing strategies that include new technologies like Generative AI, Explainable AI, conversational commerce, virtual shopping experiences, and sustainable digital business models to enhance the long-term competitiveness of MSMEs in the fashion sector.

CONCLUSION

This research conducted a systematic review of existing knowledge regarding the use of Artificial Intelligence (AI)-driven e-commerce to improve digital marketing for fashion-sector MSMEs in the Industry 5.0 era, combining the Systematic Literature Review (SLR) method with bibliometric analysis through VOSviewer. In accordance with the PRISMA 2020 protocol, twenty peer-reviewed journal articles published from 2022 to 2025 satisfied the inclusion criteria and were analyzed to pinpoint dominant research themes, technological

developments, and potential research avenues. The PRISMA analysis reveals that while there has been a notable rise in publications on AI and digital transformation, only a small number of studies focus on the interconnectedness between AI-driven e-commerce, digital marketing capabilities, and fashion-sector MSMEs' competitiveness.

The bibliometric results indicate that the research environment is organized into five key thematic clusters, with industry, data, machine learning, business performance, and digital economy standing out as the most significant concepts. Network visualization shows that AI-driven e-commerce has transformed from a mere technological advancement into a strategic organizational asset that enhances personalized marketing, customer relationship management, predictive analytics, and data-informed decision-making. Overlay visualization highlights a temporal transition from research concentrating on digital adoption and technological preparedness to studies prioritizing organizational performance, business sustainability, and smart marketing ecosystems consistent with the tenets of Industry 5.0. At the same time, density visualization highlights industry, data, SMEs, and business performance as key research areas, while more advanced topics like Generative AI, Explainable AI, conversational commerce, AI ethics, virtual shopping experiences, and sustainable AI applications are still relatively overlooked.

The analysis of the examined literature validates that the application of AI enhances digital marketing outcomes by boosting customer engagement, personalizing marketing efforts, increasing operational efficiency, and improving market responsiveness. However, effective implementation relies not just on the availability of technology but also on organizational preparedness, digital proficiency, management dedication, skillful human resources, and a supportive digital framework. These results indicate that AI should be considered an integrated strategic asset instead of just a technological resource, allowing fashion-sector MSMEs to establish sustainable competitive edges in progressively evolving digital markets.

This research adds to the current body of work by offering an extensive synthesis that integrates systematic review and bibliometric mapping to deliver a complete understanding of AI-driven e-commerce adoption in the realm of fashion-sector MSMEs. This review, unlike earlier studies that mainly focus on AI, e-commerce, or digital marketing separately, combines these elements within the Industry 5.0 framework, providing an expanded conceptual view on how smart digital technologies generate organizational value.

In spite of these contributions, this research has various limitations. The analysis focused on journal articles published from 2022 to 2025 and depended solely on publications that had full texts available and DOI identifiers. As a result, pertinent research published beyond the chosen databases or timeframe might not have been included. Additionally, the bibliometric analysis examined keyword co-occurrence and thematic mapping but did not perform empirical validation of the causal links between AI adoption, digital marketing capability, and MSME competitiveness.

Future studies should broaden the research scope by including larger bibliographic databases, long-term empirical investigations, and mixed-method approaches to confirm the practical effects of AI adoption. Specifically, advanced technologies like Generative AI, Explainable AI, large language models (LLMs), AI-driven recommendation systems, virtual fitting technologies, and conversational commerce merit increased academic focus, particularly concerning their ability to enhance sustainable digital marketing strategies, improve customer experiences, and boost the long-term competitiveness of fashion-sector MSMEs within the human-centered and resilient framework proposed by Industry 5.0.

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