INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN MULTIDISCIPLINARY EDUCATION

ISSN (print): 2833-4515, ISSN (online): 2833-4531

Volume 04 Issue 08 August 2025

DOI: 10.58806/ijirme.2025.v4i8n05 Impact factor- 6.748

Page No. 776-783

The Effect of Digitalization on Food Sector Smes' Competitiveness and Product Quality in Attracting Global Markets

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ABSTRACT: SMEs in the food sector, with the trend of intense competition in the global food business, Micro, Small, and Medium Enterprises (MSMEs) face huge pressure to produce healthier, quality, and sustainable food products that markets call for. Poor access to resources and finance constrains the innovation and uptake of digital technology by MSMEs to become more competitive. This research aims to evaluate how digitalization may help SMEs in the food sector increase competitiveness, efficiency, and product quality of food industry SMEs. This study utilizes a quantitative approach with the survey method of MSMEs who utilize digital technology in marketing and operations. The results of research show that marketing facilities, proper management of raw materials, and enhancing the quality of products have a positive impact on digitalization. Digitalization has been found to assist in enhancing market access through e-commerce as well as enhancing the ability of MSMEs to compete in the global market.

KEYWORDS: Digitalization, SMEs, Food Sector, Competitiveness, Sustainability.

INTRODUCTION

In the global food sector, competition is a matter of life and death, triggered by soaring customer expectations of healthier, more sustainable, and higher quality products. SMEs must balance their plans to meet market demand with industrial changes. Their limited resource capabilities do not give them enough room to adopt sophisticated marketing strategies or explore digital ways to optimize customer engagement and execute their operational lines successfully (Song et al., 2021). These factors make SMEs face many unique challenges and opportunities in the food sector. One of the most restrictive factors in the business is the limited access to capital that largely makes it unable to invest in innovation, marketing, and the application of various digital technologies that are key to maintaining competitive advantage (Cuevas-Vargas et al., 2021).

According to the data, the community in Balong Hamlet, Donoharjo, Ngaglik, Sleman, Yogyakarta, previously only sold the red chili harvest in fresh form without any further processing, so it was very dependent on market price fluctuations and harvest seasons (Nugroho, 2021). Entering the digitalization era, innovations in the chili processing industry in Indonesia have experienced significant developments. If previously chili was only sold in raw form or processed into chili sauce as a complement to food, now chili-based products have evolved into practical and attractive ready-to-eat foods. One example is sambal lauk packaging that not only contains chili sauce but also comes with a variety of side dishes in one package, such as those available in the form of cans (MNews, 2021). This innovation not only makes it easier for consumers to enjoy chili sauce with complete side dishes instantly but also encourages an increase in national consumption of chili sauce. This is reflected in data from the National Food Agency, which noted that Indonesia's per capita chili consumption reached a record high in 2023, at 2.27 kg/capita/year, an increase from previous years (databoks, 2024).

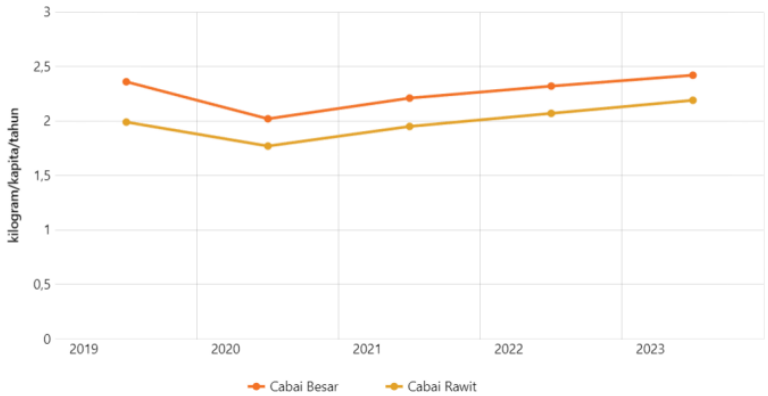

Figure 1. chili pepper usage increase data. Sumber: Ahdiat/databoks (2024)

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The ability to adapt to the digitalization era is a key factor in maintaining competitiveness, especially for traditional industries such as the food sector. Digital transformation has opened up new opportunities in product development and market expansion. The change from selling raw chili peppers to ready-to-eat chili sauce products complete with side dishes in canned packaging shows how adaptation to digitalization allows the creation of added value and new appeal for modern consumers who prioritize practicality. In Indonesia, especially SMEs in the food sector, have many challenges. Capital limitations are one of the most significant challenges faced by small and medium enterprises (SMEs) in the food sector. Access to adequate capital is essential to support growth, innovation, and competitiveness, especially in today's fast-growing markets, where consumer preferences, technology, and regulations continue to change (Amoa-Gyarteng & Dhliwayo, 2024). In many countries, government support for small and medium enterprises (SMEs) in the food sector is still limited, thus hindering their growth and ability to compete effectively. Although some aid programs do exist, they often lack the scope, accessibility, or flexibility needed to meet the business's various special needs. Many existing programs are not in line with the operational realities faced by SMEs, such as challenges related to funding, licensing, certification, and the implementation of new technologies (Cuevas-Vargas et al., 2021). As a result, SMEs in the food sector often have difficulty competing with large companies that are better prepared to adapt quickly to market changes and consumer demand. The food sector is one of the most competitive industries globally, driven by high consumer demand, continuous innovation, and a large number of players competing for market share.

The purpose of this study is to evaluate how digitalization may help SMEs in the food sector increase competitiveness, efficiency, and product quality. This research directly attempts to generate practicable strategies that allow SMEs to overcome the obstacles facing them by examining the role of digital tools in marketing, raw material management, and operations. Therefore, this study proposes the following research question: First, how does digitalization affect the internationalization capabilities of SMEs in the food sector? Second, how does e-commerce play a role in expanding market access for food sector SMEs?. Lastly, what are some of the main obstacles facing SMEs in the adoption of digital technology?

LITERATURE REVIEW

Small and Medium Enterprises

The study will define SMEs according to (Gaweł et al., 2023) the most recent definition on the basis on their employment with small SMEs having under 50 employees and medium SMEs under 300 employees, according to World Bank guidelines. This research will also examine any distinguishing features specific to the Indonesian economy prepared by (Melo et al., 2023). Besides that, it will extend the usual definition of SMEs to capture delivery and platform-based startups which, though few in workforce, can operate at wide outreach and have magnified value propositions (Lopez-Torres, 2023).

Also, it will study the challenges and opportunities faced by SMEs during their transition to the digital economy-namely, the integration of digital technologies that will reshape both business processes and marketing strategies (Yordanova et al., 2024). The study will also focus on other critical determinants, such as inadequate availability of adequate financial resources and certain cybersecurity apprehensions, and how SMEs that cross these barriers can reflect positively on their operating conditions in the global market (Verdecchia et al., 2022). Thus, this study brings greater emphasis to a greater appreciation for understanding SMEs in terms of their role in the modern economy and the effect of their digital transformation process on development and internationalization.

Marketing Facilities

Marketing facilities serve as an important link between manufacturers and consumers, therefore, their development affects the efficiency of product distribution and the level of customer experience (Butollo & Schneidemesser, 2022). Marketing facilities are not only good for visibility, but they also enhance brand loyalty and consumer connection (Sabihaini et al., 2023). According to (Cuevas-Vargas et al., 2021) found that companies that invest in innovative, user-centered facilities, such as interactive kiosks, AR/VR tools, and live customer care, have higher customer retention rates. Localized marketing techniques, such as community events and pop-up stores, on the other hand, enable businesses to create experiences tailored to specific populations.

Competitiveness

Competitiveness is a multi-dimensional concept that captures an organization's capability to attain and sustain superior performance in a dynamic market environment (Cuevas-Vargas et al., 2021). According to (Ijomah et al., 2024) competitive advantage is one of the major pillars that can be achieved through cost leadership, differentiation, or focus strategies. This allows firms to offer unique value propositions, enabling them to position themselves favorably against competitors. Moreover, the globalized market environment increased the propensity of firms to continuously innovate, as consumer demand is constantly evolving. There is evidence to prove that competitiveness today depends on technological integration, operational efficiency, and the ability to leverage analytics in decision-making (Rong et al., 2024).

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Technological advancements and Innovation

Energy consumption is an important aspect in the digitalization process of MSMEs, especially in the food sector, which has high operational needs. The use of digital devices such as electronic payment devices and tools for making food often increases the energy burden (Simion et al., 2023). According to (Nazari & Musilek, 2023), without an efficiency strategy, digitalization can increase energy costs and create a conflict between efficiency and sustainability. This is a major challenge for MSMEs with limited resources.

Digitalization of SMEs

Digitalization of SMEs has been one of the crucial research areas, especially considering the challenges and opportunities of the changing technological environment (Yordanova et al., 2024). That digitalization has significantly improved operational efficiency, market reach, and overall competitiveness of SMEs. Highlighting how adopting digital technologies such as cloud computing and electronic commerce-optimizes SMEs business models and better engages customers (Zhang & Don, 2023). Moreover, digital strategies should be aligned with organizational goals to maximize the benefit of technology adoption.

Quality improvement

Improving quality has long been a cornerstone of competitive advantage and organizational success across industries. The Total Quality Management (TQM) framework emphasizes a systematic approach to enhancing quality by involving all organizational levels and focusing on customer satisfaction (Permana et al., 2021). That consistent quality improvement leads to increased operational efficiency, reduced costs, and higher customer loyalty (NGUYEN et al., 2020). Besides, there is an increased adoption of digital tools like artificial intelligence and machine learning that monitor, predict, and optimize quality in real time, thus revolutionizing traditional quality management practices (Chhetri, 2024). The concept of quality has become broader, moving from just products to the level of customer experience and sustainability. Today's consumer is also concerned not just with quality products and services but with ethical production methods and respect for the environment (Noori Hussain et al., 2023). So, nowadays, organizations combine sustainable methods in their product development, like ecological materials or carbon footprint reductions, as a part of the quality management policy.

Research Model

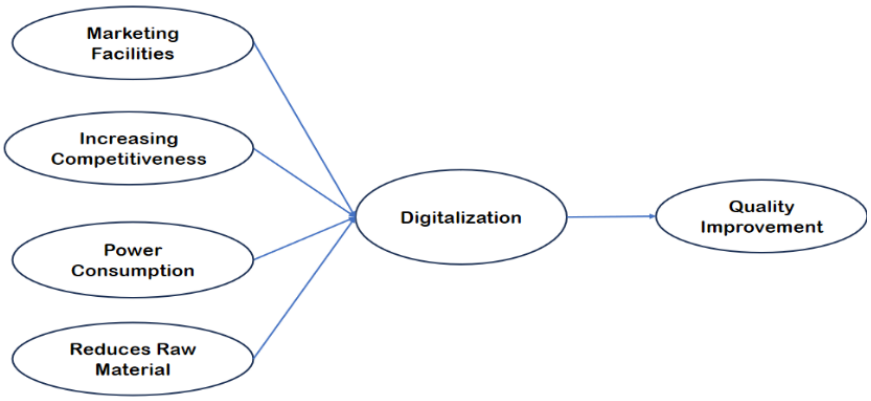

Figure 2. Research Model. Source: Authors

DEVELOPMENT OF HYPOTHESIS

Marketing facilities have significantly impacted the level of digitalization adoption among MSMEs, especially in the culinary sector. Digitalization allows MSMEs to reach a wider market through online platforms, social media, and e-commerce, increasing marketing efficiency and effectiveness. Investing in digital marketing tools like chatbots and interactive visualizations can boost customer loyalty and sales conversions, according to a study by (Cuevas-Vargas et al., 2021). Furthermore, research by (Maulana, 2024) discovered that using social media and e-commerce platforms improved business performance for Karawang's culinary MSMEs that embraced online marketing. We conclude that *H1: Marketing facilities have a positive impact on Digitalization.*

Increasing competition has directly hindered MSMEs' ability to adopt digital technology. A strategic change toward short-term cost-cutting measures like price reductions has resulted in a significant decline in investment in digital innovation due to competitive pressure. (Ijomah et al., 2024) found that the rate of digital transformation has been slowed by intense market competition, especially for companies with inadequate IT infrastructure. Moreover, (Chen et al., 2024) demonstrated that while digitization can boost performance, it can also have a negative impact on MSMEs' results when it is not in line with corporate strategy. Based on this explanation we suggest *H2: Increasing competitiveness has a negative impact on Digitalization.*

High energy consumption has a significant impact as an obstacle in the digitalization process of MSMEs, especially in the food sector, which requires equipment with large electrical power. (Simion et al., 2023) showed that energy dependence has a major

impact on the adoption of sustainable digital technology. Further, (Xu et al., 2022) studied the phenomenon and concluded that digitalization can enhance the use of energy, which in turn negatively affects the operational efficiency of MSMEs. From result of previous paper we develop *H3: Power consumption has a negative impact on Digitalization.*

The availability of more efficient raw materials has a significant impact on MSMEs to adopt digital technology in their production processes. Digitalization helps business actors monitor inventory in real-time, reduce waste, and increase efficiency in the supply chain. According to (Hendijani & Saei, 2020), digital integration in the supply chain can improve operational efficiency and overall company performance. In addition, (Bagale et al., 2021) also found that a digital system in raw material management has a direct impact on MSMEs' ability to adjust production to market demand flexibly, quickly, and precisely. We conclude that H4: Reduced Raw Material has a positive impact on Digitalization.

Improving product quality is one of the main drivers for MSMEs to adopt digital technology. Digitalization enables automatic and continuous quality control through AI and IoT-based systems, thereby reducing production errors and increasing consistency. In the context of Total Quality Management (TQM), digital technology supports continuous process improvement. (Chhetri, 2024) stated that the application of AI in the food industry can improve the accuracy of quality control. In addition, (Permana et al., 2021) found that the implementation of TQM supported by digitalization can significantly increase operational efficiency and customer satisfaction. Based on this explanation we suggest *H5: Quality improvement has a positive impact on Digitalization.*

This research was conducted using quantitative methods with several steps involving data collection techniques, and data analysis, the research needs of the food sector SMEs in the context of internationalization.

Sample and research population

The population of this study consisted of SMEs in the food sector operating in Indonesia. Samples are taken purposive sampling, which is choosing SMEs that have used digital technology in their business operations and have experience in selling products online (Campbell et al., 2020).

Data collection

Data collection was conducted through a survey by distributing questionnaires to previously determined respondents using G-from. The questionnaire was carefully designed and consisted of a combination of closed and open questions to obtain comprehensive information. The purpose of this survey is to measure several important aspects of the use of digital technology by SMEs, including:

Digital technology usage rate

The statements in this section aim to identify how widely and deeply SMEs adopt digital technologies in their operations (Bagale et al., 2021).

Impact of digitalization on competitiveness

Respondents will be asked to assess how digitalization affects their business competitive position in the market. These statements may include aspects such as increased efficiency, product innovation, as well as the ability to reach new customers.

By using surveys as a data collection method, researchers hope to collect quantitative information that can be analyzed statistically. This will allow researchers to draw more general conclusions regarding the patterns of digital technology use among SMEs as well as the relationship between digitalization and their competitiveness.

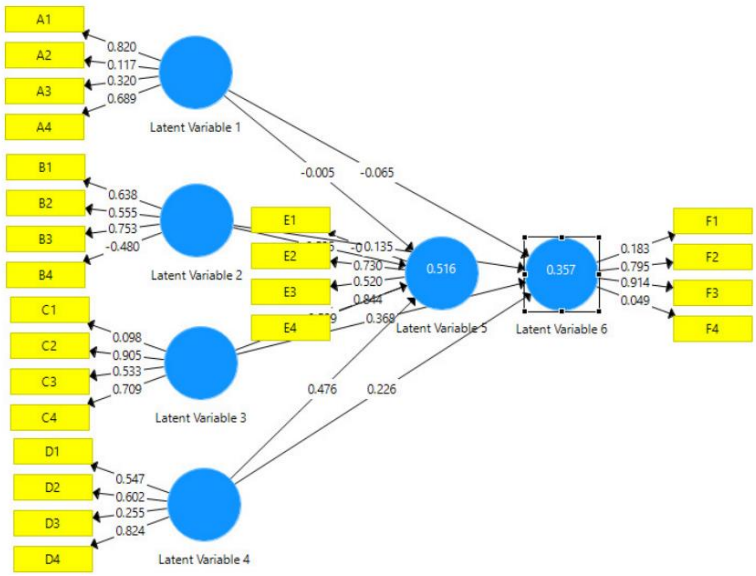

Figure 3. Result Data Collection

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Based on the structural model analysis findings of this study, it was found that several latent variables made significant contributions to the digitalization of food sector SMEs. More specifically, latent variables for greater competitiveness (Latent Variable 2), power consumption efficiency (Latent Variable 3), and raw material savings (Latent Variable 4) were observed to have a positive and statistically significant impact on digitalization (Latent Variable 5) with path coefficients of 0.730, 0.369, and 0, respectively.476. This suggests that improving internal efficiency and resource management strongly stimulates the application of digitalization among SMEs in the food sector (Simion et al., 2023). These results concur with previous studies conducted by (Cuevas-Vargas et al., 2021;Hendijani & Saei, 2020) where it was evident that technology application in supply and marketing channels increases business performance and efficiency as a whole.

The latent variable digitization (Latent Variable 5) also positively affects the capacity of internationalization (Latent Variable 6) with a coefficient value of 0.226. This uncovers that digitalization is responsible for enhancing the expansion of global market access through channels such as e-commerce and digitalized marketing strategy. (Yordanova et al., 2024) and (Gaweł et al., 2023) affirm this outcome by elucidating that digitalization enhances the global competitiveness of SMEs and accelerates the internationalization process.

Meanwhile, marketing facility variables (Latent Variable 1) exert negative and very slight effects on internationalization and digitalization, with coefficients of -0.005 and -0.065. This implies that although marketing is important in general, in this case, marketing facilities are not powerful enough to drive digitalization ahead of other internal drivers such as production efficiency or raw material management. These findings were supported by (Ijomah et al., 2024) and (D. Wang & Chen, 2024) research, which shows market pressures and lack of preparedness for technology often lead SMEs to delay digital investment, especially if their agenda remains dominant on conventional marketing.

CONCLUSIONS

First, how does digitalization affect the internationalization capabilities of SMEs in the food sector? The results show that digitalization significantly affects quality in order to be international in the food sector. Especially in cases where digitalization can help SMEs to improve international capabilities by providing tools to reach the global market, we therefore conclude that digitalization has a positive impact on SMEs to reach the global market.

Second, how do e-commerce play a role in expanding market access for the food sector SME? The results show that e-commerce helps SMEs expand market access, therefore we conclude with this platform that it can interact directly with consumers, and that SMEs have the ability to compete with large enterprises.

Finally, what are some of the main obstacles facing SMEs in the adoption of digital technology?. Research results show that SMEs face some major obstacles in adopting digital technology. Therefore, we deduce that the main barriers for SMEs in the adoption of digital technology are shortage of financial resources, limitations of labor competency in technology, and non-supportive policy barriers. These findings indicate that even greater support-from government subsidies and policies that make digital technologies more affordable to SMEs-is necessary to further increase their shift towards digitalization, and with it, increase competitiveness.

So, overall digitalization can provide food sector SMEs with opportunities to expand internationally and be competitive through the application of e-commerce and digital marketing. These technologies will also enhance market access, operational efficiency, and product quality, enabling SMEs to meet global standards and customer demands. However, the barriers to adoption include limited funding, lack of digital skills, high energy costs, and complex regulations. In this regard, government support, training, and flexible policies are very important. Digitalization thus places SMEs in a position to grow, adapt to global market trends, and achieve sustainable success.

RECOMMENDATION

Research indicates that digitalization may result in massive competitiveness, operational efficiency, and product quality enhancement for food industry MSMEs. However, some challenges in this regard need to be taken into consideration: a lack of financial resources, inadequate support on the part of government machinery, and barriers to adopting digital technologies. The following recommendations will help SMEs tap the potential of digitalization:

Digital Capacity Building. SMEs need to adopt technologies such as e-commerce, data analytics, and real-time tracking to enhance their operational efficiencies and expand their market reach. For this, regular training in digital skills is required.

Effective Management of Raw Materials. Digitalization provides the facility of real-time monitoring of inventories of raw materials, which reduces waste and enhances production efficiency. Digital inventory systems can facilitate planning of production as per demand.

Improvement in Product Quality. Through AI and automation, MSMEs could ensure quality consistency in the product, reduction of errors, and improved customer satisfaction. This helps SMEs to reach international levels.

Marketing Optimization. Digital channels, social media, online marketplaces can increase product visibility and help access more global markets. Engaging marketing strategies through AR/VR will lead to improved customer loyalty.

Promotion of Energy Efficiency. While digitalization may enhance energy consumption, SMEs should implement energy-efficient technologies and adopt sustainable practices that could reduce operational costs and mitigate environmental impacts.

By implementing these strategies, food sector SMEs can enhance their competitiveness in both local and international markets, while contributing to addressing global sustainability challenges. The success of digital transformation largely depends on strategic readiness and resource allocation.

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