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Development and Evaluation of a Web-Based MSME Information System for Operational Efficiency and Market Access

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Abstract

Micro, Small, and Medium Enterprises (MSMEs) play a vital role in regional economic development, but most MSMEs still face challenges in managing business information, promoting products, and providing customer service that is not yet digitally integrated. This study aims to develop and evaluate a web-based MSME information system to support operational efficiency and market access for MSMEs in Sidenreng Rappang Regency. The study uses a Research and Development approach with a Waterfall model, including the stages of needs analysis, system design, implementation, testing, and maintenance. System evaluation is conducted through functional testing using the black-box testing method and user perception evaluation using a 5-point Likert-scale questionnaire. The research respondents were 30 users, consisting of MSMEs and the general public, who are potential users of the system. The research instrument covers five assessment dimensions, namely ease of use, information quality, interface display, service speed, and digital marketing support. The results of the black-box test indicate that all main features of the system function with 100% success. The results of the instrument reliability test show a Cronbach's alpha of 0.892, indicating good reliability. The results of the quantitative analysis show that the overall average user perception score is 4.36 on a scale of 5.00, which falls in the very good category. In detail, the ease of use dimension obtained a score of 4.41, information quality 4.39, interface display 4.31, service speed 4.22, and digital marketing support 4.47. The results of the study indicate that the developed system is feasible to use and can support operational efficiency and expand market access for MSMEs. The contribution of this study is a development and evaluation model for a web-based MSME information system that can serve as a reference for regional MSME digitalisation programs.

Keywords: Web-Based Information Systems; Operational Efficiency; Market Access; Digital Transformation; User Evaluation.

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Introduction

Micro, Small, and Medium Enterprises (MSMEs) play a strategic role in economic development, particularly in developing countries like Indonesia. MSMEs not only contribute to national economic growth but also create jobs, increase community income, and reduce poverty. Various studies have shown that MSMEs can be drivers of regional economies because the majority of community economic activity is in the small and medium enterprise sector (Enaifoghe & Ramsuraj, 2023; Purnomo & Purwandari, 2025). Furthermore, MSMEs play a role in driving local economies by leveraging regional strengths, such as craft products, processed foods, agriculture, and other local services. Therefore, strengthening MSMEs is a crucial strategy for sustainable economic development, particularly in the regions.

Despite their crucial role, MSMEs still face various challenges in managing their businesses. One of the main challenges is limited business information management, product promotion, and customer communication. Many MSMEs still use conventional methods to run their businesses, such as word-of-mouth promotion, manual transaction recording, and a lack of widely accessible business information channels. This situation makes it difficult for potential customers to access product and business information, thus limiting market opportunities. Furthermore, manual business data management leads to less efficient operational processes and a higher risk of errors in data recording.

The development of information and communication technology has brought significant changes to various sectors, including small and medium enterprises (SMEs). Information technology enables businesses to manage business

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information more effectively, expand market reach, and improve the quality of customer service. Digitalisation through information systems and web-based platforms can help MSMEs increase their competitiveness. (Arista & Hermawan, 2025; Mahmudah & Muhtarom, 2024) stated that digitalisation has a positive impact on MSME business performance, particularly in terms of marketing, customer service, and operational efficiency. With a digital-based information system, MSMEs can manage product data, transactions, and business information in a more structured and easily accessible manner.

One way to leverage information technology to support MSMEs is by developing web-based information systems. Web-based systems offer advantages in accessibility, flexibility, and ease of use, as they can be accessed anytime, from anywhere, as long as there is an internet connection. Furthermore, web-based systems enable the integration of business information into a single platform that can serve as a promotional, informational, and transactional medium. (Gürkut et al., 2023; Wen et al., 2023) explain that web-based technology can serve as an effective decision-support and information-management system for organisational and business activities. In the context of MSMEs, web-based systems can help business owners present product information digitally, manage business data, and improve customer interactions.

Several previous studies have discussed the use of digital technology to support the development of MSMEs. (Pahsa, 2024; Sun, 2024) stated that the use of online media by MSMEs can increase business visibility and help them reach a wider customer base. Another study by (Sutrisno et al., 2024; Vasani & Abdulkareem, 2024) found that e-commerce and digital platforms can increase the competitiveness of MSMEs in the global market. Furthermore, research by (Susanti et al., 2023; Yuwono et al., 2025) demonstrated that the use of information technology influences MSME performance and competitive advantage. These studies demonstrate that digitalisation is a crucial factor in the development of MSMEs in today's digital economy.

However, most prior research has focused on large e-commerce platforms or existing marketplaces. In contrast, research on web-based information systems tailored to the needs of local MSMEs remains relatively limited. Furthermore, much research on system development focuses solely on application development, without quantitatively evaluating user acceptance and system quality. In fact, in information systems research, user evaluation is a crucial component in determining whether the developed system is truly usable and accepted by users.

Based on previous research, digitalisation of MSMEs through information technology has a positive impact on business development. However, there is still a research gap in developing web-based information systems appropriate to the needs of local MSMEs and equipped with quantitative system evaluation. Therefore, this study not only focuses on the development of a web-based MSME information system, but also evaluates the developed system using a quantitative approach through functional testing and user perception. Thus, this research not only produces an information system but also generates evaluation data to assess the feasibility of the developed system.

This research was conducted on MSMEs in Sidenreng Rappang Regency, which boasts significant local business potential but still faces challenges in digital promotion and business information management. Most MSMEs in this area do not yet have a web-based business information system that can serve as an integrated promotional and information management tool. Therefore, the development of a web-based information system is expected to assist MSMEs in improving service quality, operational efficiency, and broader market access.

The purpose of this study is to develop and evaluate a web-based MSME information system to support operational efficiency and market access for MSMEs in Sidenreng Rappang Regency. System evaluation was conducted through functional testing using the black-box method and a user-perception evaluation using a Likert-scale questionnaire. The results of this study are expected to provide both practical and academic contributions. Practically, the developed system can be used by MSMEs as a medium for information and business promotion. Academically, this study contributes a development and evaluation model for a web-based MSME information system that can serve as a reference for further research, particularly in the fields of information systems and MSME development based on digital technology. This research is expected to provide solutions to problems faced by MSMEs in managing business information and product promotion, and to support the digital transformation of MSMEs at the regional level through a web-based information system that is easy to use and tailored to their needs.

Method

Research Design

This study uses a Research and Development (R&D) approach to develop and evaluate a web-based information system for Micro, Small, and Medium Enterprises (MSMEs) in Sidenreng Rappang Regency. The Research and Development approach was used because this study not only produces a software product but also evaluates the system's quality and user acceptance. The software development model used in this study is the Waterfall model. The Waterfall model is a system development model that is carried out systematically and sequentially, starting from the needs analysis stage to the system maintenance stage (Pratama et al., 2024; Saravanos & Curinga, 2023; Umar & Lano, 2024). This model is widely used in information systems development research because it has clear, structured stages that facilitate system development and documentation.

System Development Procedure

The system development stages in this study follow the Waterfall model, which comprises five stages: needs analysis, system design, system implementation, system testing, and system maintenance. The needs analysis stage is conducted to identify user needs and the problems faced by MSMEs. The system design stage involves defining the system structure, database, and user interface. The system implementation stage is carried out by building the system using a web-based programming language. The testing stage is carried out to ensure the system performs as expected using the Black Box Testing method. The maintenance stage is carried out to fix system errors and develop the system according to user needs. The Waterfall model is used because it is appropriate for information systems development research that requires systematic, structured stages.

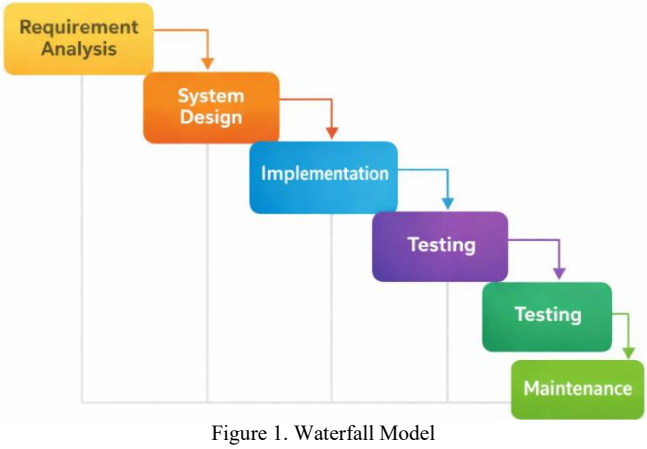

Figure 1. Waterfall Model

Research Subjects

The subjects in this study were users of the MSME information system, comprising MSME actors and the general public who had the potential to become users. The number of respondents in this study was 30. The sampling technique used was purposive sampling, which is based on specific criteria (Ahmed, 2024; Sarker & AL-Muaalemi, 2022). The respondents in this study were MSME actors in Sidenreng Rappang Regency and the public who had conducted online transactions and had tried using the developed MSME information system. Respondents were asked to use the developed system and then complete a questionnaire to assess it.

Research Instrument

The research instrument in this study was a 5-point Likert-scale questionnaire to measure user perceptions of the developed MSME information system. The Likert scale is used to quantitatively measure a person's attitudes, opinions, and perceptions of a system (Ghozali et al., 2022; South et al., 2022). The Likert scale used consists of five assessment categories: strongly agree (score 5), agree (score 4), neutral (score 3), disagree (score 2), and strongly disagree (score 1).

The research instrument consisted of 15 statements divided into five assessment variables: usability, information quality, user interface, system response time, and digital marketing support. The instrument was developed based on system quality and information quality indicators adapted from (Muliawati et al., 2025; Riski et al., 2026) information system success model and then adapted to the context of a web-based MSME information system. These research variables were used to measure system quality and user acceptance of the developed system.

Validity and Reliability Testing

Validity testing was conducted to assess the instrument's validity. Validity testing was conducted using Pearson Product-Moment correlation. The instrument was declared valid if the calculated r-value exceeded the table r-value at the 0.05 significance level (Hidayati et al., 2023; Hilmi et al., 2025). Reliability testing was conducted to determine the instrument's consistency using Cronbach's alpha. The instrument was considered reliable if Cronbach's alpha exceeded 0.70, indicating good internal consistency (Govindasamy et al., 2024; Trabelsi et al., 2024).

Data Analysis Technique

The data analysis technique in this study used quantitative descriptive analysis to determine the level of user acceptance of the developed system. Data obtained from the questionnaire were then calculated using the mean formula to determine the average value of each research variable. The obtained average values were then categorised into assessment categories to determine the quality of the developed system. Furthermore, system testing was conducted using Black Box Testing to determine whether the system met user needs (Aghababaeyan et al., 2023; Higgins et al., 2023). The results of the data analysis were then used to determine the feasibility of the developed MSME information system and the level of user acceptance.

Results and Discussion

System Development Results

This research resulted in a web-based MSME information system designed to assist MSMEs in managing business information, promoting their products, and conducting online transactions. The developed system is designed to be easy to use for MSMEs that lack strong technical skills in information technology. This system has several main features, namely a dashboard page, a product catalogue page, a product detail page, a shopping cart page, a checkout page, and a contact page. This system also allows MSMEs to manage product data and receive customer orders online. The interface of the developed system is shown in Figure 2, which depicts the system dashboard page. The dashboard page is the main page used by admins or MSMEs to manage the system.

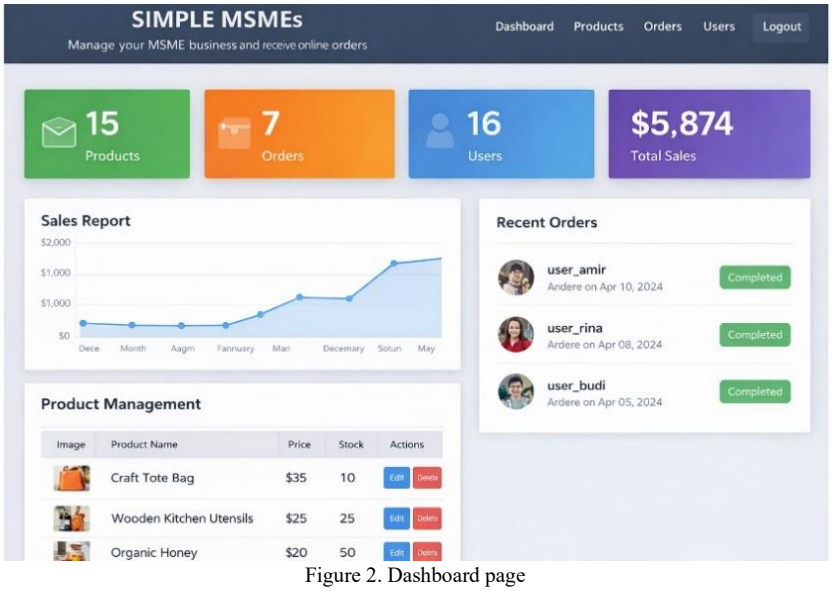

Figure 2. Dashboard page

Based on Figure 2, the dashboard page displays the main menus, including product data, order data, user data, and sales reports. The dashboard is designed with a simple interface to make it easy for MSMEs to use. On this page, admins can add, edit, delete products, and view incoming customer orders. Furthermore, the product page and system checkout are shown in Figure 3. Customers use this page to view products and place orders.

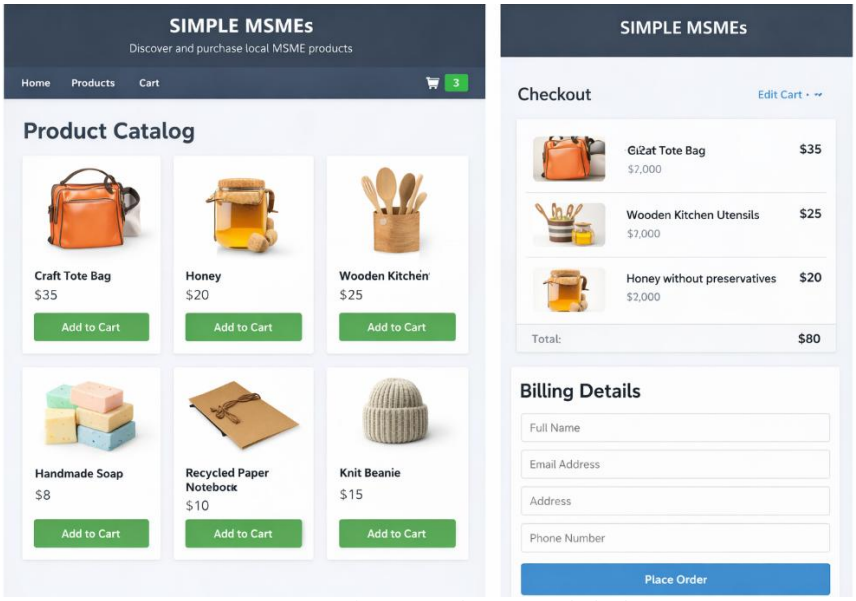

Figure 3. Product Page and Checkout

In Figure 3, the product page displays a list of MSME products for users to view. Users can select products and add them to their shopping cart. Afterwards, users can check out by filling in their order details. This system is designed to facilitate the ordering process.

Black Box Test Results

System testing was conducted using the Black Box Testing method to determine whether the system was functioning as expected. Testing was performed on key system features, including login, product input, shopping cart, and checkout. The results of the Black Box testing are shown in Table 1.

Table 1. Black Box test results

No	System Features	Testing Scenario	Results	Information
1	Login	Enter username and password	Succeed	Valid
2	Product Input	Adding product data	Succeed	Valid
3	Edit Product	Changing product data	Succeed	Valid
4	Delete Product	Deleting product data	Succeed	Valid
5	Shopping cart	Adding products	Succeed	Valid
6	Checkout	Ordering process	Succeed	Valid
7	Contact	Sending message	Succeed	Valid
8	Registration	Create an account	Succeed	Valid

Based on Table 1, all system features performed well in line with their intended functions. Test results indicate that all system features are valid, and no errors were found during system testing. The system testing success rate reached 100%, indicating that the developed system is functionally sound and ready for use.

Instrument Validity Test Results

Validity testing was conducted on 15 questionnaire items using Product-Moment correlation. The results of the validity test are shown in Table 2.

Table 2. Validity Test Results

No	Statement Items	r Count	r Table	Information
1	P1	0.512	0.361	Valid
2	P2	0.534	0.361	Valid
3	P3	0.601	0.361	Valid
4	P4	0.575	0.361	Valid
5	P5	0.623	0.361	Valid
6	P6	0.544	0.361	Valid
7	P7	0.588	0.361	Valid
8	P8	0.566	0.361	Valid
9	P9	0.612	0.361	Valid
10	P10	0.590	0.361	Valid
11	P11	0.603	0.361	Valid
12	P12	0.577	0.361	Valid
13	P13	0.521	0.361	Valid
14	P14	0.548	0.361	Valid
15	P15	0.559	0.361	Valid

Based on Table 2, all statement items have a calculated r value greater than the table r (0.361), so all statement items are declared valid and can be used as research instruments.

Reliability Test Results

Reliability testing was conducted using Cronbach's Alpha to assess the instrument's internal consistency. The results of the reliability test are shown in Table 3.

Table 3. Reliability Test Results

Variables	Cronbach Alpha	Information
Ease of Use	0.871	Reliable
Information Quality	0.883	Reliable
Interface View	0.856	Reliable
System Speed	0.842	Reliable
Marketing Support	0.901	Reliable
Total	0.892	Reliable

Based on Table 3, the Cronbach's Alpha value of 0.892 indicates that the research instrument has high reliability and can be used for data collection. The results of the analysis of user responses to the developed MSME information system are presented in Table 4.

Table 4. User Response Analysis Results

No	Variables	Mean	Category
1	Ease of Use	4.41	Very good
2	Information Quality	4.39	Very good
3	Interface View	4.31	Very good
4	System Speed	4.22	Very good
5	Marketing Support	4.47	Very good
	Average Total	4.36	Very good

Based on Table 4, the overall average value of 4.36 indicates that the developed MSME information system is in the very good category and suitable for use.

Discussion

The results indicate that the web-based MSME information system developed in this study can support MSME operations, particularly in managing business information, promoting products, and providing customer service. Based on the Black Box testing results shown in Table 1, all system features perform as expected, with a 100% success rate. These results indicate that the developed system has met the system quality aspects with respect to functionality. In the information system success model proposed by (Al-Okaily & Al-Okaily, 2022; Merhi, 2023), system quality is one of

the main factors determining the success of information system implementation. System quality includes ease of use, speed, reliability, and flexibility. A high-quality system will increase user satisfaction and encourage continued use.

In addition to functional system testing, this study also evaluated user perceptions of the developed system. The evaluation was conducted using a Likert-scale questionnaire covering five variables: ease of use, information quality, interface display, system speed, and digital marketing support. Before using the questionnaire, validity and reliability tests were conducted to ensure the instrument was suitable for data collection. Based on the validity test results shown in Table 2, all statement items had a calculated r value greater than the table r, so all statement items were declared valid. This indicates that each statement item in the questionnaire measured the variables intended in this study. According to Ghozali (2018), a valid research instrument measures what it is supposed to measure. Furthermore, based on the reliability test results shown in Table 3, the Cronbach's alpha of 0.892 indicates that the research instrument has high reliability. A Cronbach's Alpha value greater than 0.70 indicates good internal consistency (Izah et al., 2023; Kusmaryono et al., 2022). Thus, it can be concluded that the research instrument used in this study is valid and reliable, so the data obtained from respondents can be used for further analysis.

The results of the user response analysis, shown in Table 4, indicate that the overall average of 4.36 falls within the very good category. This indicates that, in general, users find the developed web-based MSME information system of good quality and suitable for use. The ease-of-use variable has an average value of 4.41, which falls within the very good category. This indicates that the system is easy for users to use and does not require special skills. Ease of use is one of the important factors in technology acceptance. In the Technology Acceptance Model (TAM), (Bustaman et al., 2023; Liesa-Orús et al., 2023) stated that perceived ease of use is one of the main factors influencing users' acceptance of technology. An easy-to-use system will increase user interest in using it.

The information quality variable has an average value of 4.39, indicating that the information displayed by the system is clear, complete, and easy for users to understand. Information quality is a crucial factor in information systems because high-quality information helps users make decisions. (Al-Okaily et al., 2025; Rokhman et al., 2022) stated that information quality influences user satisfaction and the use of information systems. Accurate, relevant, and easy-to-understand information will increase user trust in the information system.

The interface display variable has an average value of 4.31, indicating that the system display is attractive and easy to use. Interface display is an important factor in web-based systems because an attractive display increases user comfort with the system. A good interface will make it easier for users to understand the system flow and use the system without difficulty. This is in line with research stating that good interface design can improve the user experience in using information systems (Baldassarre et al., 2022; Jenneboer et al., 2022). The system speed variable has an average value of 4.22, indicating a fairly fast response. System speed is a component of system quality that can affect user satisfaction. A slow system will make users uncomfortable using it. Therefore, system speed is an important factor in the success of a web-based information system.

The digital marketing support variable had the highest average value, at 4.47. This indicates that the developed system can help MSMEs promote their products and expand their market reach. Web-based information systems enable MSMEs to promote their products online, thereby increasing their visibility to more customers. This finding aligns with previous research suggesting that digitalising MSMEs through web-based information systems can increase business competitiveness and expand market access (Tamin & Adis, 2022; Türkeş, 2024). Digitalising MSMEs enables businesses to reach a wider market without being limited by geographic location. Based on the average values for each variable, the digital marketing support variable has the highest value, while the system speed variable has the lowest. This indicates that the developed system is very helpful for digital marketing, but further development is needed to improve its speed. System speed can be increased by improving server quality or performing system optimisations.

Overall, the research results indicate that the developed web-based MSME information system has met the aspects of system quality, information quality, and user satisfaction. This finding is consistent with the information systems success model of (Al-Okaily et al., 2025), which posits that system quality and information quality are key factors influencing user satisfaction and system usage. Furthermore, the high ease-of-use score in this study indicates that the system is easy for users to understand and operate. This finding is consistent with the concept of perceived ease of use in the Technology Acceptance Model (Al-Okaily & Al-Okaily, 2022; Thabet et al., 2024), which posits that users are more likely to accept easy-to-use technology. Thus, the system developed in this study not only has good system quality

but also has a high level of user acceptance, making it suitable for implementation to support the digitalisation of MSMEs.

From a practical perspective, this system can help MSMEs manage business information and promote their products online without relying on large marketplaces. This system can serve as a digital promotional platform for MSMEs in areas that lack access to large marketplaces. In addition, this system can help MSMEs manage product and order data more effectively. From a practical perspective, this system can help MSMEs manage business information and promote their products online without relying on large marketplaces. This system can serve as a digital promotional platform for MSMEs in areas that lack access to large marketplaces. In addition, this system can help MSMEs manage product and order data more effectively. The developed system also supports operational efficiency through centralised product and order data management, reduced manual recording, and accelerated information service processes for customers. Thus, this system can improve the operational efficiency of MSMEs.

From an academic perspective, this research contributes to the development and evaluation of a web-based MSME information system and serves as a reference for further research. It also provides empirical data on user acceptance of a web-based MSME information system. Future research can expand on this study by adding other variables such as user satisfaction, user loyalty, and the system's impact on increasing MSME sales.

This study also has several limitations, namely the limited number of respondents and the system being web-based and not mobile-based. Therefore, future research could develop a mobile-based system and conduct research with a larger number of respondents. Furthermore, further research could also measure the impact of system use on increasing MSME revenue. Therefore, it can be concluded that the web-based MSME information system developed in this study can assist MSMEs in managing business information, promoting products, and improving market access. This system can also support the digital transformation of MSMEs at the regional level.

Conclusions and Suggestions

Conclusions

This study aims to develop and evaluate a web-based information system for Micro, Small, and Medium Enterprises (MSMEs) in Sidenreng Rappang Regency to support operational efficiency and market access. This study uses a Research and Development approach with a Waterfall development model, including the stages of needs analysis, system design, implementation, testing, and maintenance. The developed system has key features, including product data management, a product catalogue, a shopping cart, an ordering system, and a contact page that serves as a communication channel between MSMEs and customers.

The study results indicate that the developed system has performed well in the Black Box test, achieving a 100% success rate. In addition, the validity test results indicate that all statement items in the questionnaire are valid. In contrast, the reliability test shows a Cronbach's Alpha of 0.892, indicating high reliability. The results of the user response analysis show an overall average of 4.36, which falls in the very good category. The digital marketing support variable has the highest average value, at 4.47, indicating that the developed system is very helpful for MSMEs in promoting their products digitally and expanding market access.

Overall, the results of this study indicate that the developed web-based MSME information system is feasible to use and can support operational efficiency and market access for MSMEs. This study also shows that system quality, information quality, and ease of use are important factors in the successful implementation of a web-based MSME information system. From a theoretical perspective, the findings of this study align with the DeLone and McLean information systems success model and the Technology Acceptance Model's concept of perceived ease of use, which emphasise the importance of system quality, information quality, and ease of use in supporting user acceptance of the system. From a practical perspective, the developed system can serve as a digital platform for managing promotional and business information for MSMEs in the region.

Suggestions

Based on the research results, several suggestions can be made for further research and system development. First, future research could use a larger number of respondents to ensure more representative results. Second, further research

could employ more complex analytical methods such as the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), or Structural Equation Modelling (SEM) to analyse the factors influencing user acceptance of information systems.

Third, the system developed in this study remains web-based, so future research could develop a mobile-based system for greater flexibility. Fourth, further research could integrate the system with digital payment systems so transactions can be processed directly through the system. Fifth, further research could measure the impact of system use on MSME sales or revenue, enabling a more comprehensive assessment of the system's benefits. Furthermore, from an implementation perspective, local governments or related institutions can use this system as a digital platform for their MSME digitalisation programs at the regional level. With a web-based information system, MSMEs can promote their products more widely, thereby increasing their competitiveness in the digital age.

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Contributions

All authors contributed significantly to this research. Their contributions included conceptualisation of the research, development of the methodology, data collection, data analysis, systems development, drafting and revising the article, and final approval of the published version.

Conflict of Interest

The author declares no conflict of interest in this research.

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