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Design and development of a management information system to support micro-enterprise empowerment

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Abstract

This study aims to assess how application-based information systems can improve data management and product marketing for micro-businesses in Bekasi Regency from the perspective of Government agencies responsible for data collection and MSME empowerment. This system was developed to replace manual processes that often cause inaccuracies and hinder the efficiency of Government agencies by providing features for business registration, data updates, location mapping, and digital product marketing. The research was conducted through observation, interviews, surveys, and system testing using White Box and Black Box Testing methods to ensure functionality and ease of use for MSME programme managers. The results of the study show that this system is capable of simplifying data management, expanding marketing reach, and assisting agencies in facilitating the use of technology by business actors more effectively, although there are still obstacles, such as infrastructure limitations and digital literacy.

Keywords

Micro-business empowerment, Management information systems, Mobile applications, Data management, Digital marketing

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Introduction

The empowerment of micro, small and medium enterprises (MSMEs) has shown significant progress, particularly when the Bekasi MSME Office implemented a community-based model and strategic management approach in the management, assistance and marketing of MSME products. The implementation of an empowerment model that integrates education and non-formal entrepreneurship has become the basis for the Bekasi MSME Office to increase the independence, production capacity, and competitiveness of local MSME actors (Lia et al., 2024; Suryono et al., 2023). This approach enables the agency to build a structured empowerment ecosystem, which not only transforms the mindset of MSME actors but also ensures the relevance of business strategies to market dynamics (Paryono et al., 2024; Santoso & Dewi, 2022).

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The utilisation of information systems (IS) is a priority strategy for the Bekasi MSME Agency to expand marketing reach, improve the efficiency of MSME data management, and overcome market access limitations. Through data digitisation, regional marketplaces, and technology-based promotional integration, the agency can help MSMEs increase product visibility, expand market networks, and strengthen regional competitiveness (Priyatna et al., 2024).

Technology also supports the agency in designing more targeted intervention programmes, including the empowerment of women entrepreneurs, the improvement of digital literacy, and the optimisation of production and marketing processes (Hananto & Veza, 2025). Technology-based approaches such as the Knowledge Acquisition from Innovation Failure (KAFIF) framework can be utilised by the Bekasi MSME Agency to instil a culture of adaptive learning, so that MSME actors can transform their experiences of failure into innovations that strengthen business resilience (Sreen et al., 2023).

However, many of the available information systems are still not suited to the needs of MSMEs in certain areas, including sub-districts with diverse socio-economic characteristics in Bekasi (Saura et al., 2023). This condition requires the Bekasi SME Agency to design a system architecture and digital policies that are adaptive to the local context, so that digital transformation can have a real impact on small and micro SMEs (Hasdiansa & Hasbiah, 2025).

The Bekasi MSME Office also faces various obstacles in promoting the adoption of digital management tools, such as limited programme budgets, low digital literacy among MSME actors, and resistance to changes in traditional business models (Hananto et al., 2025). Areas with minimal digital infrastructure face major challenges in service integration, which also affects the ability of MSMEs to compete (Ewim et al., 2024). Recent literature also shows that these issues are still rarely discussed comprehensively, creating a research gap regarding the agency's strategy in strengthening the adoption of digital technology for regional MSMEs (Ademola & Atiso Ahiaku, 2023).

Despite various digital initiatives to support MSMEs, many government agencies still face difficulties in managing accurate business data and monitoring empowerment programmes due to fragmented and manual administrative processes. Existing studies mostly discuss digital transformation in SMEs from a general perspective, but limited attention has been given to how a management information system can support government-led micro-enterprise empowerment activities and decision-making processes.

Therefore, the key problem addressed in this study is whether the implementation of an integrated management information system can effectively support micro-enterprise empowerment activities, particularly in improving data management, programme monitoring, and business promotion.

This study contributes beyond system implementation by positioning the management information system as an institutional support mechanism in micro-enterprise empowerment. From the government agency perspective, the proposed system integrates data governance, programme monitoring, and market facilitation within a single platform. The findings demonstrate that an integrated MIS can function as an enabling infrastructure that supports evidence-based decision making and coordination between public agencies and micro-enterprise actors. Thus, the novelty of this research lies in conceptualising the MIS not merely as an administrative application, but as a governance tool that mediates the empowerment process.

The success of the management information system (MIS) developed by the Bekasi MSME Office is greatly influenced by the system's adaptability to local conditions, the level of MSME stakeholder involvement, and the alignment of the office's operations with MSME business practices. The integration of artificial intelligence (AI) and a strategic approach has been proven to increase the brand equity of MSMEs under guidance and improve operational efficiency (Indrasari et al., 2024). In addition, transformational leadership in public agencies plays an important role in mediating the relationship between digital transformation and MSME sustainability, especially in the face of rapidly changing market dynamics (Cuevas-Vargas, 2025). More in-depth digitalisation also strengthens the resilience of MSMEs, especially when facing crises. However, the adjustment of information systems that can accommodate the needs of MSMEs in rural and suburban areas, such as Bekasi, is still an issue that has not been widely explored (Sinha et al., 2024).

Method

Time and place of research

This research will be conducted over a period of six months, starting in January 2025 and ending in June 2025. The research location will be in several micro-businesses located in rural and underdeveloped areas in Indonesia. The selection of this location aims to identify the specific challenges and needs faced by MSMEs in these areas related to the adoption and implementation of management information systems (MIS).

Introduction to methods

The methodological approach in this study uses mixed methods, which combine qualitative and quantitative approaches to obtain a more comprehensive understanding of the effectiveness of management information systems (MIS) in empowering micro-enterprises. Qualitative methods, such as in-depth interviews and focus group discussions, were used to explore users' experiences and perceptions of MIS use. Meanwhile, quantitative methods through surveys and operational performance indicator measurements were used to present empirical evidence of the influence of MIS on the efficiency and productivity of MSMEs. A mixed approach was chosen because it integrates the depth of qualitative findings with the generalisability of quantitative data, thus providing a more holistic picture of the adoption process and the impact of MIS on MSMEs (Leso et al., 2023; Samtani et al., 2023). Stages of the research process present in Figure 1.

Stages of the research process

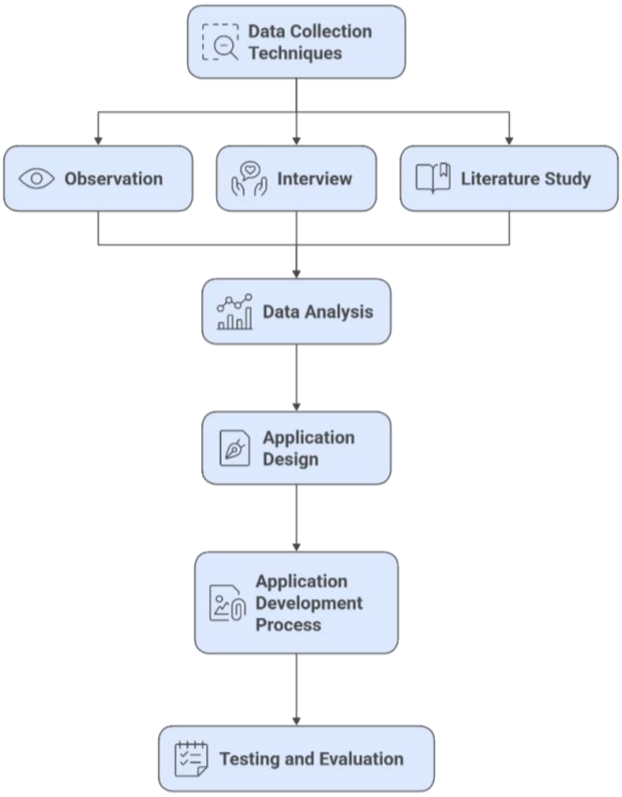

Figure 1. Stages of the research process

1. Data collection techniques
    a. Observation: Researchers will conduct direct observations of MIS usage in several micro-businesses in rural areas. The purpose of these observations is to understand how users work with and interact with the system, as well as to identify problems that arise during implementation.
    b. Interviews: Semi-structured interviews will be conducted with MSME owners and employees to gain deeper insights into the challenges they face in adopting and

using MIS. These interviews also aim to identify whether the system used suits their needs.

c. Literature study: Researchers will conduct a literature study to explore relevant theories on the application of MIS in MSMEs, as well as findings related to the challenges faced by MSMEs in rural areas in adopting digital technology.

2. Research participants and data analysis

   The evaluation of the system involved users consisting of micro-enterprise actors and officers from the Bekasi Regency Cooperative and SME Office who interacted directly with the system. Respondents were selected using purposive sampling, as only users who had experience operating the system were considered relevant for the evaluation. The respondents participated in system trials and completed a structured questionnaire after using the application.

   The questionnaire measured several aspects of system effectiveness, including ease of use, data management support, and usefulness for business promotion and programme monitoring. Responses were recorded using a Likert scale to capture user perceptions of the system.

   Quantitative data were analysed using descriptive statistical analysis to identify trends in user responses and perceived system benefits. The results were then interpreted together with qualitative findings from interviews and observations to provide a comprehensive evaluation of the role of the management information system in supporting micro-enterprise empowerment activities. (Ng et al., 2024; Orero et al., 2025)

3. Application development process

   The application development method in this study began with gathering requirements through observation and interviews with micro-business owners to understand their workflows, obstacles, and key digital needs. These requirements were then entered into a backlog and prioritised before entering the sprint cycle, where each sprint resulted in application function improvements that were immediately tested through black-box testing and evaluated with users. This cycle is repeated until the application reaches stability and meets the operational needs of MSMEs. At the same time, user feedback continues to be used for continuous feature refinement and system performance improvement. (Minasa et al., 2024).

4. Application design

   The application design in this study focused on developing an integrated management information system that enables agencies to manage MSME data, update business profiles, map locations, and facilitate product marketing in a single, easy-to-use platform. The application design was developed based on requirements obtained from observations and interviews, then modelled using a user-centred design approach to ensure that the features were compatible with the agency's workflow and the capabilities of MSME users. The system architecture was made modular so that each feature such as the monitoring dashboard, data management, product catalogue, and analytical reports could be developed and tested iteratively using agile methods. In addition to ensuring ease of navigation and informative data visualisation, the application design also considers data security and the potential for integration with other local Government systems, in line with the principles of effective MIS design for SME empowerment (Hananto et al., 2022).

5. Testing

   The testing and evaluation stage is carried out to ensure that the system functions stably, is easy to use, and meets the operational needs of MSMEs. Each feature is examined in terms of functionality, ease of navigation, and display consistency, then tested directly by users to assess the actual user experience. This approach is in line with digital system evaluation practices that emphasise the suitability of technology to field requirements and ease of adoption for users.

Results and Discussion

Results

This study evaluates the implementation of the Cooperative Mapping Information System in Bekasi Regency, which has successfully improved the efficiency of MSME data management and product marketing. The SIMPUM application replaces manual systems such as Microsoft Excel, which often cause errors, and allows MSME actors to update data in real time and market their products more widely, increasing competitiveness in local and global markets. The user-friendly interface ensures easy access for users with limited technological backgrounds. Testing using White Box Testing and Black Box Testing showed that the system functioned as expected, with good logic flow and functionality that met user needs. In addition, the management of sub-district, village, business category, and MSME data through the Admin Page facilitates centralised information management, enabling more effective supervision and guidance by local governments. Overall, this system not only improves operational efficiency but also expands market reach, increases product visibility, and supports data-driven decision-making, with ongoing development and maintenance expected to address emerging challenges.

Home is the first menu that appears when users access the Micro Business Empowerment Management Information System application. The home page displays information snippets related to Micro Business Empowerment. At the top of the home page, there is a menu and a slider image displayed in the form of a gallery shown in Figure 2.

The map display showing the locations of MSMEs that have been registered in the Micro Business Empowerment Management Information System application is located at the bottom after the information display. Figure 3 present display of MSME location points.

A page displaying partnership information available in the Micro Business Empowerment Management Information System application shown in Figure 4.

Figure 2. Home display menu and slider section

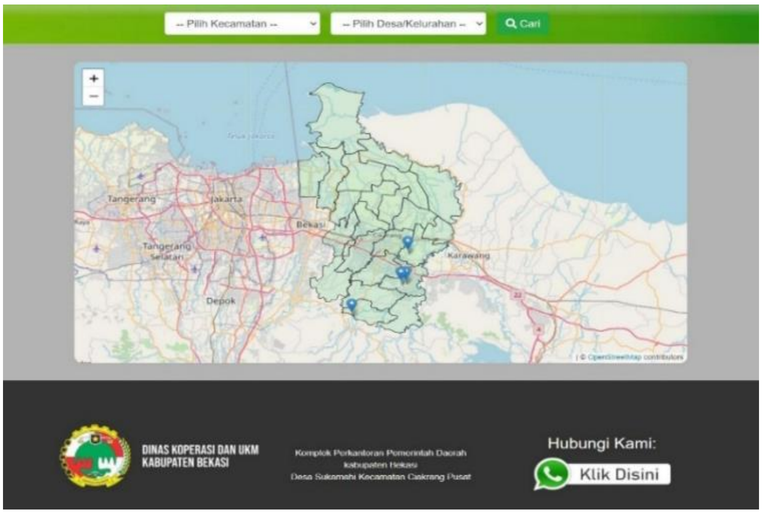

Figure 3. Display of MSME location points

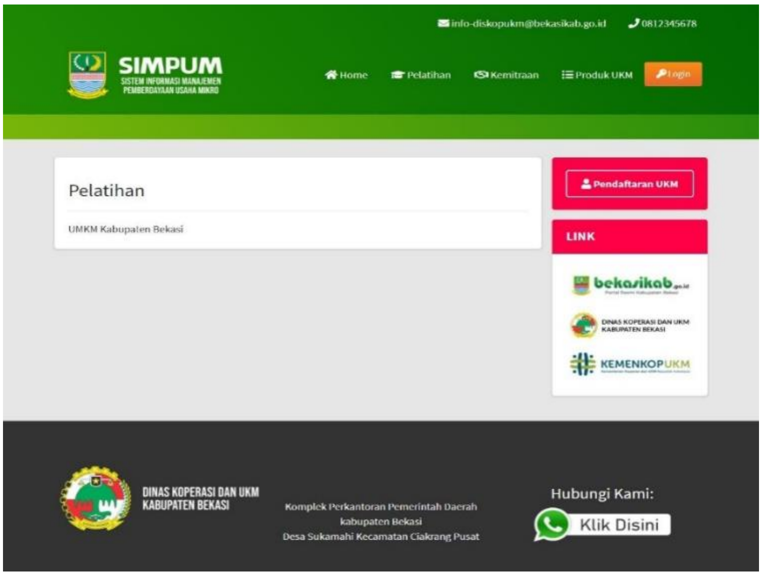

Figure 4. Partnership display

Menu display showing MSME products that have registered on the Micro Business Empowerment Management Information System application shown in Figure 5.

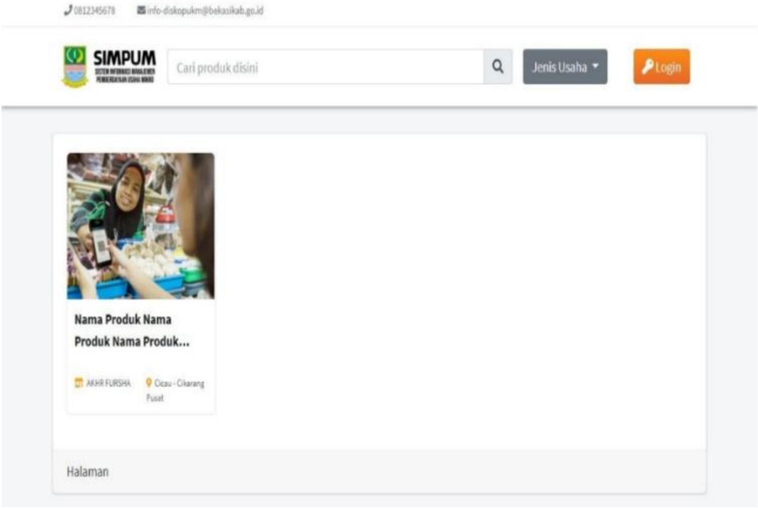

Figure 5. SME product display

Table 1. Black box testing table for simpum application functionality

No	Testing area	Cases test	Outcome expectation
1.	Home	The application opens the Home page	The Home page opens with the appropriate menu and slider display.
2.	Training	Click the Training menu	The Training page is open and displays available training information.
3.	Partnership	Click the Partnership menu	The Partnership page is open and displays available partnership information.
4.	SME products	Click the SME Products menu	The SME Product page is open and displays correctly registered products.
5.	MSME Registration	Enter valid and invalid data in the MSME registration form	Valid data is accepted and stored; invalid data is rejected with an error message.
6.	Login	Enter a valid username and password	The user successfully logged in and was directed to the dashboard page.

The black box testing table for simpum application functionality tests six main features of the application, namely the Home, Training, Partnership, SME Products, MSME Registration, and Login menus presents in Table 1. Each test focuses on how the application responds to user input without looking at the behind-the-scenes processes. Testing begins by checking whether the Home page opens correctly, followed by testing the Training and Partnership menus to ensure that each displays the correct information. The SME Products menu is tested to ensure that registered products are displayed correctly. The MSME registration feature is tested by entering valid and invalid data to ensure that the system processes the data correctly and provides error messages when necessary. Finally, the Login feature was tested using valid credentials to ensure that users could log in and access the dashboard page. This table shows that the application was tested based on functionality that is directly visible to users.

Discussion

The findings indicate that the management information system functions not only as a data recording application but also as a coordination mechanism in empowerment activities. The availability of centralised and updated MSME data enables the agency to monitor business development and design targeted intervention programmes. This supports the view that information systems in public organisations can enhance evidence-based decision making by transforming scattered administrative information into actionable knowledge.

This study successfully identified gaps in management information systems (MIS) for micro-enterprises, especially in rural and underdeveloped areas. Although the SIMPUM application is capable of improving efficiency in data management and product marketing, this system has not been fully adapted to local needs due to limitations in digital infrastructure and low technological literacy among MSME actors (Yuwono et al., 2024). These challenges are in line with findings that the digitisation process of MSMEs is often hampered by a lack of resources and dependence on manual procedures that are difficult to abandon (Hafiz & Dóra, 2024).

In addition, the implementation of digital systems such as MIS also faces technical and organisational barriers, such as a lack of technological competence, security concerns, and limited support. In addition, the implementation of digital systems such as MIS also faces technical and organisational barriers, such as a lack of technological competence, security concerns, and limited internal support (Soleman, 2025). The successful adoption of MIS not only depends on technical aspects, but is also driven by the digital capabilities of the organisation and transformational leadership that can facilitate change (Gyamerah & Afshari, 2025). In the context of rural MSMEs, relevant digital innovations such as cloud-based business models, IoT, or digital credit services also play an important role in increasing the resilience and growth capabilities of businesses (Sun et al., 2025).

Furthermore, knowledge management and external collaboration have been proven to accelerate the digitalisation process of MSMEs through cross-organisational information exchange and learning. Therefore, the implementation of SIMPUM needs to be complemented by strategies to strengthen the local digital ecosystem, including continuous training, mentoring, and technology alignment with the operational needs of MSMEs. Overall, this research makes an important contribution to the development of MIS for MSMEs. However, further study is still needed to assess the long-term impact on business sustainability and growth (Adomako & Nguyen, 2024; Romero & Mammadov, 2025).

Conclusion

This study successfully demonstrated that the implementation of a Management Information System (MIS) through the SIMPUM application contributed significantly to improving the operational efficiency and product marketing of MSMEs in Bekasi Regency. This application replaces the manual systems previously used, such as Microsoft Excel, by making it easier for MSME players to update business data in real time and promote their products to a wider market, which in turn increases competitiveness in local and global markets. Testing using White Box Testing and Black Box Testing ensured that the application functioned properly according to its design and met the functional needs of users. However, this study also identified gaps related to limitations in digital infrastructure, low technological literacy, and the inability of some MSME players to switch from manual systems, which are significant barriers to the adoption of digital technology. Therefore, although SIMPUM has had a positive impact, this study emphasises the importance of further development to overcome existing challenges and ensure the sustainability of technology implementation in MSMEs, especially in rural areas with limited resources.

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