

ENHANCING SME OPERATIONS THROUGH SYSTEM MANAGEMENT AND RESOURCE TRANSFORMATION (SMART): EVIDENCE FROM PURWAKARTA

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Abstract-Introduction/Main Objectives: *This research aims to understand the experiences of MSMEs in implementing digitalization in the inventory management process and to analyze how operational systems, management, and digitalization interact to improve the efficiency and competitiveness of MSMEs. Background Problems:* MSMEs face various challenges in digitalization, including low digital literacy, limited infrastructure and internet access, limited capital and human resources, and the dominance of manual practices in business record-keeping and administration. The adoption rate of digital technology among MSMEs is still low and uneven. *Novelty:* This research presents novelty by focusing on the actual experiences of MSME actors in inventory management digitalization, using in-depth interviews to gain direct perspectives, which allows for a deeper comprehension of digitalization practices and difficulties in the field. *Research Methods:* The research used a qualitative approach that utilized in-depth interviews with 8 MSME actors in Purwakarta. The information collected from interviews was cleaned and processed in RIS format, then analyzed and visualized using VOSviewer software to map keywords, inter-concept relationships, and operational thematic

patterns of MSMEs. Finding/Results: The VOSviewer analysis identified dominant keywords such as system, business, digital system, recording, process, and manual, which formed five major clusters: system digitalization & innovation, products & distribution, recording & administration, operational activities & processes, and manual procedures & traditional administration. The results demonstrate that MSMEs combine manual and digital practices, with a primary focus on workflow, record-keeping, inventory management, business management, and digitalization. Conclusion: Digitalization and system innovation are central themes in MSME operations, while record-keeping, operational processes, and distribution serve as supporting elements. The implementation of specific Management Control Systems can enhance the flexibility, accountability, and ability of MSMEs to face the challenges of digitalization and resource limitations.

Keywords: Challenges; Digitalization; Purwakarta; SMEs; Sustainability; VOSviewer

1. INTRODUCTION

MSMEs (Micro, Small, and Medium Enterprises) are the backbone of the Indonesian economy, contributing significantly to the national Gross Domestic Product (GDP) and employment. Data shows that MSMEs contribute between 60.34% and 61.07% of Indonesia's GDP and employ approximately 97% of the national workforce, with the number of business units reaching 64–66 million across various sectors and regions in Indonesia (Probohudono et al., 2025; Rahman et al., 2025; Samputra & Alfarizi, 2025; Zuhroh et al., 2025). Beside contributing to the social sphere, MSMEs in Indonesia also drive inclusive economic growth, reduce unemployment, and improve community welfare. (Probohudono et al., 2025; Srimulyani et al., 2023; Zuhroh et al., 2025). Even though the contribution of MSMEs is very significant, MSME actors face various challenges in navigating the digital era, such as the digital technology adoption rate among MSMEs is still low and uneven. Data shows that internet usage by MSMEs in Surabaya only increased from 44% in 2021 to 46% in 2022, indicating that less than half of MSMEs have gone digital (Samputra & Alfarizi, 2025). This challenge also occurs in various other regions such as Riau, Java, and Sulawesi, where digital literacy and the utilization of digital infrastructure are still limited (Fahrurrozi, 2025; Rahman et al., 2025). Similar situation faced by MSME in Purwakarta according to several scholars (Abdimas et al., 2024; Basuki Putri et al., 2021; Trena et al., 2023).

In Indonesia, the adoption of digital technology by MSMEs is still limited, particularly in rural areas. Data shows that 32% of the total 64 million MSMEs adopt digital technology for marketing improvement using mobile devices and computers (Desmaryani et al., 2024). There have been many previous studies focusing on the digitalization of marketing in MSMEs (Battistoni et al., 2023; Marzi et al., 2023; Muhammad et al., 2025; Scuotto et al., 2021; Succurro & Donati, 2025; Zimmermann et al., 2024). For comparison, in the United States, 52.6% of SMEs use social media and video, while in Australia, 42% of SMEs sell products online (Sutherland et al., 2025).

This research offers a novel contribution through an approach that focuses on the empirical experiences of MSME actors in implementing digitalization for inventory management processes, obtained thru in-depth interviews. Some scholars revealed that inventory management plays a crucial role in improving the operational efficiency of Micro, Small, and Medium Enterprises (MSMEs) (Immadisetty, 2025; Lijuan et al., 2023; Wulan et al., 2024). Effective inventory management helps MSMEs reduce unnecessary costs (Gaoat et al., 2023; Ramesh Murthy et al., 2024), prevent stock shortages (Aubrey et al., 2026; Nomleni et al., 2025), and ensure the availability of products to meet customer demand (Atmika, et al.,

2023). In the digital business era, proper inventory control also supports better decision-making, business sustainability, and increased competitiveness in the market. Thematic and narrative analysis is used to construct a more comprehensive understanding of the dynamics of the experiences and perspectives of MSME actors during the digitalization process, thus enabling the formulation of findings that are scientifically more valuable and contextually rich.

1.1 SMEs in Small Town

The characteristics and socio-economic role of MSMEs in Indonesia have been studied by several researchers. Many MSMEs in small towns and villages have a traditional character, operate informally, and serve as a survival strategy for the community (Pratono & Sutanti, 2016; Ridwan Maksum et al., 2020). MSMEs function as an informal social safety net, providing alternative employment opportunities especially after economic crises or disruptions (Affandi et al., 2024). Meanwhile, women play a crucial role, with approximately 60% of MSMEs being managed by women, contributing significantly to GDP and job creation (Hendratmi et al., 2022, 2024). Furthermore, MSMEs located in small cities in Indonesia face various challenges, such as limited capital and access to financing, with 60–70% lacking access to banking (Al-shami et al., 2024; Zuhroh et al., 2025). Another challenge is that low financial literacy and knowledge about financial institutions are major obstacles, especially in villages and small towns (Al-shami et al., 2024; Ridwan Maksum et al., 2020). From a management and human resources perspective, there are limitations in human resource management, employee training, and financial administration systems, making business development difficult. Added to this, factors such as the work environment, motivation, compensation, and leadership style significantly influence the performance of MSME employees (Al-shami et al., 2024; Lukito et al., 2025). MSMEs in small towns also face challenges in product innovation, technology adoption, and digitalization, especially in areas with a digital infrastructure gap (Fahrurrozi, 2025; Probohudono et al., 2025; Shahroui & Abdalla, 2025; Zuhroh et al., 2025). These conditions are also evident in Purwakarta, where MSMEs play an important role in local economic growth (Sulistyanto & Wilman, 2025) and employment (Imroatussolehah et al., 2024). However, MSMEs in Purwakarta still face challenges such as limited access to financing (Sulistyanto & Wilman, 2025), low digital adoption, and weak managerial capabilities (Sastradinata et al., 2024). Therefore, studying MSMEs in Purwakarta is important to understand how they maintain competitiveness and adapt to changing economic conditions.

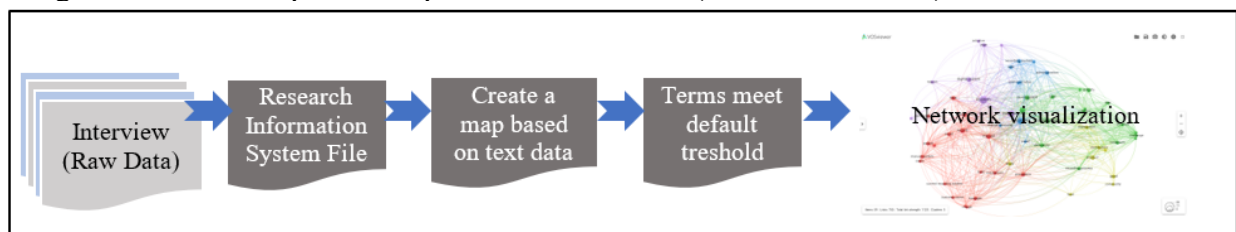
1.2 The Digitalization Adoption Rate of MSMEs

The rapid advancement of technology has driven the digitalization of micro, small, and medium enterprises (MSMEs), introducing innovations such as e-commerce and electronic invoicing to improve business processes and reduce transaction costs. Government initiatives, like expanding broadband access, aim to support MSMEs in adopting e-commerce and e-payments, thereby integrating them into the digital business ecosystem and enhancing their performance (Kilay et al., 2022; Probohudono et al., 2025). The level of digital adoption among MSMEs in Indonesia is still low and uneven. The main obstacles to digitalization include low digital literacy, limited infrastructure and internet access, weak internal coordination, and low stakeholder engagement (Desmaryani et al., 2024; Fahrurrozi, 2025; Kilay et al., 2022; Samputra & Alfarizi, 2025). Additionally, only 36% of micro-enterprises engage in internet-based customer management, exacerbated by low digital literacy (Fitriani et al., 2023). The digital divide between large cities and small towns/rural areas remains a challenge, so the government needs to expand broadband access and other digital services (Probohudono et al., 2025; Sarkum et al., 2020; Widita et al., 2024). Implementing programs to accelerate the digitalization of MSMEs, such as "Making Indonesia 4.0," tax incentives for digital startups,

and expanding access to e-payment and e-government services (Sarkum et al., 2020). However, on the ground, there are still obstacles, especially in converting infrastructure and educational support into measurable improvements in business performance (Fahrurrozi, 2025; Kilay et al., 2022). Digitalization in MSMEs has been proven to improve business performance, expand market access, and drive product and service innovation (Hasan & Serhat, 2024; Kilay et al., 2022). Other researchers revealed that implementing digital marketing strategies through social media, improves the business performance of MSMEs, although many are still not optimal in digital customer management.

2. RESEARCH METHODOLOGY

This research uses an interview-based qualitative method that employs verbal communication to gather information related to the research objectives. Although the topic is controlled by the researcher, the informants have the freedom to answer the open-ended questions asked (Ahmad & Seet, 2009; Al Blooshi et al., 2024; Fitriani et al., 2023). Interview data was obtained from five MSME actors in Purwakarta as informants, all of whom have experience in running their businesses. The informants are familiar with the concept of digitalization but have not yet implemented it optimally in their business operations, particularly in the aspect of inventory management. The data cleaning process is performed on the interview transcripts before further analysis. At this stage, the transcript is cleaned of various filler words and spontaneous expressions that have no analytical value. Additionally, conjunctions that are repeated without a functional meaning are also reduced when they are not relevant to the context of the answer. The removal of these non-substantive elements aims to make the informant's narrative clearer and focused, thus supporting the thematic analysis process. The cleaned data is organized into RIS (Research Information System) file format for mapping and visualization using VOSviewer software. The mapping results from the software are images of relationships between concepts, keyword occurrences, and thematic patterns visualized in a structured manner. To provide an in-depth understanding of the data analysis process flow, the following figure illustrates the stages from data collection and cleaning to mapping and visualization using VOSviewer, adapted from previous researchers (Bukar et al., 2023).



Source: Research Data (2026)

Figure 1. Text Data Processing

The final results of the interview data were entered into the software with the default settings, except for the steps specified by the researcher. The process of creating a map based on text data using RIS data, specifically from the Abstract field containing interview data. Using a minimum number of occurrences = 3, all keywords are used to form the map.

3. RESULT AND DISCUSSION

This research uses 8 informants from MSME actors who have been running their businesses for over 10 years. The speakers reside in Purwakarta Regency, and all of them are aware of digitalization as a tool to help run their MSME businesses. All speakers have used digitalization to varying degrees, from simple methods to using applications available in the market. The

improve efficiency and competitiveness. Cluster 4 (Yellow) emphasizes products and distribution, with keywords 'product', 'marketing', and 'distribution', relating to product management, marketing, and sales strategies. Cluster 3 (Blue) focuses on recording and administration, with keywords 'recording', 'administration', and 'recording system', indicating the importance of documentation, both manual and digital, as a support for business operations and compliance. Cluster 2 (Green) reflects operational activities and processes, highlighting 'process', 'activity', and 'development' as the core workflow and daily operational challenges. Meanwhile, Cluster 1 (Red) describes manual procedures and traditional administration, with keywords 'manual', 'record', and 'procedure', indicating that some MSMEs still rely on manual record-keeping and require integration with digitalization. Overall, this analysis confirms that digitalization and system innovation are central themes, while record-keeping, operational processes, and distribution play a supporting role in MSME operations.

Analysis of keyword relationships reveals several important insights regarding MSME operations. First, the reliance on manuals is evident from traditional recording practices, indicating that the majority of MSMEs still rely on conventional methods. Second, the terms "system" and "recording" emphasize the importance of record-keeping and administration, both manual and digital, to support smooth business operations. Third, the main focus of MSMEs remains on process, namely daily operations, workflows, and inventory management as well as product distribution. This entire activity reflects how MSMEs combine traditional practices and modernization efforts to maintain business effectiveness.

Further analysis was conducted based on the keywords with the highest occurrences and link strength from the interview results. These dominant keywords indicate the central themes that are of concern to MSME actors, whether related to digitalization, administration, or daily operational processes. The following table presents detailed information for each main keyword, including its position on the map (x, y), cluster, and relationship weight, allowing for the identification of priorities and interconnections between topics in the operation of MSMEs.

Table 2. Detailed Keyword Network from SME Interviews

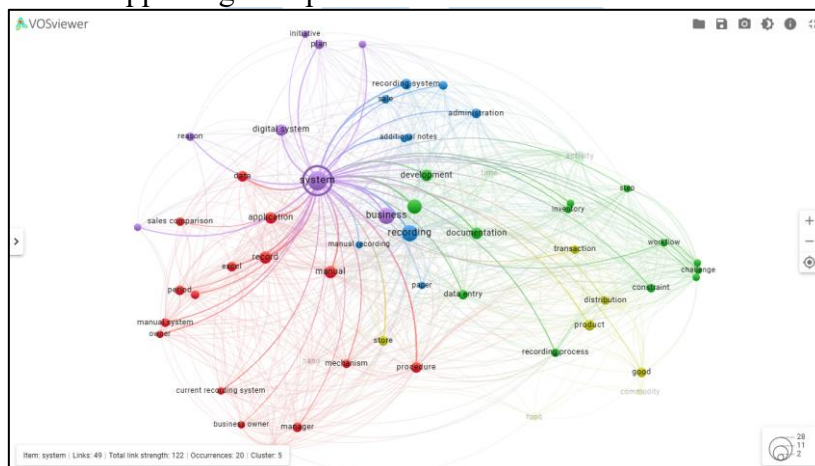
Label	Coordinate		Cluster	Weight		
	x	y		Links	Link strength	Occurrences
system	-0.389	0.280	5	49	122	20
business	-0.107	0.137	5	34	59	14
recording	-0.012	0.066	3	52	123	14
process	0.008	0.175	2	45	83	11
manual	-0.336	-0.093	1	44	73	8
record	-0.603	-0.033	1	37	67	8
development	0.057	0.303	2	30	41	7
digital system	-0.538	0.487	5	25	35	7
activity	0.684	0.379	2	26	38	6
procedure	0.015	-0.482	1	38	62	6
product	0.724	-0.310	4	21	25	6
recording system	-0.026	0.675	3	24	37	6
administration	0.260	0.555	3	29	44	5
distribution	0.788	-0.209	4	29	38	4
marketing	0.853	-0.234	4	26	32	4

Source: Research Data (2026)

From the table above, it can be seen that the keywords 'system', 'business', 'recording', 'process', 'manual', 'procedure', 'digital system', 'recording system', 'activity', 'development', 'product',

'distribution', 'marketing', and 'administration' dominate the discussion related to MSME operations. The words 'system' and 'digital system' emphasize the importance of digitalization and system innovation, while 'recording' and 'recording system' indicate the need for record-keeping and administration, both manual and digital, to ensure the smooth operation of business activities. Meanwhile, 'process', 'procedure', and 'activity' emphasize a focus on workflow and daily operational steps, which are at the heart of business management. The word 'manual' emphasizes that traditional practices are still used, while 'business' highlights the main concern of MSME actors regarding business activities and decision-making. The word 'development' indicates a focus on business growth and development, while 'product', 'distribution', and 'marketing' emphasize aspects of product management, distribution, and marketing strategies. Finally, 'administration' signifies the need for neat and structured record-keeping and documentation to support administration and accountability. Overall, this combination of keywords describes the balance between traditional practices and modernization efforts in managing MSMEs.

The image below shows the network of relationships between the main keywords, namely 'system', in the operational aspects of MSMEs, based on interview results analyzed using VOSviewer. Each node represents a keyword, the lines between nodes indicate the relationship or connection between keywords. The size of the node reflects the number of occurrences, and the thickness of the line shows the weight of the connection (link strength) between words. From this visualization, a relationship is seen between the central theme, 'system,' which is the dominant keyword in supporting the operational activities of MSMEs.



Source: Research Data (2026)

Figure 3. Network Visualization of 'system' During the Interview

The image above, generated by VOSviewer analysis, shows that the keyword 'system' is the central hub, connecting the three main domains. First, operations and processes (process, record, procedure, manual, digital system) show a combination of manual and digital processes. Second, management and business (business, business owner, manager, plan, stock) emphasize the aspects of management and decision-making. Third, digitalization and data (digitalization, data, data entry, excel) highlight the shift toward digital systems. Challenge groups (challenges, constraints, problems) appear more sporadically, indicating technical and operational obstacles. This visualization confirms the transition of small businesses from manual to digital processes, as well as the need for effective system development.

The following table shows the relationships between the keywords analyzed using VOSviewer from the results of interviews and field observations. Each row in the table represents a pair of

keywords (Node-1 and Node-2) along with a weight that describes the degree of association between those words. This analysis helps identify key and systematic concepts within the research context, particularly those related to mechanisms, processes, and recording systems in small and medium-sized enterprises. By understanding these relationships, patterns of interconnectedness can be seen between operational, management, and digitalization aspects, which are the main focus in business system development.

Analysis of keyword relationships using VOSviewer shows that the keyword 'system' is central to connecting various operational, management, and digitalization aspects in the small businesses studied. This finding reflects the main focus of business owners in managing business processes and data recording. Small and medium enterprises (SMEs) rely on various systems to improve their operations (Chabalala et al., 2024; Dimoso & Utonga, 2024; Gaglio et al., 2022), decision-making (Gilmore & Carson, 2000; Lee et al., 2023), and competitiveness (Inegbedion et al., 2024; Setyawan Agus et al., 2015). Management accounting systems and information systems in SMEs have proven to play a very important role (Msomi & Vilakazi, 2023; Zhao et al., 2022), because the system allows MSMEs to analyze, integrate, and disseminate both financial and non-financial information (Gyamera et al., 2023; Van Caneghem & Van Campenhout, 2012; Wijekoon et al., 2024) throughout the organizational structure of MSMEs. This supports department managers in making higher-quality decisions and responding to customer needs and market changes more quickly.

Management Control Systems (MCS) play a very important role in the operations of MSMEs (Broccardo et al., 2024; Jutidharabongse et al., 2024) by structuring processes, guiding decision-making, and supporting strategic planning. The findings of this study indicate that MSMEs are highly reliant on systems for managing operational processes, record-keeping, and business activities, with the keyword 'system' emerging as the central element connecting operational, managerial, and digitalization aspects (Telukdarie et al., 2022; Viswanathan & Telukdarie, 2021). Efficient management control helps MSMEs optimize limited resources, align actions with strategic goals, and improve overall productivity. In practice, MSMEs combine manual and digital methods, such as paper-based record-keeping alongside Excel or digital systems, to handle budgeting, performance evaluation, and data management. Although resource limitations may restrict the implementation of advanced MCS, customized control systems can enhance flexibility, accountability, and adaptability, enabling SMEs to overcome challenges related to digitalization and operational constraints.

4. CONCLUSION

Based on the analysis of interview data and visualization using VOSviewer, this study successfully identified the main patterns of interconnectedness between operations, management, and digitalization of MSMEs. Several things were revealed in this study regarding the priorities, challenges, and strategies implemented by MSME actors in managing their businesses, both through manual and digital practices. Subsequently, the following conclusion summarizes the findings that are the core of this research and provides practical implications for the development of operational systems and the digitalization of MSMEs.

1. Digitalization and systems are the main focus for MSMEs, with the keyword 'system' standing out as the central connection, linking operations, management, and digitalization. This indicates that implementing digital systems and business innovation is a top priority for improving the efficiency and competitiveness of MSMEs.
2. The combination of manual and digital practices is still dominant, with most MSMEs relying on manual record-keeping (manual, record, procedure), but they are starting to

integrate digital systems like digital systems and Excel to support their record-keeping, administration, and performance evaluation.

3. Operational processes are at the core of MSMEs' concerns, with daily activities, workflows, inventory management, and product distribution (process, activity, development, product, distribution) being important focuses in business management, supported by digitalization.
4. Management and decision-making play an important role, and keywords related to business, manager, and business owner indicate that managerial aspects, decision-making, and business strategy remain a primary concern for MSMEs.
5. The challenges of digitalization remain a real obstacle, such as limited resources, infrastructure, digital literacy, and technical constraints, which still arise although they are not dominant, indicating the need for a customized system to improve flexibility and accountability.
6. The implementation of Management Control Systems can enhance the effectiveness of SMEs, tailored to optimize resources, align actions with strategic goals, and strengthen their ability to face the challenges of digitalization and operations.
7. The findings also imply that the Government of Purwakarta Regency should focus more on operational and back-end training, such as financial administration, inventory systems, and digital record-keeping, rather than concentrating primarily on marketing-oriented programs.

5. LIMITATION

This research has several limitations that need to be considered. First, the limited number of informants and the geographical focus on MSMEs in Purwakarta restrict the generalizability of the findings to the context of MSMEs in other regions. Second, the variation in the level of understanding and implementation of digitalization among the informants may influence the results of the analysis regarding digitalization experiences. Third, the data obtained thru in-depth interviews is susceptible to subjective bias and researcher interpretation. Fourth, the research focus on inventory management digitalization overlooks other aspects such as marketing, finance, or product innovation, which are also relevant for the development of MSMEs.

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