



How Can Resource-Constrained MSMEs Compete in the Digital Economy? A Systematic Review of Frugal Innovation and Digital Capabilities

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Abstract. This study aims to analyze the development of the literature on *frugal innovation* and *digital capabilities* as a strategy to increase the competitiveness of micro, small, and medium enterprises (MSMEs) that face limited resources in the digital economy. The research used a *systematic literature review* and bibliometric analysis of 3,287 documents for the period 2008-2026, which were searched through Scopus and Crossref, then mapped using VOSviewer. The literature selection was carried out based on inclusion and exclusion criteria, while 24 core articles for the 2022-2026 period were used in the thematic synthesis. The results showed that publications were dominated by the fields of *Business, Management and Accounting, Social Sciences*, and *Computer Science*, with China, India, and the United Kingdom as the main contributors. Keyword analysis showed the dominance of the themes of *sustainable development, innovation, sustainability, digital transformation*, and *artificial intelligence*. Network visualization showed the relationship between *frugal innovation, resource scarcity, resource limitation, medium enterprises*, and *competitive advantage*. The thematic synthesis shows that limited resources can encourage frugal innovation, while *digital capabilities* and *dynamic capabilities* strengthen the ability of MSMEs to select, integrate, and reconfigure technology and resources. This study confirms that the competitiveness and resilience of MSMEs are built through the integration of *resource constraints, frugal innovation, digital capabilities*, and *dynamic capabilities*. These findings provide an integrative conceptual framework for future research and offer a strategic basis for MSMEs to optimize technology efficiently, adaptively, and sustainably.

Keywords: Competitiveness; Digital Capabilities; Digital Economy; Frugal Innovation; MSMEs.

1. BACKGROUND

Digital transformation has changed the competitive pattern of MSMEs through the use of digital platforms, artificial intelligence, data analytics, and *the Internet of Things*. These technologies open up opportunities to expand markets, increase productivity, and accelerate decision-making. Many MSMEs still face limited capital, digital competencies, infrastructure, and human resources. Rossit and Bidanda (2026) show that technological complexity and investment needs are obstacles to the digital transformation of SMEs, while Sánchez-Rodríguez *et al.* (2025) affirm that limited skills, data infrastructure, and financial capabilities can hinder the creation of strategic advantages. The main challenge for MSMEs is not just to adopt technology, but to utilize it economically, adaptively, and strategically (Ahmed *et al.*, 2022; Avelar *et al.*, 2024; Dey *et al.*, 2024).

In this context, *frugal innovation* becomes relevant because it emphasizes value creation with limited resources. Alsharaideh *et al.* (2026) explain that *frugal innovation* is oriented towards reducing costs, fulfilling essential functions, and optimizing value. Rossit and Bidanda (2026) show that frugal digitalization can be implemented gradually through low-cost solutions and technology that is easy to apply to ongoing business processes. However, this approach requires *digital capabilities* so that companies are able to choose and integrate

technology effectively. Sahoo *et al.* (2026) show that digital platform capabilities strengthen frugal innovation strategies, while Alsharaideh *et al.* (2026) affirm the role of AI capabilities in recognizing opportunities and optimizing resources (Dabic *et al.*, 2022; De Marchi *et al.*, 2022; Khattak *et al.*, 2022).

The relationship between resource limitations, *frugal innovation*, and *digital capabilities* can be explained through the perspective of *dynamic capabilities*. Sánchez-Rodríguez *et al.* (2025) show that AI adoption can increase innovation and competitiveness of SMEs through the ability to recognize opportunities and reconfigure resources. Sagala and Óri (2026) place *the Resource-Based View* and *dynamic capabilities* as important frameworks in explaining the resilience of SMEs. Pradana *et al.* (2026) link *frugal innovation* with resilience; Edlbi and Yilmaz (2026) emphasize the role of knowledge management, while Sahoo *et al.* (2026) and Sánchez-Rodríguez *et al.* (2025) more highlight digital capabilities, AI, and competitiveness (Achmad & Wiratmadja, 2024; Iqbal & Piwovar-Sulej, 2023; Shehzad *et al.*, 2023).

The gap was strengthened by bibliometric mapping of 3,287 documents for the 2008-2026 period. Publications were dominated by *Business, Management and Accounting* with 1,894 documents, followed by *Social Sciences* with 1,026 and *Computer Science* with 747 documents. The keywords *Sustainable Development*, *Innovation*, *Sustainability*, *Digital Transformation*, and *Artificial Intelligence* appeared more frequently, while *Frugal Innovation* appeared only 100 times and *Dynamic Capabilities* 99 times. The VOSviewer visualization also showed the relationship between *frugal innovation*, *resource scarcity*, *resource limitation*, *medium enterprises*, and *competitive advantage*. Based on these gaps, this research was formulated through the following four *research questions (RQ)*: RQ1. How is the development of publications and knowledge structures regarding frugal innovation and digital capabilities in MSMEs that face limited resources?, RQ2. How do limited resources shape the application of frugal innovation in MSMEs in the digital economy?, RQ3. How do digital capabilities and dynamic capabilities support the competitiveness and resilience of MSMEs through frugal innovation?, RQ4. What are the gaps in research and research agendas that arise from the integration of resource constraints, frugal innovation, digital capabilities, and dynamic capabilities?.

2. LITERATURE REVIEW

Limited Resources and *Frugal Innovation*

MSMEs generally face limited capital, technology, digital competencies, and human resources that can hinder the digital transformation process. Rossit and Bidanda (2026) show that investment costs and technological complexity are the main obstacles for SMEs in digitalization. In these conditions, *frugal innovation* is a relevant approach because it emphasizes value creation through cost reduction, fulfillment of key functions, and resource optimization (Alsharaideh *et al.*, 2026). This approach allows MSMEs to produce solutions that are simple, affordable, and in accordance with market needs without relying on large investments (Dabic *et al.*, 2022; De Marchi *et al.*, 2022; Lopez-Sanchez & Santos-Vijande, 2022).

Digital Capabilities

Digital capabilities describe a company's ability to select, use, integrate, and adapt digital technology to business needs. These capabilities are important because technology ownership does not automatically lead to excellence. Sahoo *et al.* (2026) found that the integration and reconfiguration capabilities of digital platforms can strengthen frugal innovation strategies. Alsharaideh *et al.* (2026) also showed that AI capabilities help companies recognize opportunities, optimize resources, and improve process efficiency. Thus, digital capabilities help MSMEs utilize technology appropriately in accordance with the limitations of their resources (Ahmed *et al.*, 2022; Al-Khatib & Ramayah, 2025; Govindan, 2024; Khattak *et al.*, 2022).

Dynamic Capabilities, Competitiveness, and Resilience

Dynamic capabilities describe a company's ability to recognize opportunities, capitalize on opportunities, and reconfigure resources as the business environment changes. Sánchez-Rodríguez *et al.* (2025) show that these capabilities help SMEs transform AI adoption into innovation and competitiveness. Sagala and Óri (2026) also place *dynamic capabilities* as an important framework in explaining SME resilience. In addition, Pradana *et al.* (2026) show that *frugal innovation* can strengthen resilience through knowledge management and sharing. The findings show that the ability to adapt and manage resources is an important basis for the sustainability of MSME competitiveness (Achmad & Wiratmadja, 2024; Dey *et al.*, 2024; Iqbal & Piwowar-Sulej, 2023; Shehzad *et al.*, 2023).

Conceptual Integration

Based on the study, limited resources can encourage MSMEs to develop *frugal innovation*, while *digital capabilities* help companies use technology more effectively. The

combination of the two can strengthen *dynamic capabilities*, which further supports the competitiveness and resilience of MSMEs. The conceptual relationship of this research is formulated as *Resource Constraints, Frugal Innovation, Digital Capabilities, Dynamic Capabilities, and MSME Competitiveness/Resilience*. This framework emphasizes that the competitiveness of MSMEs in the digital economy is not only determined by the amount of resources they have, but also by the ability of companies to manage limited resources efficiently, adaptively, and innovatively (Avelar et al., 2024; Dubey et al., 2022; Hossain et al., 2024; Ling et al., 2025; Park et al., 2022).

3. RESEARCH METHODS

This study uses a *systematic literature review (SLR)* design combined with bibliometric analysis. Bibliographic data were obtained from Scopus with a publication range of 2008-2026, while Vosviewer used Crossref. The search process resulted in 3,287 documents, which were then used as a basis for mapping publication development and knowledge structure. The use of these two sources aims to expand the scope of publication metadata while supporting document identification based on title, author, year, keyword, publication source, and DOI.

The search strategy was compiled using a combination of the terms "MSME", "SME", "small and medium enterprise", "small business", "microenterprise", "frugal innovation", "resource constraint", "resource scarcity", "resource limitation", "digital capability", "digital transformation", "digital technology", and "digitalisation". The terms were combined using Boolean AND and OR operators. The document was then selected based on the suitability of the title, abstract, keywords, and relevance to the research focus. Articles that do not have a direct relationship with the context of MSMEs, frugal innovation, limited resources, or digital capabilities are not included in the substantive synthesis.

The analysis was carried out through two techniques. First, bibliometric descriptive analysis was used to identify the distribution of publications by year, field of science, country, and keyword. Second, co-occurrence analysis using VOSviewer was used to map relationships between keywords. *Network visualization* was used to identify clusters and proximity between themes, while *overlay visualization* was used to observe changes in research focus over time. Node size indicates the frequency of occurrence of terms, while lines between nodes indicate the strength of relationships between keywords.

The final stage is carried out through thematic synthesis of the publications that are most relevant to the research focus. The synthesis mainly considers the cutting-edge literature for the period 2008-2026 to obtain the latest conceptual developments. The literature selection

process is summarized in Figure 1. A search through Scopus and Crossref yielded 3,287 documents used in the bibliometric analysis. Furthermore, titles, abstracts, keywords, and topic relevance were examined for thematic synthesis, with 24 core publications for the 2008-2026 period used in the final discussion. The results of the bibliometric mapping were then compared with substantive findings to identify research patterns, relationships between concepts, and areas that are still understudied.

Inclusion and Exclusion Criteria

Literature selection is carried out using inclusion and exclusion criteria to ensure that the published analysis is in accordance with the research objectives. The criteria are applied to the title, abstract, keywords, availability of the full text, publication period, and suitability of the research substance. The following are the inclusion and exclusion criteria:

Table 1. Inclusion and Exclusion Criteria.

Aspect	Criteria Inclusion	Exclusion Criteria
Data source	Publications obtained through Scopus and Crossref	Publications outside of the data sources used in the study
Publication period	2008–2026 for bibliometric analysis; 2022–2026 is prioritized for thematic synthesis	Publications before 2022 were not used in the core thematic synthesis, but were retained in bibliometric mapping
Research context	Discuss MSMEs, SME, <i>small and medium enterprises</i> , <i>small business</i> , or <i>microenterprise</i> .	Not related to MSMEs or small and medium-sized enterprises
Focus noun	Discuss <i>frugal innovation</i> , <i>resource constraints</i> , <i>resource scarcity</i> , <i>resource limitation</i> , <i>digital capabilities</i> , <i>digital transformation</i> , <i>digital technology</i> , atau <i>digitalisation</i> .	Lack of a direct relationship to the main theme of the research
Relevance	Titles, abstracts, and keywords according to the focus of the research	Titles, abstracts, or keywords are outside the focus of the research
Full text	Full text is available and accessible for the synthesis process	Full text is not available or inaccessible
Study quality	Has adequate methodological information and findings to support synthesis	Insufficient methodological clarity or substance does not support the synthesis of the research
Duplication	One unique version of the publication	Duplicate publications, if found

Source: data processed (2026)

Based on these inclusion and exclusion criteria, the literature selection process is carried out in stages to ensure that each published analysis has relevance in accordance with the focus of the research. The selection stages include document identification, screening by title, abstract, and keyword, feasibility assessment based on the availability of complete text and suitability of substance, and determination of articles used in the thematic synthesis. The entire selection process is visualized through the PRISMA diagram in Figure 1 to show the flow of literature selection systematically and transparently.

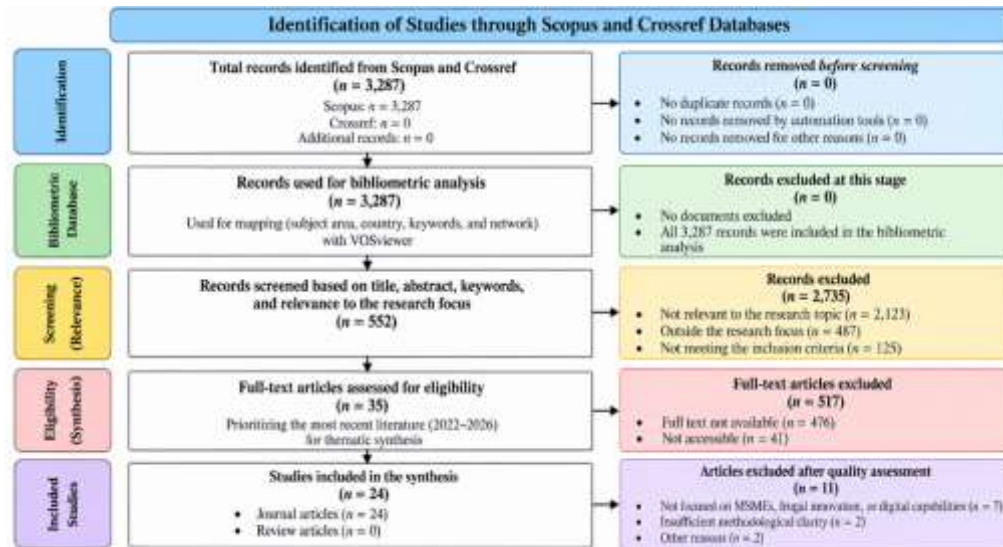


Figure 1. Literature Selection Flow Diagram Based on PRISMA.

4. RESULTS AND DISCUSSION

Development and Distribution of Literature

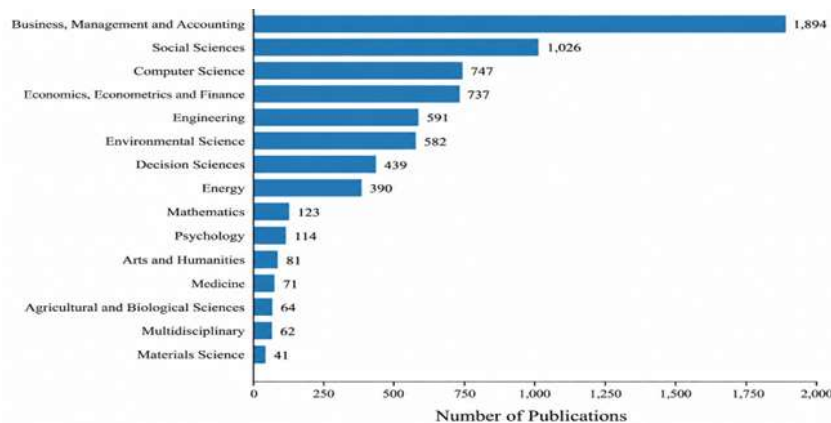


Figure 2. Distribution of Publications by Field of Science.

Figure 2 shows the distribution of publications based on fields of science, namely Business, Management and Accounting dominating with 1,894 publications, followed by Social Sciences (1,026), Computer Science (747), and Economics, Econometrics and Finance (737). Other fields that also contribute significantly are Engineering (591), Environmental Science (582), and Decision Sciences (439). These findings show that the studies analyzed are mainly rooted in the fields of management and social sciences, but also develop in a multidisciplinary manner through the relationship with technology, economics, engineering, environment, and decision science.

transformation and sustainability in general rather than integrating them specifically with frugal innovation and dynamic capabilities. These findings are important because recent research shows that digital capabilities and frugal innovations can actually reinforce each other. Alsharaideh *et al.* (2026) found that AI capabilities support frugal innovation through opportunity recognition, resource optimization, and process redesign, while Sahoo *et al.* (2026) show that the integration and reconfiguration capabilities of digital platforms have a positive effect on frugal innovation strategies (Al-Khatib & Ramayah, 2025; Govindan, 2024).

Research Theme Structure

Keyword analysis shows that *Sustainable Development* has the highest frequency with 414 occurrences, followed by *Innovation* with 369, *Sustainability* with 331, *Digital Transformation* with 306, and *Artificial Intelligence* with as many as 270 occurrences. In contrast, *Frugal Innovation* recorded 100 occurrences and *Dynamic Capabilities* 99 occurrences. These differences show that the literature discusses digital transformation and sustainability in general rather than integrating them specifically with frugal innovation and dynamic capabilities. These findings are important because recent research shows that digital capabilities and frugal innovations can actually reinforce each other. Alsharaideh *et al.* (2026) found that AI capabilities support frugal innovation through opportunity recognition, resource optimization, and process redesign, while Sahoo *et al.* (2026) show that the integration and reconfiguration capabilities of digital platforms have a positive effect on frugal innovation strategies (Govindan, 2024).

RQ1. The bibliometric results show that research on frugal innovation and digital capabilities in MSMEs develops in a multidisciplinary manner and is globally spread. The study is mainly rooted in the fields of management and social sciences, but is also connected to computer science, economics, engineering, environment, and decision science. The knowledge structure shows that frugal innovation is an important node that connects resource scarcity, resource limitation, medium enterprises, and competitive advantage. This pattern shows a shift in the literature towards the integration of issues of resource limitation, innovation, digital capabilities, and the competitiveness of MSMEs.

Shift in Research Direction

The results of the overlay visualization in Figure 5 show a shift in the research theme from the issue of resource scarcity and resource limitation to frugal innovation, MSMEs, competitive advantage, and technology-based approaches. This pattern shows that resource limitations are gradually no longer treated only as obstacles, but are beginning to be understood as conditions that can trigger innovation.

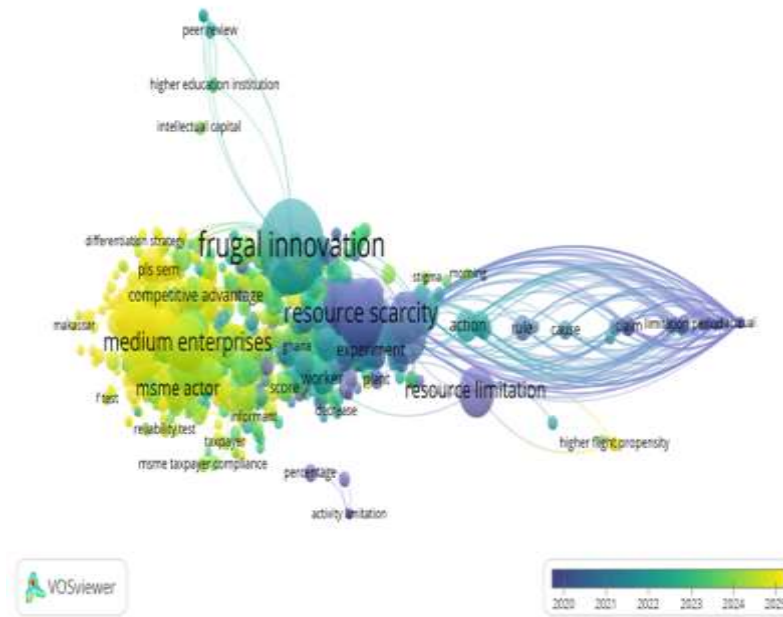


Figure 5. Development of Research Themes (Overlay Visualization).

Figure 5. shows this shift emphasizes that digital transformation in MSMEs should not be understood as a process of acquiring increasingly sophisticated technology. The results of the study show that the strategic value of technology actually arises when companies are able to adapt technology to their business capabilities and needs. Rossit and Bidanda (2026) show that a frugal approach allows digital transformation to be carried out in a modular and gradual manner by utilizing technology that is easy to implement. These findings strengthen the argument that MSMEs can build digital capabilities without having to follow the investment patterns of large companies. Competitiveness in the digital economy depends more on the ability to optimize resources than just the amount of resources available (Ahmed et al., 2022; Khattak et al., 2022).

RQ2. Resource constraints shape the implementation of frugal innovation by encouraging MSMEs to prioritize key functions, reduce costs, utilize available knowledge, and choose solutions that suit the organization's capabilities. Thus, limitations are not only an obstacle but also a pressure that encourages companies to develop simpler, more efficient, and adaptive solutions. (Dabic et al., 2022; Edlbi & Yilmaz, 2026; Pradana et al., 2026).

Integration of Frugal Innovation and Digital Capabilities

The synthesis results show that *frugal innovation* and *digital capabilities* are two complementary mechanisms. *Frugal innovation* helps companies simplify solutions, reduce costs, and focus resources on the functions that provide the greatest value. Meanwhile, *digital capabilities* allow companies to select, integrate, and configure technology as needed. Sahoo

et al. (2026) show that the integration and reconfiguration capabilities of digital platforms strengthen frugal's innovation strategy. Alsharaideh *et al.* (2026) also show that AI capabilities have a positive influence on frugal innovation.

This relationship can then be explained through *dynamic capabilities*. MSMEs need to recognize market changes, identify relevant opportunities, and readjust resources so that frugal innovation and digital technology provide strategic results. Sánchez-Rodríguez *et al.* (2025) show that *dynamic capabilities* bridge AI adoption with SME innovation and competitiveness. Sagala and Öri (2026) also found that the *Resource-Based View* and *dynamic capabilities* are important perspectives in explaining SME resilience. These results support the view that it is not enough for companies to simply own technology or run low-cost innovations. Companies must also have the ability to turn both sources into strategic actions as the business environment changes (Achmad & Wiratmadja, 2024; Avelar *et al.*, 2024).

RQ3. Digital capabilities strengthen frugal innovation by enabling MSMEs to select, integrate, and configure technology according to resource constraints and business needs. Furthermore, dynamic capabilities allow companies to recognize opportunities, take advantage of market changes, and reconfigure resources so that frugal innovation and digital technology generate strategic benefits. The integration of these three capabilities strengthens the adaptation, resilience, and competitiveness of MSMEs in the digital economy (Alsharaideh *et al.*, 2026; Sahoo *et al.*, 2026; Sánchez-Rodríguez *et al.*, 2025).

Synthesis of Findings and Theoretical Implications

Based on the overall results, this study identifies the relationship pattern of Resource Constraints, Frugal Innovation, Digital Capabilities, Dynamic Capabilities, and MSME Competitiveness/Resilience. Resource limitations are the initial condition that encourages MSMEs to look for more economical and simple ways to innovate. *Frugal innovation* provides a logic of value creation in limitations, while *digital capabilities* provide technological capabilities that support the process. *Dynamic capabilities* then become a mechanism that allows companies to transform these two capabilities into responses to market changes, innovation, resilience, and competitiveness. Findings of Pradana *et al.* (2026), Alsharaideh *et al.* (2026), and Sánchez-Rodríguez *et al.* (2025) provide support for these parts of the relationship (Dabic *et al.*, 2022; Hossain *et al.*, 2024; Lopez-Sanchez & Santos-Vijande, 2022). RQ4. The main gap in the literature lies in the limited number of studies that integrate resource constraints, frugal innovation, digital capabilities, and dynamic capabilities in one framework to explain the competitiveness and resilience of MSMEs. Previous literature tends to discuss frugal innovation, digital transformation, dynamic capabilities, or resilience separately. Based

on the synthesis of this research, the next research agenda needs to empirically examine the patterns of Resource Constraints, Frugal Innovation, Digital Capabilities, Dynamic Capabilities, MSME Competitiveness/Resilience in various sectors and countries and use longitudinal design to explain changes in MSME capabilities during the digital transformation process. (Dabic et al., 2022; De Marchi et al., 2022; Hossain et al., 2024; Lopez-Sanchez & Santos-Vijande, 2022).

5. CONCLUSIONS AND SUGGESTIONS

Conclusion

The results of the *systematic literature review* and bibliometric analysis of 3,287 documents for the 2008-2026 period show that the study of MSMEs in the digital economy is developing strongly on the themes of digital transformation, innovation, sustainability, and artificial intelligence. However, discussions that specifically integrate *frugal innovation*, *digital capabilities*, *resource constraints*, and *dynamic capabilities* are still relatively limited. The VOSviewer mapping shows the relationship between *frugal innovation*, *resource scarcity*, *resource limitation*, *medium enterprises*, and *competitive advantage*, which shows that resource constraints are increasingly understood as conditions that can encourage innovation and adaptation.

The literature synthesis shows that *frugal innovation* helps MSMEs create value through efficient use of resources, while *digital capabilities* strengthen the company's ability to select, integrate, and utilize technology according to business needs. Both capabilities become more effective when supported by *dynamic capabilities* that allow companies to recognize opportunities, adjust strategies, and reconfigure resources. Thus, this research produces a conceptual pattern of Resource Constraints, Frugal Innovation, Digital Capabilities, Dynamic Capabilities, and MSME Competitiveness/Resilience. These findings confirm that the competitiveness of MSMEs in the digital economy does not only depend on the amount of resources, but also on the ability to manage limitations efficiently, adaptively, and innovatively.

Suggestions

The next research is suggested to test the conceptual framework empirically on MSMEs in various sectors and countries to determine the strength of the relationship between *frugal innovation*, *digital capabilities*, *dynamic capabilities*, competitiveness, and resilience. Future studies can also use a longitudinal approach or cross-sector comparison to see changes in MSME capabilities during the digital transformation process. In addition, subsequent bibliometric research can expand data sources and update publication periods so that the

development of themes can be monitored more comprehensively. Practically, MSMEs are advised to prioritize technologies that are affordable, easy to apply, and in accordance with core business needs, as well as strengthen organizational capabilities in managing knowledge, technology, and environmental change.

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