Digitalization of MSMEs: A bibliometric analysis using Biblioshiny and VOSviewer

Sita Nurhayati | Alni Rahmawati | Arni Surwanti

Abstract The primary objective of this study was to analyze the research progress made regarding the digitalization of MSMEs via the Scopus data source. The research was addressed by bibliometric analysis through the visualization software packages Biblioshiny and VOSviewer. The study’s objective is to analyze the progress of research on digitalization on MSMEs. The survey results show that the digitalization of MSMEs experienced a positive growth trend from 2018-2023. The best contribution of this research is to emphasize both the authors and sources and relevant documents and explore the collaboration of digitalization research on MSME. A thorough review will benefit future researchers by helping them create a solid conceptual framework that provides an overview of research around the world.

Keywords: MSME, digitalization, bibliometric analysis, Scopus

1. Introduction

Technology presents many opportunities to communicate within the reach of many people without limitations of time or place (Rahayu et al., 2023). Entering the Industry 4.0 phase encourages the emergence of renewed technologies that offer various benefits to their users. Digital transformation, which continues to develop rapidly from previous technologies, requires people to adapt quickly (Culot et al., 2020).

Likewise, large and small industries are highly committed to integrating digitalization in this phase. Digitalization offers unprecedented opportunities for MSME actors (Cenamor et al., 2019). Digitalization refers to improvements in operations, functions, models, processes, and activities using new digital technology (Gürdürü et al., 2019). The digitalization process showed rapid progress when the world was hit by the widespread spread of COVID-19, where all industries, including MSMEs, had to force their business to survive under enormous pressure by advertising their products through digital channels (Kádárová et al., 2023).

According to Brodny & Tutak (2022), digitization is driven by the application of IT, improving employee skills in a business, and by digital strategy, where digitalization impacts the financial performance of MSMEs. This digitalization is essential for increasing future productivity (Schönfuß et al., 2021).

Several studies have explored the digitalization of MSMEs, which is associated with digital transformation, digital readiness, and business economic recovery (Fliege et al., 2023; Moreira, 2021; Okfalisa et al., 2022). Digitalization can automatically improve both the process and the final product, thus driving high requirements and increased business quality (Hu et al., 2023).

This study utilizes instruments related to bibliometrics, such as analyzing overall conceptual trends and ideas that can be displayed in each section. The objective of this study stems from the questions below, namely, to analyze research trends and highlight patterns of knowledge development about digitalization on MSME, and integrate whole wisdom to achieve a more exploratory compassionate using Biblioshiny and VOSviewer applications in visualizing data related to research trends. This bibliometric study seeks to answer the following research questions:

1. Which authors and journals are most dominant in the digitalization of MSMEs?
2. What is the collaboration network involved in the digitalization of MSMEs?
3. The science of digitalization of MSMEs continues to be studied and developed. What are the most discussed themes in recent research?

2. Literature review

Digitalization is part of the development process of transformation in operations, functions, and models as activities utilizing digital technology continue to develop rapidly. Digitalization can create opportunities to achieve high profits in an industry or business by combining big data, analytics, the Internet of Things (IoT), and automation. Therefore, information and communication technology can be integrated through the digitalization of both the natural world and the virtual world (Gürdürü et al., 2019).
Better and more readily available information integration is the goal of this digitalization (Szalavetz, 2019). Implementing digital competency values with full awareness is also an essential concern for business actors, such as MSMEs, who want their business to succeed. A business, including MSMEs, must overcome challenges related to business continuity and must quickly adapt and master digitalization, which provides many benefits. Mubarak et al. (2021) suggested that digitalization has a positive and substantial impact on the performance of MSMEs in addition to the many challenges that must be overcome.

Among other literature review methods, bibliometric analysis differs in that it involves the extraction of information on behavior and dynamics from the realm of knowledge (Abdollahi et al., 2021; Fosso Wamba & Queiroz, 2021), the visualization of published scientific articles (Ragazou et al., 2022) and the evaluation of the efficiency, validity and reliability of the research process (Mukherjee et al., 2022). Bibliometric analysis is a method that involves identifying, managing, and applying main analytical instruments in a particular field of study (Gálvez-Sánchez et al., 2021).

3. Materials and Methods

This study began with analysis, including database identification from Scopus, and then a keyword search was carried out for the data collection (Figure 1).

![Flowchart of data collection](https://www.malque.pub/ojs/index.php/mr)

**Figure 1** Data collection.
*Source:* Scopus database (2023)

Figure 1 shows the data used in this study after identifying and selecting a database from Scopus by searching and combining several appropriate keywords. After the data have been collected according to the required criteria and saved in BibTex and CSV files, the data will be analyzed by Biblioshiny and VOSviewer software. First, a descriptive data analysis will be carried out concerning the sources, documents, and authors presented in this study. Furthermore, network maps display data visualization related to related research (Aria & Cuccurullo, 2017).

The main requirement in bibliometric analysis is that the description of articles indexed in the database be structured based on data downloaded from Scopus in BibTex or CSV form, assisted by R Studio-Bibliometrix (Biblioshiny) and VOSviewer software for data visualization. Scopus was used in this study because it is claimed to be one of the most trusted and reliable, it is often used by academics because it includes abstracts and the most extensive peer-reviewed research citation database (Velasco-Muñoz et al., 2018); and it includes the complete database of peer-reviewed journals in various fields of study (Bedi et al., 2019).

In this study, the data used for analysis were obtained from the Scopus database for the last five years from 2018-2023, where articles were published before August 2023. Keyword searches in the Scopus database begin with input (TITLE-ABS-KEY (msme) OR TITLE-ABS-KEY (somes) AND TITLE-ABS-KEY (digitalization)) AND PUBYEAR > 2017 AND PUBYEAR < 2024 AND (( LIMIT To (( LANGUAGE , "English" ) ) AND (( LIMIT TO (( OA , "all" ) ). The search is based on articles in English and open access, as this approach can increase the visibility of this research and benefit many people. The Biblioshiny and
VOSviewer software applications were used in this study to analyze and visualize the data. The workflow of the research method used in this study is shown in Figure 2.

![Methodological Flowchart](https://www.malque.pub/ojs/index.php/mr)

4. Results and Discussion

4.1. Summary of Articles

The first part of this study included descriptive analysis. Table 1 describes the 215 selected documents from a systematic search through the Scopus database. The total documents analyzed in this study were from 127 sources, with an average citation score of 15.41, and the number of authors in this field reached 715, indicating that research related to the digitalization of MSMEs is interesting for future research.

<table>
<thead>
<tr>
<th>Description</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time range</td>
<td>2018:2023</td>
</tr>
<tr>
<td>Sources (Journal, Books, etc.)</td>
<td>127</td>
</tr>
<tr>
<td>Documents</td>
<td>215</td>
</tr>
<tr>
<td>Document Average Period</td>
<td>1,41</td>
</tr>
<tr>
<td>Average citations per docs</td>
<td>15,41</td>
</tr>
<tr>
<td>Author’s Keywords</td>
<td>728</td>
</tr>
<tr>
<td>Authors</td>
<td>715</td>
</tr>
<tr>
<td>International Co-Authorship</td>
<td>0,34</td>
</tr>
<tr>
<td>Coauthors per docs</td>
<td>3,55</td>
</tr>
</tbody>
</table>

Source: Biblioshiny database (2023)

4.2. Annual scientific article production

In the first part, this study answers the first point question: There were 215 documents published between 2018 and 2023. The development of annual scientific articles related to MSME digitization research is presented in Figure 3. The
The development of articles shows a positive trend from year to year; in 2022, as many as 75 documents were published related to this field, while in 2023, there are 55 documents.

### Figure 3
Annual scientific production of publications.

*Source: Biblioshiny database (2023)*

#### 4.3. Most relevant sources and authors

The most relevant journals in the field are listed in Table 2. Sustainability (Switzerland) has the most articles, totaling 25 documents, and is at the top of the list of most influential sources (Figure 4).

<table>
<thead>
<tr>
<th>Sources</th>
<th>Articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainability (Switzerland)</td>
<td>25</td>
</tr>
<tr>
<td>Technological Forecasting and Social Change</td>
<td>7</td>
</tr>
<tr>
<td>Serbian Journal of Management</td>
<td>5</td>
</tr>
<tr>
<td>Administrative Sciences</td>
<td>4</td>
</tr>
<tr>
<td>Applied sciences (Switzerland)</td>
<td>4</td>
</tr>
<tr>
<td>Computers in Industry</td>
<td>4</td>
</tr>
<tr>
<td>Energies</td>
<td>4</td>
</tr>
<tr>
<td>Journal of Business Research</td>
<td>4</td>
</tr>
<tr>
<td>TQM Journal</td>
<td>4</td>
</tr>
<tr>
<td>Economies</td>
<td>3</td>
</tr>
</tbody>
</table>

*Source: Biblioshiny database (2023)*

### Figure 4
Top ten impactful resources.

*Source: Biblioshiny database (2023)*
Figure 4 shows the 10 most impactful journals on digitalization MSME in 2018-2023. The H-index can be a better instrument for evaluating the quality and quantity of journal impact. The H-index refers to the maximum value “n”, where “n” refers to the number of journals that publish “n” articles with a minimum of “n” references. In terms of authors, there are the top ten most prolific authors with the best publications in the field, namely, Amoozad Mahdiraji H, Anggraini W, Liu Z, Mcfarlane D, Okfalisa O, Parida V, Saktioto S, Strielkowski W, Caputo A, and Fasano F, with an average of two or three articles published in this field (Figure 5).

4.4. Most cited documents globally and corresponding author countries

The Journal of Business Research by Author Cenamor J (2019) is ranked first among the most cited documents globally, with 268 citations. The Journal of Digital Policy, Regulation, and Governance by author Bouwman H (2018) ranks second in this list, and eight other authors have the most influential articles presented in Table 3.

Table 3 Top ten cited documents.

<table>
<thead>
<tr>
<th>Articles</th>
<th>Total citations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cenamor J (2019); Business Research</td>
<td>268</td>
</tr>
<tr>
<td>Bouwman H (2018); Digital Policy, Regulation and Governance</td>
<td>7</td>
</tr>
<tr>
<td>Eller R (2020); Journal Business Research</td>
<td>5</td>
</tr>
<tr>
<td>Guo H (2020); Frontiers of Business Research in China</td>
<td>4</td>
</tr>
<tr>
<td>Quinton S (2018); Strategic Marketing</td>
<td>4</td>
</tr>
<tr>
<td>Turkes MC (2019); Processes</td>
<td>4</td>
</tr>
<tr>
<td>Klein (2021); Knowledge and Process Management</td>
<td>4</td>
</tr>
<tr>
<td>Troise C (2022); Technology Forecasting and Social Change</td>
<td>4</td>
</tr>
<tr>
<td>Cai M (2020); Shanghai Jiatong University (Science)</td>
<td>4</td>
</tr>
<tr>
<td>Soluk J (2021); European Journal of Information Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: Biblioshiny database (2023)

In addition, various countries’ contributions to academic research are presented in this study. Articles related to MSME digitization are dominated by the UK, Italy, China, Indonesia, and the Czech Republic, which occupy the top five positions in Figure 6. More details can be found in Table 4, where the five countries show the values of the single country publication (SCP) and multiple country publication (MCP). SCP is a publication assessment based on the origin of researchers from the same country as a form of domestic research collaboration. Moreover, the MCP is a publication assessment tool based on the origin of researchers from various countries as a form of international or intercountry research collaboration (Sweileh et al., 2016).
4.5. Keywords and country collaboration

The second part of this study includes an analysis of keyword occurrences and presents the answers to the second point question. The entire field of MSME digitization research has received increased attention. The keywords “small and medium-sized enterprises” appear 40 times, “digitalization” 21 times, “digital transformation” and “industry 4.0” 14 times, and “digitization” and “innovation” 11 times.

Figure 7 is a tree map, presenting several keywords often used in research about digitalization of MSME, indicated by the details of the number of occurrences and the size of the boxes in the image. The high frequency of this research can be seen from the tree map, which explores various antecedents of the digitalization of MSMEs in business development and sustainability.

Other techniques in network analysis of the occurrence of keywords can also use VOSviewer software, which can present maps based on keyword relationships calculated based on the distance between different terms, better known as text mining (Laudano, 2018). With the help of this software, researchers have gained insight into the divergence of knowledge and different paradigms related to the digitalization of MSMEs.

The network built through this software performs consistency-based spatial grouping based on the entire calculation technique (Abdollahi et al., 2021). Thus, to obtain meaningful visualization, the cutoff value of five recommended in previous research was used in this analysis (Kumar et al., 2019; Shukla et al., 2020). Four clusters were obtained after importing the data into VOSviewer software, as shown in Figure 8. The color of the nodes shows the membership of the clusters formed.

Digitalization has the most prominent nodes compared to the others, followed by navigation by SMEs. This indicates that there is a mutual relationship between them.
The geographical collaboration between authors involved in MSME digitalization is presented in Figure 9. The Biblioshiny tool was used to map the scientific collaboration among authors in the global community. This geographic collaboration analysis revealed an affiliation network in the field studied. The conclusion in this graph is the joint writing that occurred between the authors and the line shown in Figure 9. The map shows that the UK was the country of origin for most of the scientific collaboration in the digitalization of MSMEs, and the most substantial scientific collaboration was recorded between the UK and Italy, with a frequency of 7, and Indonesia-Malaysia, with a frequency of 6.
4.6. Most widely discussed research themes

The third part of this study covers research in the most widely discussed area of MSME digitalization and presents answers to the third point question. The research themes gained from the bibliometric analysis are presented in the thematic map presented in Figure 10. Each quadrant that appears in Figure 10 represents a diverse research theme. The upper right quadrant represents motor themes characterized by high centrality and density.

Niche themes are represented by quadrants at the top left of the topic map and are characterized by low centrality and high density. In addition, topics discovered in the bottom right corner of the topic map are known as core topics. In contrast, the bottom left quadrant of the topic map represents topics urgently determined centrally and with low density.

Thus, industrialization and transformation are presented in thematic map themes that are being developed (Aghamiri et al., 2022; Culot et al., 2020; Henderson, 2020; Kääriäinen et al., 2020; Peter et al., 2020; Szalavetz, 2019). Moreover, the themes of digitization and sustainability, located in the motorcycle theme quadrant, have been widely discussed or researched. In the lower right quadrant are themes that influence the digitalization field of MSMEs but have not been widely researched or discussed as research titles. Therefore, references or benchmarks for future research can include themes related to small-medium-sized enterprises, digitalization, and digital transformation. The author is also interested in raising research themes related to the digitalization of MSMEs. The emergence of this theme shows the importance of digitalization for encouraging innovation business continuity, and presenting new market opportunities (Khan & Uddin, 2023).

Figure 10 Thematic map.
Source: Biblioshiny database (2023)
5. Final considerations

In brief, this study presents research trends on the digitalization of SMEs and surveys their current progress. This research aimed to analyze research developments related to the digitalization of MSMEs during the 2018-2023 period, using Biblioshiny and VOSviewer software to carry out bibliometric analysis of 215 articles recorded in the Scopus database. This analysis focused on the development of annual scientific articles, the most prolific authors and journals, the most cited journals in the world, the contributions of various countries, and the most researched themes in the scope of MSME digitalization. With respect to digitalization MSME, the country’s contribution to this research is dominated by the UK, Italy, China, Indonesia, and the Czech Republic.

This study reveals certain limitations that must be recognized. First, this study used only the Scopus database to search for and filter articles related to the digitization of MSMEs. Therefore, this study included sources from only databases other than Scopus. Second, keyword formulas, different research periods, and the search performance of other databases can influence the results obtained. It is hoped that in the future, researchers can use additional databases, such as Web of Science and Google Scholar, and increase the duration of research to increase the interpretability of the findings so that researchers can work in the field to deepen research on the digitalization of MSMEs.

Ethical Considerations

Not Applicable.

Conflict of Interest

Funding

References


