SILESIAN UNIVERSITY OF TECHNOLOGY PUBLISHING HOUSE

SCIENTIFIC PAPERS OF SILESIAN UNIVERSITY OF TECHNOLOGY 2025
ORGANIZATION AND MANAGEMENT SERIES NO. 225

DIGITAL TRANSFORMATION OF SMES IN THE VIEW OF DYNAMIC CAPABILITIES – A BIBLIOMETRIC ANALYSIS

Kamila MALEWSKA

Poznań University of Economics and Business; kamila.malewska@ue.poznan.pl,
ORCID: 0000-0002-0365-6318

Purpose: The purposes of this article are to: (1) analyze trends in publications related to the digital transformation of SMEs from the optics of dynamic capabilities, (2) identify influential authors, globally cited papers and journals, and notable affiliations related to the research analyzed, (3) explore thematic evolution through a network approach, and (4) determine future research directions in the area of digitization of SMEs from a dynamic capabilities perspective.
Design/methodology/approach: The objectives ware achieved using the bibliometric analysis method (RStudio software – Biblioshiny and VOSviewer software). The scientific data consisted of documents exported from the Web of Science database.
Findings: The analysis shows dynamic growth in publications on SME digitization from a dynamic capabilities perspective. It identified leading journals, authors, and affiliations based on article counts and citations. Examining the most cited articles revealed five clusters and their connections, helping to outline future research directions. Additionally, an analysis of frequently occurring words allowed the identification of key themes and four main categories in the literature.
Research limitations: The study relies exclusively on Web of Science data, potentially omitting relevant publications from sources like Scopus or Google Scholar. It uses quantitative analysis without considering content quality or citation context. The bibliometric tools in RStudio are limited in functionality, which may not fully reflect the topic's complexity. Results can also be affected by the chosen time frame and keywords.
Originality/value: This study provides insight into the current state of research in the area of SMEs digitization with the adoption of dynamic capability optics. It contributes to the progress and development of knowledge on this issue by identifying leading trends and research gaps.
Keywords: digital transformation, SMEs, dynamic capabilities.
Category of the paper: Literature review.

1. Introduction

Digital transformation is one of the key factors determining the competitiveness and adaptability of modern enterprises (Gaspar et al., 2024; Ma et al., 2025). In an era of dynamic technological development and changing consumer expectations, the implementation of digital solutions is becoming not only an opportunity for growth, but often a condition for survival in the market (Straub et al., 2021; Sun et al., 2024; Urban, Plattfaut, 2025). This is particularly important in the context of the small and medium-sized enterprise (SME) sector, which - despite limited resources - can, through digitization, improve operational processes, increase efficiency and reach new groups of customers (Silva et al., 2022).

In recent years, there has been growing interest among researchers in the topic of digitization of small and medium-sized enterprises (SMEs), which is reflected in the growing number of scientific publications devoted to this issue (Bilal et al., 2024; Wang et al., 2023; Williams, Schallmo, Lang, Williams et al., 2019). However, despite the increase in research, relatively few authors analyze the digital transformation process from a dynamic capabilities perspective (Fan et al., 2024; Li et al., 2018; Matarazzo et al., 2021; Rupeika-Apoga et al., 2022; Skare et al., 2023). Meanwhile, this approach provides a better understanding of how SMEs identify, adapt and reconfigure their resources in response to the changing technological and market environment (Ogrean, 2025). SMEs often operate under conditions of limited resources, low formalization of processes and greater vulnerability to external disruptions. This is why it is not resources per se, but the ability to dynamically reconfigure them that becomes a key source of competitive advantage (Gyamerah et al., 2025). Moreover, the prism of dynamic capabilities makes it possible to identify different transformation paths - from gradual, iterative changes to radical transformations of the operating model. This enables digital development strategies to be better aligned with individual business circumstances, such as the age of the company, the level of digital competence of employees, organizational culture or access to knowledge and social networks (Jie et al., 2025).

The dynamic capabilities perspective therefore represents an important yet still underdeveloped strand of research that can significantly enrich existing analyses of digitization in the SME sector. It seems reasonable, therefore, to undertake research in this area, but the design of new research requires a detailed recognition of the existing body of work in this area, in order to avoid duplication of research or lack of progress in the ongoing scientific discourses. Accordingly, the purposes of this article are to (1) analyze trends in publications related to the digital transformation of SMEs from the optics of dynamic capabilities, (2) identify influential authors, globally cited papers and journals, and notable affiliations related to the research analyzed, (3) explore thematic evolution through a network approach, and (4) determine future research directions in the area of digitization of SMEs from a dynamic capabilities perspective. These objectives will be achieved using the bibliometric analysis method (RStudio software -

Biblioshiny). This study will identify areas of importance and potential research gaps in the literature, thus contributing to the progress and development of knowledge in the area of digitization of SMEs. Thus, the research aims mentioned above make the current study more profound and applicable.

The article consists of five sections. Section 2 provides the theoretical background and considers leading research in the area of digital transformation of SMEs with the adoption of a dynamic capabilities perspective. Section 3 characterizes the methodology of the research procedure. The results of the study and a discussion of the findings are presented in section 4. The last section of the article summarizes the main cognitive results achieved in the course of the research procedure.

2. Theoretical background

The theme of digital transformation of SMEs is widely explored in the literature (Bilal et al., 2024; Silva et al., 2022; Williams, Schallmo, Lang, Boardman, 2019). A new important and at the same time dynamically developing trend within this issue seems to be the digitization of SMEs from the perspective of dynamic capabilities (Fan et al., 2024; Gyamerah et al., 2025; Hafeez et al., 2025; Jie et al., 2025). Researchers addressing this topic recognize the need to implement new technologies in this category of enterprises while developing dynamic capabilities. An overview of selected studies in this area is presented in Table 1. Analyzing the data in Table 1 with the study context criterion in mind, it can be noted that two studies were conducted in Vietnam, two in China, and one each in Indonesia, Ecuador, Germany/Austria/Switzerland, Italy, Sardinia, and the Czech Republic. Six studies focused on SMEs, one on MSMEs, one on small businesses, one on family-owned SMEs, and one on agrifood SMEs. Some studies included additional sectoral focus (such as manufacturing/service, food/fashion/furniture). Taking into consideration the methodology five studies used quantitative methods, three studies used qualitative methods (including two case studies and three with interviews) and finally two studies used mixed methods (both including SEM and one with Fuzzy-set Qualitative Comparative Analysis). As for the sample size, it ranged from 6 to 596 for firm-level studies, and from 15 to 127 for qualitative interview-based studies. Regarding the thread of key dynamic capabilities that were analyzed in the studies presented, the three studies examined the core dynamic capabilities framework (sensing, seizing, transforming), with one study including all three, one including two, and one including sensing plus learn ing/integrating/coordinating. Three studies examined digital-specific capabilities, including digital exploitation, digital exploration, digital capability (broadly defined), digital literacy, and security. One study examined human capital, structural social capital, and entrepreneurial competencies. Four studies examined dynamic capabilities in

a more general or unspecified way, including stage specific, not further specified, collaborative/social, or various types.

Table 1.
A review of selected research in the area of SME digitization with the adoption of a dynamic capabilities perspective

Study	Study context	Research Focus	Methodology	Key Dynamic Capabilities Examined
(Vo Thai et al., 2024)	Vietnamese Small and Medium-sized Enterprises (SMEs); emerging market	Relationship between dynamic capabilities, digitalization strategies, business model innovation, and sustainable performance	Quantitative; validated measurement framework; sample size = 596	Sensing, seizing, transforming
(Jing et al., 2023)	Chinese SMEs; accelerating digital transformation	Digital ambidextrous capabilities, business model innovation, transformation performance	Mixed methods; Structural Equation Modeling (SEM), Fuzzy-set Qualitative Comparative Analysis (fsQCA); sample size = 289	Digital exploitation, digital exploration
(Prakasa, Jumani, 2024)	Indonesian small businesses; East Java	Digital capability, digital business transformation, business performance	Quantitative; SEM; sample size = 330	Digital capability (broadly defined)
(Lang et al., 2023)	Vietnamese SMEs; emerging market	Human/structural capital, entrepreneurial competencies, innovativeness, technology adoption, business performance growth	Mixed methods; SEM; sample size = 371	Human capital, structural social capital, entrepreneurial competencies
(Amaya et al., 2024)	Ecuadorian Micro, Small, and Medium-sized Enterprises (MSMEs); developing economy	Dynamic capabilities, digitalization, moderating role of f irm age	Quantitative; SEM, Partial Least Squares (PLS), Confirmatory Factor Analysis (CFA); sample size = 280	Sensing, seizing
(Soluk, Kammerlander, 2021)	Family-owned Mittelstand manufacturing SMEs; Germany, Austria, Switzerland	Stages, enablers, and barriers of digital transformation	Qualitative; multiple case study, 127 interviews (15 firms)	Dynamic capabilities (stage-specific)
(Chung et al., 2024)	Chinese SMEs	Digital transformation, customer value creation, dynamic capabilities	Qualitative; multi-case study (6 SMEs), interviews	Sensing, learning, integrating, coordinating

Cont. table 1.

(Matarazzo et al., 2021)	Italian SMEs; food, fashion, furniture	Digital transformation, customer value creation, dynamic capabilities	Qualitative; multi-case study (6 SMEs), interviews	Sensing, learning, integrating, coordinating
(Cannas, 2023)	Sardinian agrifood SMEs	Dynamic capabilities and digital transformation	Qualitative; in-depth interviews (21 respondents)	Dynamic capabilities (collaborative, social)
(Civelek et al., 2023)	Czech SMEs; man ufacturing/service	Dynamic capabilities and digital transformation	Quantitative; ordinal logistic regression; sample size = 330	Dynamic capabilities (various), digital literacy, security

Digital transformation in small and medium-sized enterprises relies on the adoption of dynamic capabilities that enable firms to spot opportunities, implement changes, and renew their business models. For example, studies by Vo Thai et al. (2024) and Amaya et al. (2024) describe how sensing capabilities help firms identify digital opportunities while seizing capabilities support product and process digitalization. In Chinese SMEs, Hao Jing et al. (2023) link digital ambidexterity with the ability to innovate business models and improve transformation performance. Other investigations document that transforming, learning, and integrating capabilities—especially in traditional or resource-constrained settings—foster gradual digital advancement, as illustrated by the staged process observed by Soluk and Kammerlander (2021). Organizational factors such as limited resources, firm age, and human or social capital modulate these dynamics. For instance, older firms exhibit reduced responsiveness in sensing digital opportunities (Amaya et al., 2024), and challenges related to digital literacy and cybersecurity appear in some contexts (Civelek et al., 2023). Overall, papers report that the causes of digital transformation lie in the initiation and deployment of diverse dynamic capabilities; the advancement follows a process that ranges from incremental digital adoption to comprehensive business model revision; and the effects include improved operational performance, enhanced customer value, and innovation.

3. Methodology

Bibliometrics is a quantitative method for analyzing scientific data and is an open-source statistical analysis tool for mapping science written in R to measure productivity within a research topic (Aria, Cuccurullo, 2017). The methodology used in the current study involves bibliometric analysis, and the scientific data consists of documents exported from the Web of Science database. The analysis was performed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 checklist (Page et al., 2021).

Articles for analysis were obtained by using thematic searches. Search queries in the database included keywords such as: “digital transformation” and ‘SME’ and “dynamic capabilities”. Further analysis was performed on records extracted from the Web of Science database that matched the search terms in title, abstract or keywords.

Data recovered from the Web of Science datebase on May 20, 2025, yielded 81 documents. In phase one of the research procedure, an initial selection of documents was made by applying two “document types” filters – „article” and “language” - “English” (Table 2). This procedure reduced the number of documents from 81 to 74 articles. In phase two, the remaining articles were manually screened, during which titles, keywords and abstracts were read and analyzed for relevance, thematic adequacy and eligibility for inclusion in the final bibliometric review. Nine articles were considered irrelevant to the issue under consideration (they did not directly relate to the constructs under analysis). After the second selection phase, 65 articles remained and were included in the bibliometric analysis. RStudio software (Biblioshiny) was used for data loading, conversion and bibliometric analysis. It allows extracting and processing complete bibliographic data from an Excel file exported from the Web of Science database. The purpose of using this tool is to review, analyze and provide insight into the current status and future direction of research in the area of small and medium-sized enterprise transformation from the optics of dynamic capabilities. It also allows to statistically assess the scientific quality of journals identifying new thematic trends from this area in 2018-2025.

Table 2.
Inclusion and exclusion criteria

Criteria	**Inclusion**	**Exclusion**
Language	English	Other than English
Timeline	2018-2025	Earlier than 2018
Literature	Articles	Other than articles
Subject area	Digital transformation, SME, dynamic capabilities	Other than digital transformation, SME, dynamic capabilities

Table 3 shows detailed data downloaded from the Web of Science database. It includes the timespan of the documents analyzed, the sources from which they came, the number of documents (articles), the annual growth rate (%), document average age, average citations per document. In addition, the content of the documents, including the keywords used by the authors, the percentage of international co-authorships, annual scientific production, globally cited documents, influential authors, affiliations and collective collaborations between countries were obtained using RStudio.

Table 3.
Data extracted form Web of Science database

MAIN INFORMATION ABOUT DATA	
Timespan	2018-2025
Sources (Journals, Books, etc)	53
Documents	65
Annual Growth Rate %	47.24
Document Average Age	1.74
Average citations per doc	38.43
References	4785
DOCUMENT CONTENTS	
Keywords Plus (ID)	205
Author's Keywords (DE)	247
AUTHORS	
Authors	222
Authors of single-authored docs	1
AUTHORS COLLABORATION	
Single-authored docs	1
Co-Authors per Doc	3.55
International co-authorships %	56.92
DOCUMENT TYPES	
Article	55
article; early access	10

4. The results and discussion

4.1. Publications trends

Based on the acquired data, a steady increase in articles on the issues of digital transformation of small and medium-sized enterprises with the optics of dynamic capabilities can be noted. In the analyzed timespan (2018-2025), a total of 65 articles were published. In 2018-2021 there were single papers, intensive growth occurred from 2022 (11 articles) and remained at a similar level in the following year. The doubling of the number of articles on this issue was observed in 2024 (articles) and this upward trend can be noticed in the current year, where 15 articles were published in the Web of Science database by May 2025.

The dynamic growth in the number of publications on the digital transformation of SMEs from the perspective of dynamic capabilities is mainly due to the increasing importance of technology in business activities and the need for rapid adaptation to market changes, especially after the COVID-19 pandemic (Papadopoulos et al., 2020). Additionally, this topic has gained popularity thanks to political and financial support for digitalization processes and the growing availability of modern technological solutions for SMEs (Côrte-Real et al., 2017). The combination of these factors has made this issue a current and important area of scientific research.

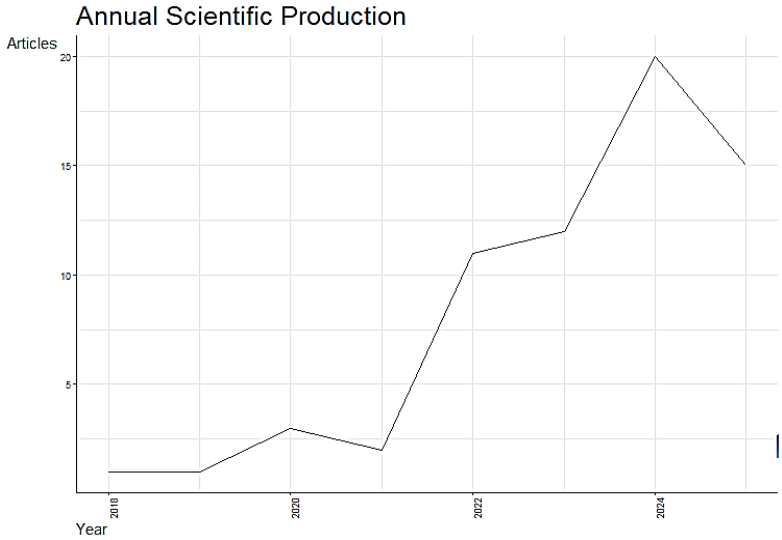

Figure 1. Annual scientific production of articles.

4.2. The most prominent journals on digital transformation of SMEs from the perspective of dynamic capabilities

With the help of RStudio software, it was possible to identify the leading journals publishing research articles on the digitization of SMEs with the adoption of a dynamic capabilities perspective. The top ten of these are shown in Figure 2. Sustainability was ranked first with 5 published articles. This was followed by Journal of Business Research (4 articles), Journal of Enterprise Information Management (3 articles), IEEE Transactions on Engineering Management (2 articles), Small Business Economics (2 articles) and Technological Forecasting and Social Change (2 articles). The remaining 47 articles were published individually in other journals. On the other hand, subjecting the analysis to the journals in which the articles selected from the Web of Science database appeared, with the adoption of the criterion of most local cited sources, it can be seen that the most cited articles were those published in the Journal of Business Research (330 citations).

This was followed by Strategic Management Journal (188 citations), Technological Forecasting and Social Change (164 citations), Sustainability (148 citations) and Long Range Planning (120 citations). The remaining journals among the top ten in terms of citations of articles on SME digitization in terms of dynamic capabilities are presented within Table 4.

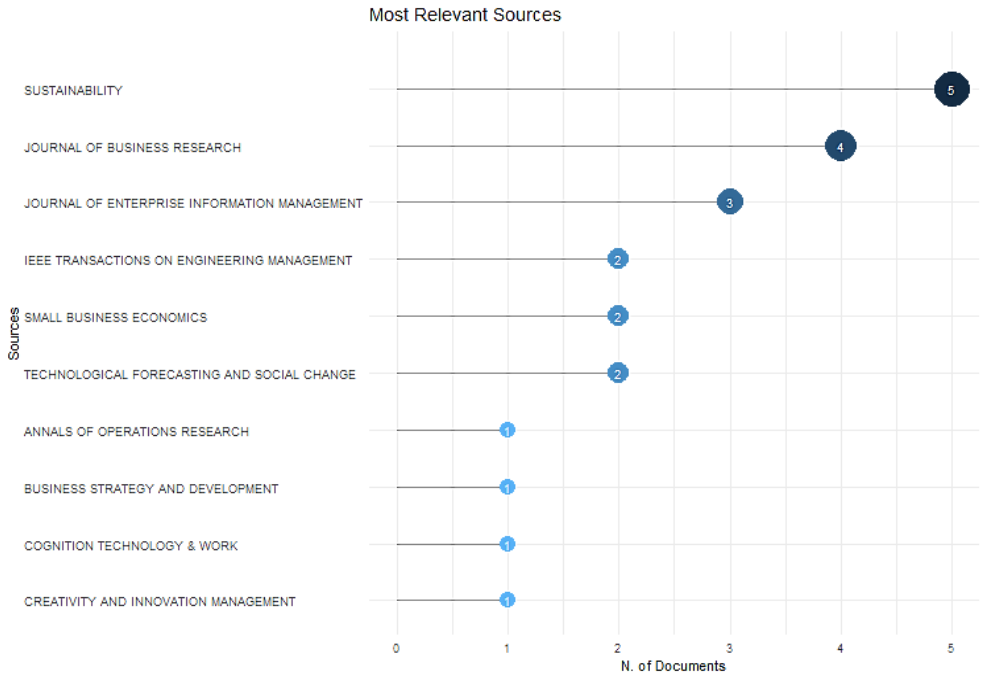

Figure 2. Most relevant sources (number of articles).

Table 4.
Most local cited sources

Sources	**Citation**
Journal of Business Research	330
Strategic Management Journal	188
Technological Forecasting and Social Change	164
Sustainability	148
Long Range Planning	120
MIS Quarterly	118
Journal of Strategic Information Systems	88
Industrial Marketing Management	77
Technovation	73
Journal of Management	68

The most articles on the digitization of SMEs from the perspective of dynamic capabilities are published in the journal Sustainability, indicating the growing importance of this topic in research on sustainable development. Apart from a few leading journals, most articles (47 out of 65) were published individually in various other journals, indicating a dispersion of research across multiple disciplines. Although Sustainability published the most articles, the most frequently cited papers appeared in the Journal of Business Research, suggesting that citation impact does not always correlate with the number of publications. The Strategic Management Journal and Technological Forecasting and Social Change also ranked high in citation counts, highlighting the interdisciplinary nature of this research area (strategic management, technology forecasting, sustainable development).

4.3. The most prominent authors, publications and affiliations from the analyzed issues

In an effort to identify authors involved in the issue of the digitization process of small and medium-sized enterprises with the adoption of the optics of dynamic capabilities, several criteria can be used to analyze articles extracted from the Web of Science database, i.e. author's production over time, most global cited documents or most relevant affiliations. The results of the analysis with the adoption of the first criterion are presented in Figure 3, where one can see the individual authors along with the number of published articles on the subject under consideration and the number of citations per year. It can be noted that two authors have published 2 articles each in the period 2018-2025, they are: Alarifi Ghadah and Satar Mir Shahid. Taking the number of citations per year as a criterion, four authors obtained a number of citations between 13 and 17, they are: Sohu Jan Muhammad, Akhtar Sadaf, Bilal Muhammad and Aagaard Annabeth. Figure 4 shows the articles with the adoption of the criterion of most global cited documents. It can be noticed that two articles with the number of citations above 500 cites come to the front, i.e. (Matarazzo et al., 2021) (article published in Journal of Business Research) and (Li et al., 2018) (article published in Information Systems). Other authors with the most citations are presented within the framework of Figure 4. Analyzing the affiliation of authors addressing the issue of SME transformation in terms of dynamic capabilities, it is noted that the leading center with the number of 5 thematic articles is Universitat Siegen (Germany). In second place with 4 articles were 3 affiliations, namely: Jiangsu University (China), University of Deusto (Spain) and Vietnam National University, Ho Chi Minh City (Vietnam). In third place (three articles) were two research centers, namely University of Vaasa (Finland) and Vnu-Hcm International University (Vietnam) (Table 5).

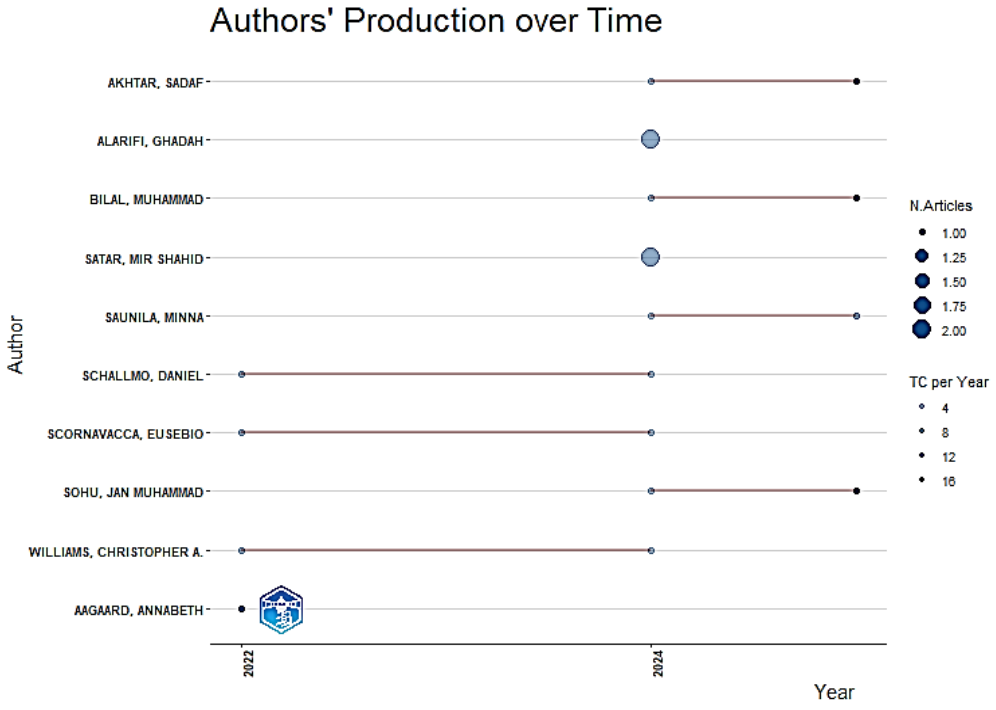

Figure 3. Author's production over time including number of articles and citation counts per year).

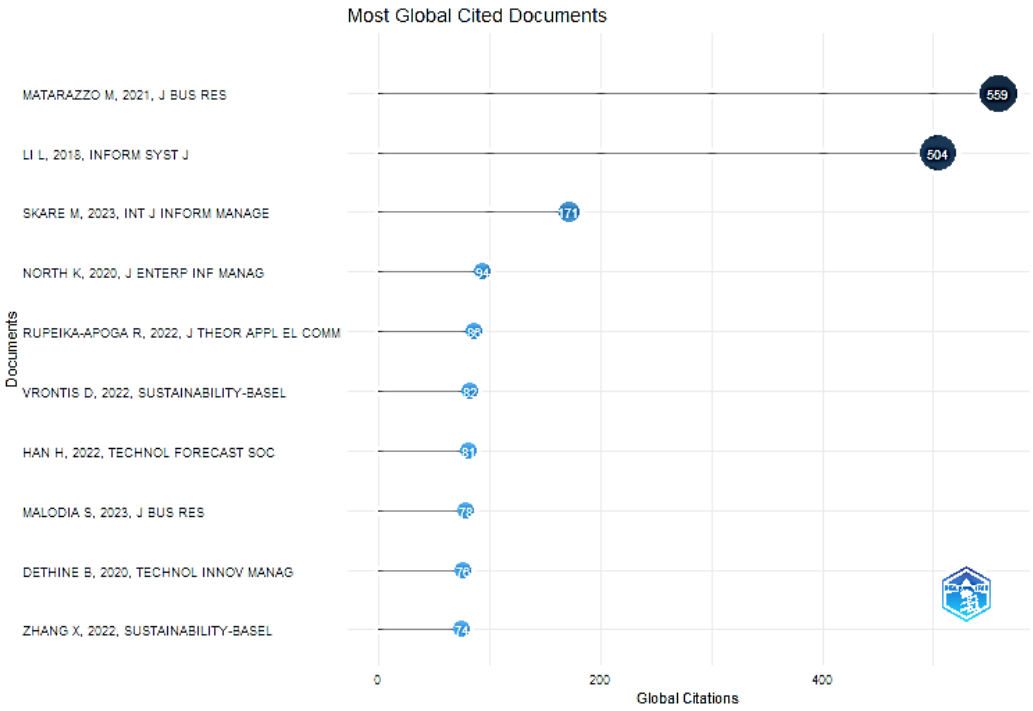

Figure 4. Most global cited documents.

Analysis of the most frequently cited articles downloaded from the Web of Science database made it possible to identify clusters and their relationships. VOSviewer software, which is a software tool for constructing and visualizing bibliometric networks, was used to identify clusters. The network includes individual publications and it was constructed based on bibliographic coupling. The analysis carried out showed, the existence of five clusters centered around the articles with the highest representativeness (having the greatest links to references of other articles - Figure 5), among them are: (1) (Matarazzo et al., 2021; Li et al., 2018; Skare et al., 2023; North et al., 2020) and (Rupeika-Apoga et al., 2022), which is consistent with the results of the analysis considering most global cited documents.

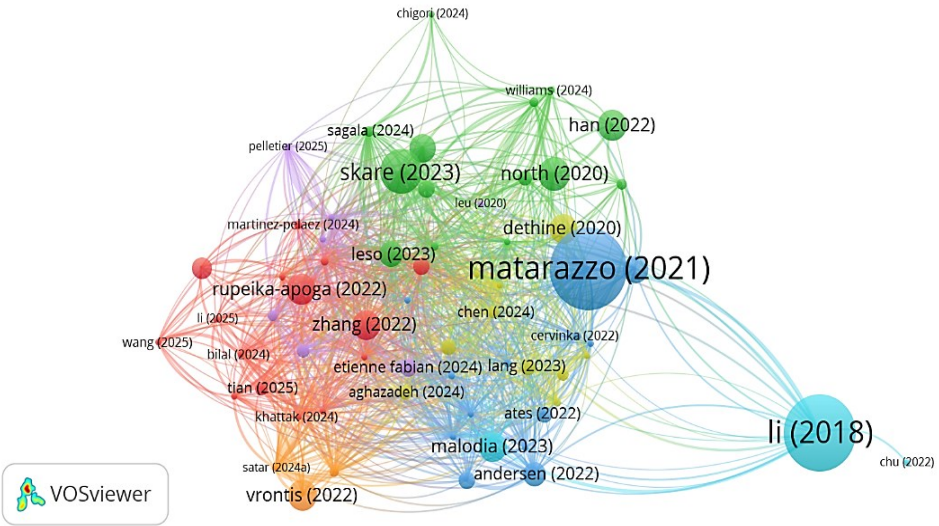

Figure 5. Analysis of the most relevant clusters of thematic publications.

Table 5.
Most relevant affiliations

Affilliation	Articles
UNIVERSITAT SIEGEN	5
JIANGSU UNIVERSITY	4
UNIVERSITY OF DEUSTO	4
VIETNAM NATIONAL UNIVERSITY HO CHI MINH CITY (VNUHCM) SYSTEM	4
UNIVERSITY OF VAASA	3
VNU-HCM INTERNATIONAL UNIVERSITY (VNUHCM-IU)	3
ARIZONA STATE UNIVERSITY	2
ARIZONA STATE UNIVERSITY-TEMPE	2
ESIC	2

4.4. Analysis of high-frequency words

The bibliometric analysis conducted made it possible to identify the most relevant words appearing in the collected articles (Table 6). The leading term was "digital transformation", followed by the construct referring to the subject of the research, namely „smes" or "sme". The research optics adopted also turned out to be an important word; the analyzed articles were prepared with the adoption of a "dynamic capabilities" perspective. This was followed by a word related to "digital transformation", that is, "digitalization". The articles also included theoretical constructs resulting from the transformation process, namely "innovation", „performance" or "competetive adantage". The analyzed studies were also conducted in relation to the concept of "industry 4.0" or with the inclusion of "digital capability" as a special type of dynamic capabilities. A graphical representation of the most relevant words in the analyzed publications is shown in Figure 6.

Table 6.
Most relevant words

Words	Occurrences
digital transformation	38
SMEs	18
dynamic capabilities	13
SME	13
digitalization	8
innovation	5
performance	5
competitive advantage	4
digital capability	4
industry 4	4

Figure 6. WordCloud.

RStudio software also makes it possible to analyze the frequency of keywords over the analyzed years (Figure 7). It can be observed that the frequency of all words classified as relevant increases over the analyzed period. The largest increase in frequency can be observed for the construct “digital transformation” starting in 2021 and ‘smes’/“sme” also starting in the same year.

The term "digital transformation" plays a central role as the most frequently appearing keyword, confirming it as the main topic of the analyzed articles. There is a clear focus on SMEs and the dynamic capabilities perspective, as evidenced by the frequent occurrence of the terms "SMEs" and "dynamic capabilities", highlighting a strong connection between the research topics and this group of enterprises along with a specific theoretical approach. Additionally, concepts related to transformation—such as "digitalization", "innovation", "performance", and "competitive advantage"—underscore the complexity of the digital transformation process and its impact on firm outcomes and competitive advantages. The inclusion of terms like "Industry 4.0" and "digital capability" reflects an expansion of the topic to incorporate new technologies and specific digital competencies as integral elements of dynamic capabilities. Overall, the diverse set of key terms demonstrates the interdisciplinary nature of the research, combining management, technology, and innovation.

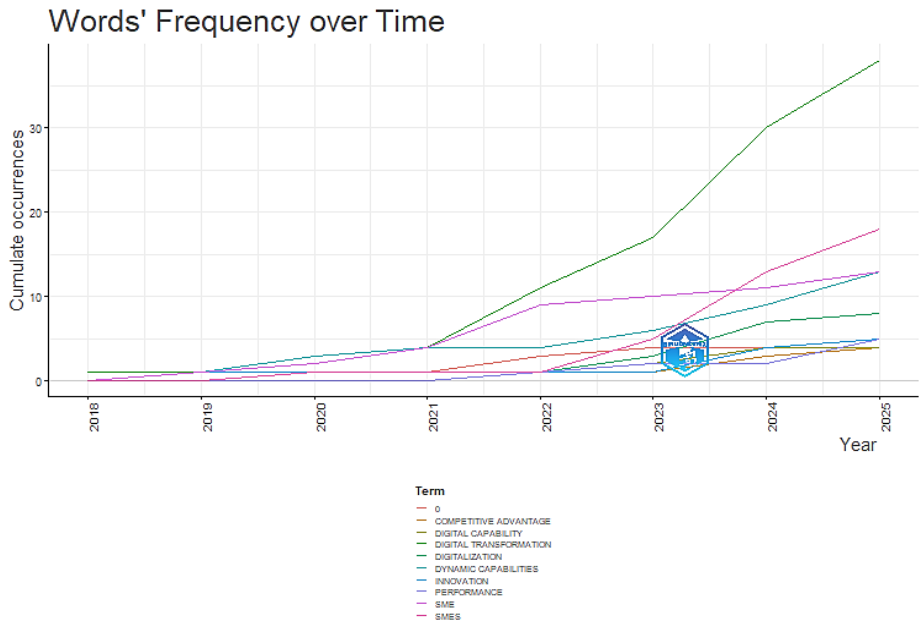

Figure 7. Words’ frequency over time.

The analysis of high-frequency words and their co-occurrence also makes it possible to determine four categories of themes addressed by researchers: niche themes (low degree of relevance and high degree of development), motor themes (high degree of relevance and high degree of development), emerging or declining themes (low degree of relevance and low degree of development), and basic themes (high degree of relevance and low degree of development). The graphical presentation of the identified topics is presented in Figure 8. The bibliometric analysis carried out confirms that the issue of digitization of small and medium-sized

enterprises from the perspective of dynamic capabilities is a significant and intensively developing research area (motor themes), compared to the general issue of digitization of small and medium-sized enterprises, which falls into the category of basic themes characterized by low relevance and development. Thus, it seems that the factor that makes the research issue attractive is the adoption of the optics of dynamic capabilities in relation to the transformation process of SMEs. Slightly less relevant, but relatively strongly developing, is the issue of dynamic capabilities and their impact on achieving competitive advantage in relation to incumbent sms. A niche but intensely developing theme is that related to the concept of Industry 4.0 and collaboration. Emerging theme seems to be the topic of talent management conducted in relation to small and medium-sized enterprises.

Figure 8. Categories of themes in analyzed articles.

The analysis identified four categories of research themes in the study of SME digitization from the perspective of dynamic capabilities: niche themes, motor themes, emerging or declining themes, and basic themes, reflecting varying degrees of relevance and development. Notably, the digitization of SMEs through the lens of dynamic capabilities stands out as a highly relevant and well-developed area, indicating that adopting this perspective significantly enhances the attractiveness and growth of research in this field. In contrast, more general topics on SME digitization without the dynamic capabilities focus remain less developed and less relevant, highlighting a need for further exploration. Additionally, research on the impact of dynamic capabilities on achieving competitive advantage among incumbent firms is relatively well-developed, though slightly less prominent. Emerging and niche themes such as Industry 4.0, collaboration, and talent management in SMEs suggest new directions and opportunities for future studies.

Adopting the dynamic capabilities perspective significantly increases both the maturity and the visibility of research on SME digitization. This indicates that combining dynamic capabilities theory with studies on digital transformation makes a unique contribution and creates a clearly distinct research stream. General research on SME digitization—without considering dynamic capabilities—remains less developed and less prominent in the academic debate. This may indicate that more in-depth studies are needed on the fundamental aspects of digital transformation that go beyond the dynamic capabilities perspective. Topics such as Industry 4.0, collaboration, and talent management are beginning to attract research interest and represent potentially promising directions for the development of the literature. This reflects the growing importance of integrating advanced technologies and human capital management in the digital transformation of SMEs. The classification of topics into different categories of development and relevance reflects the multidimensional nature of research that combines strategic management, innovation, technology, and organizational capabilities. This highlights the need for interdisciplinary collaboration in building knowledge in this field. The results suggest that further progress in research on SME digitization requires integrating the dynamic capabilities approach with the analysis of technological factors (e.g., Industry 4.0) and social factors (e.g., digital competencies, talent management) in order to capture the full complexity of this transformation process.

4.5. Future research directions

Based on a detailed analysis of the articles qualified by bibliometric analysis as the most prominent, being the center of the identified clusters, it was possible to determine future research directions. These articles highlight various limitations and future research directions that can enhance the understanding of the impact of digital technologies on SMEs in different sectors and business sizes. Suggested research directions include (Dethine et al., 2020; Li et al., 2018; Matarazzo et al., 2021; Rupeika-Apoga et al., 2022; Skare et al., 2023): (1) focusing on specific digital technology instruments such as Cloud Computing (CC), Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), big data and advanced cloud computing, (2) studying the impact of these technologies on companies of different sizes and sectors (this can provide deeper insights into their effectiveness and application), (3) using more comprehensive data sources, such as the Orbis database, to increase the reliability of the results, (4) applying advanced scientific methodologies, such as dynamic panel analysis with time series data, can provide more nuanced insights into how digital technology affects SMEs over time and help understand the longitudinal impact of digital transformation on business operations and performance), (5) developing a global cross-country digital transformation model that examines the impact of digital technology on SMEs around the world, (6) incorporating company-level and industry-level indicators to more accurately assess the impact of digital technology adoption on SMEs.

In summary, the future of digital transformation research in SMEs with the adoption of dynamic capability optics should focus on specific technologies, address data limitations, use advanced methodologies, and incorporate global perspectives. In this way, researchers can contribute to a more comprehensive understanding of how digital technologies can improve the performance and resilience of SMEs in an increasingly digital economy.

5. Conclusions

Analyzing the digital transformation of small and medium-sized enterprises (SMEs) through the lens of dynamic capabilities makes it possible to grasp the "internal logic of change" - that is, the deep mechanisms that allow companies not only to survive under growing technological uncertainty, but also to actively adapt and grow. Instead of treating digitization as a one-time deployment of new IT tools, the dynamic capabilities approach makes it possible to understand digital transformation as a process of strategic learning and continuous adaptation to a changing environment. Therefore, it seems justified to undertake research in this area, but it should be preceded by a thorough analysis of the previous achievements of researchers in this area. This can be done using the method of bibliometric analysis. This study covers the analysis of articles from 2018-2025, providing a comprehensive overview of research on the issue of digitization of small and medium-sized enterprises with the concept of dynamic capabilities. The results of the analysis conducted show dynamic growth based on the annual production of articles in this area. It can be noted that in 2018 the research on the issue of digitization of SMEs in terms of dynamic capabilities was at an early stage, but gained momentum in 2020, resulting in a rapid increase in articles in 2024. The intensification of research in this area demonstrates the interest of researchers in this field. A comprehensive analysis made it possible to identify prominent journals, both in terms of the number of topical articles (Sustainability, Journal of Enterprise Information Management) and the number of citations (Journal of Business Research, Strategic Management Journal, Technological Forecasting and Social Change). Leading authors were also identified by taking author's production over time (Alarifi Ghadah and Satar Mir Shahid), number of citations per year (Sohu Jan Muhammad, Akhtar Sadaf, Bilal Muhammad and Aagaard Annabeth) and most globally cited documents (Matarazzo et al., 2021) - article published in Journal of Business Research and (Li et al., 2018) - article published in Information Systems Journal) as criteria. Analysis of the most cited articles in the pool of articles obtained from the Web of Science database made it possible to identify clusters and links between them. Based on a thorough analysis of the most important articles from each cluster, the main directions for future research were determined.

The analysis also identified the most important affiliations - centers where research in this area is conducted (Universitat Siegen - Germany; Jiangsu University - China), University of Deusto - Spain and Vietnam National University, Ho Chi Minh City - Vietnam). In addition, analysis of high-frequency words and their co-occurrences made it possible to identify the most relevant words appearing in the set of analyzed articles and their frequency of occurrence. This, in turn, made it possible to identify four categories of themes appearing in articles on this subject. The bibliometric analysis conducted confirms that the issue of digitization of small and medium-sized enterprises from the perspective of dynamic capabilities is the so-called "motor theme", compared to the general issue of digitization of small and medium-sized enterprises, which can be categorized as basic themes characterized by low relevance and development. It can be assumed that the factor that fosters the increase in relevance and development of this theme is the combination of the constructs of digital transformation and dynamic capabilities in relation to the SME category.

On the basis of the bibliometric analysis conducted, an attempt can be made to formulate both theoretical and empirical implications. The study confirms the growing interest and dynamic development of the topic of SME digitization from the perspective of dynamic capabilities, indicating the need for further deepening of knowledge combining these two areas. The identification of key articles, authors, and research institutions allows for a better understanding of the main trends and thematic connections in the literature, facilitating the development of coherent and comprehensive theoretical models. Highlighting the role of dynamic capabilities as a "motor theme" suggests that integrating the concepts of digital transformation with dynamic capabilities theory may be crucial for future research on SME innovation and adaptation.

The rapid increase in publications and interest in the topic indicates the growing importance of SME digital transformation for business practitioners. Knowledge about leading institutions and authors can help companies and decision-makers establish industry-academic collaborations and leverage the latest research achievements. Understanding key themes and their development helps practitioners identify areas that require investment and innovation, particularly in building organizational dynamic capabilities that support effective digital transformation and competitive advantage for SMEs.

This study, based on a bibliometric analysis conducted using the RStudio environment, involves several important limitations. First and foremost, it relies solely on data from the Web of Science database, which may lead to the omission of relevant publications available in other sources, such as Scopus or Google Scholar. The study does not account for potential language and regional biases in the dataset, which may disproportionately reflect English-language or Western-centric publications, limiting the global representativeness of the findings. The analysis is quantitative in nature and therefore does not account for the quality of content or the context of citations. Additionally, the scope of the analysis was limited by the capabilities of the Biblioshiny package and the quality of the metadata, which may contain errors or

inconsistencies. The results may also be influenced by the selected time frame and the choice of keywords.

Despite the above limitations, this study provides insight into the current state of research in the area of SME digitization with the adoption of dynamic capability optics. It contributes to the progress and development of knowledge on this issue by identifying leading trends and research gaps.

References

1. Amaya, A., Campoverde, J., Granda, M.L. (2024). The effect of dynamic capabilities on msmes digitalization: Exploring the moderating role of firm age. *Journal of Technology Management and Innovation*, *19*(1), 40-51. https://doi.org/10.4067/S0718-27242024000100040
2. Aria, M., Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, *11*(4), 959-975. https://doi.org/10.1016/j.joi.2017.08.007
3. Bilal, M., Xicang, Z., Jiying, W., Sohu, J.M., Akhtar, S., Hassan, M.I.U. (2024). Digital Transformation and SME Innovation: A Comprehensive Analysis of Mediating and Moderating Effects. *Journal of the Knowledge Economy, Iss. May*. Springer US. https://doi.org/10.1007/s13132-024-02054-0
4. Cannas, R. (2023). Exploring digital transformation and dynamic capabilities in agrifood SMEs. *Journal of Small Business Management*, *61*(4), 1611-1637. https://doi.org/10.1080/00472778.2020.1844494
5. Chung, K.W., Chiu, W., Chen, G., Liu, K.P. (2024). Digital Transformation Driving SME Business Model Innovation: A Dynamic Capabilities Perspective. *Journal of Global Information Management*, *32*(1). https://doi.org/10.4018/JGIM.350191
6. Civelek, M., Krajčík, V., Ključnikov, A. (2023). The impacts of dynamic capabilities on SMEs' digital transformation process: The resource-based view perspective. *Oeconomia Copernicana*, *14*(4), 1367-1392. https://doi.org/10.24136/oc.2023.019
7. Côrte-Real, N., Oliveira, T., Ruivo, P. (2017). Assessing business value of Big Data Analytics in European firms. *Journal of Business Research*, *70*, 379-390. https://doi.org/10.1016/j.jbusres.2016.08.011
8. Dethine, B., Enjolras, M., Monticolo, D. (2020). Digitalization and SMEs' export management: Impacts on resources and capabilities. *Technology Innovation Management Review*, *10*(4), 18-34. https://doi.org/10.22215/TIMREVIEW/1344
9. Fan, Z., Long, R., Shen, Z. (2024). Regional digitalization, dynamic capabilities and green innovation: Evidence from e-commerce demonstration cities in China. *Economic*

Modelling, *139*(February), 106846. https://doi.org/10.1016/j.econmod.2024.106846

10. Gaspar, J.M., Wang, S., Xu, L. (2024). Digitalization and the performance of non-technological firms: Evidence from the COVID-19 and natural disaster shocks. *Journal of Corporate Finance*, *89*. https://doi.org/10.1016/j.jcorpfin.2024.102670
11. Gyamerah, S., Afshari, L., Asante, D. (2025). Digital transformation in the SME context: The nexus between leadership, digital capabilities and digital strategy. *International Small Business Journal: Researching Entrepreneurship*. https://doi.org/10.1177/02662426251314108
12. Hafeez, S., Shahzad, K., De Silva, M. (2025). Enhancing digital transformation in SMEs: The dynamic capabilities of innovation intermediaries within ecosystems. *Long Range Planning*, *58*(3), 102525. https://doi.org/10.1016/j.lrp.2025.102525
13. Jie, H., Gooi, L.M., Lou, Y. (2025). Digital maturity, dynamic capabilities and innovation performance in high-tech SMEs. *International Review of Economics and Finance*, *99*(November 2024), 103971. https://doi.org/10.1016/j.iref.2025.103971
14. Jing, H., Zhang, Y., & Ma, J. (2023). Influence of digital ambidextrous capabilities on SMEs' transformation performance: The mediating effect of business model innovation. *Heliyon*, *9*(11), e21020. https://doi.org/10.1016/j.heliyon.2023.e21020
15. Lang, L., Behl, A., Phuong, N.N.D., Gaur, J., Dzung, N.T. (2023). Toward SME digital transformation in the supply chain context: the role of structural social and human capital. *International Journal of Physical Distribution & Logistics Management*, *53*(4), 448-466. https://doi.org/10.1108/IJPDLM-12-2021-0525
16. Li, L., Su, F., Zhang, W., Mao, J.Y. (2018). Digital transformation by SME entrepreneurs: A capability perspective. *Information Systems Journal*, *28*(6), 1129-1157. https://doi.org/10.1111/isj.12153
17. Ma, J., Shang, Y., Liang, Z. (2025). Digital transformation , artificial intelligence and enterprise innovation performance. *Finance Research Letters*, *78*(March), 107190. https://doi.org/10.1016/j.frl.2025.107190
18. Matarazzo, M., Penco, L., Profumo, G., Quaglia, R. (2021). Digital transformation and customer value creation in Made in Italy SMEs: A dynamic capabilities perspective. *Journal of Business Research*, *123*. https://doi.org/10.1016/j.jbusres.2020.10.033
19. North, K., Aramburu, N., Lorenzo, O. J. (2020). Promoting digitally enabled growth in SMEs : a framework proposal. *Journal of Enterprise Information Management*, *33*(1), 238-262. https://doi.org/10.1108/JEIM-04-2019-0103
20. Ogrean, C. (2025). Rethinking Dynamic Capabilities for a Digital World: A Bibliometric Analysis of Emerging Trends and Conceptual Shifts. *Studies in Business and Economics*, *20*(1), 374-391. https://doi.org/10.2478/sbe-2025-0021
21. Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., Shamseer, L., Tetzlaff, J.M., Akl, E.A., Brennan, S.E., Chou, R., Glanville, J., Grimshaw, J.M., Hróbjartsson, A., Lalu, M.M., Li, T., Loder, E.W., Mayo-Wilson, E., McDonald, S.,

… Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *Journal of Clinical Epidemiology*, *134*, 178-189. https://doi.org/10.1016/j.jclinepi.2021.03.001

22. Papadopoulos, T., Baltas, K.N., Balta, M.E. (2020). The use of digital technologies by small and medium enterprises during COVID-19: Implications for theory and practice. *International Journal of Information Management*, *55*(June), 102192. https://doi.org/10.1016/j.ijinfomgt.2020.102192
23. Prakasa, Y., Jumani, Z.A. (2024). Linking digital capability to small business performance: the mediating role of digital business transformation. *Cogent Business and Management*, *11*(1). https://doi.org/10.1080/23311975.2024.2342486
24. Rupeika-Apoga, R., Petrovska, K., Bule, L. (2022). The Effect of Digital Orientation and Digital Capability on Digital Transformation of SMEs during the COVID-19 Pandemic. *Journal of Theoretical and Applied Electronic Commerce Research*, *17*(2), 669-685. https://doi.org/10.3390/jtaer17020035
25. Silva, R.P., Saraiva, C., Mamede, H. S. (2022). Assessment of organizational readiness for digital transformation in SMEs. *Procedia Computer Science*, *204*(2021), 362-369. https://doi.org/10.1016/j.procs.2022.08.044
26. Skare, M., de las Mercedes de Obesso, M., Ribeiro-Navarrete, S. (2023). Digital transformation and European small and medium enterprises (SMEs): A comparative study using digital economy and society index data. *International Journal of Information Management*, *68*(November 2022), 102594. https://doi.org/10.1016/j.ijinfomgt. 2022.102594
27. Soluk, J., Kammerlander, N. (2021). Digital transformation in family-owned Mittelstand firms: A dynamic capabilities perspective. *European Journal of Information Systems*, *30*(6), 676-711. https://doi.org/10.1080/0960085X.2020.1857666
28. Straub, F., Weking, J., Kowalkiewicz, M., Krcmar, H. (2021). Understanding Digital Transformation from a Holistic Perspective. *Proceedings of the Pacific Asia Conference on Information Systems (PACIS 2021)*, *August*, 1-8.
29. Sun, F., Qu, Z., Wu, B., Bold, S. (2024). Enhancing global supply chain distribution resilience through digitalization: Insights from natural resource sector of China. *Resources Policy*, *95*. https://doi.org/https://doi.org/10.1016/j.resourpol.2024.105169 Get rights and content
30. Urban, I., Plattfaut, R. (2025). The Interplay of Digital Responsibility and Digital Transformation: Empirical Insights from a Nationwide Digital Transformation. *Information Systems Frontiers, Iss. 0123456789*. Springer US. https://doi.org/10.1007/s10796-025-10610-5
31. Vo Thai, H.C., Hong-Hue, T.H., Tran, M.L. (2024). Dynamic capabilities and digitalization as antecedents of innovation and sustainable performance: empirical evidence from Vietnamese SMEs. *Journal of Asia Business Studies*, *18*(2), 385-411.

https://doi.org/10.1108/JABS-08-2023-0325

32. Wang, Q., Gao, Y., Cao, Q., Li, Z., Wang, R. (2023). What Kind of Configuration Can Facilitate the Digital Transformation? A fsQCA and NCA Study of SMEs. *Journal of Organizational and End User Computing*, *35*(1), 1-20. https://doi.org/10.4018/JOEUC.334110
33. Williams, C.A., Schallmo, D., Lang, K., Boardman, L. (2019). Digital Maturity Models for Small and Medium-sized Enterprises : A Systematic Literature Review. *International Society for Professional Innovation Management (ISPIM) Innovation Conference*, *June*.
34. Williams, C.A., Schallmo, D., Lang, K., Williams, C., Boardman, L. (2019). *Digital Maturity Models for Small and Medium-sized Enterprises: A Systematic Literature Review Digital Maturity Models: Towards the transformation of SMEs View project Digital Maturity Models for Small and Medium-sized Enterprises: A Systematic Literature*. *June*. www.ispim.org.