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THE BUSINESS, INNOVATION AND DIGITAL TRANSFORMATION RESEARCH: A BIBLIOMETRIC ANALYSIS[1]

ДОСЛІДЖЕННЯ БІЗНЕСУ, ІННОВАЦІЙ ТА ЦИФРОВОЇ ТРАНСФОРМАЦІЇ: БІБЛІОМЕТРИЧНИЙ АНАЛІЗ

Abstract. *This study utilizes bibliometric analysis to review the academic literature systematically focused on the influence of digital transformation and digitalization on business and innovation research. A total of 700 articles in Scopus related to the research topic were analyzed. Trend analysis of digital transformation and digitalization, using Google Books Ngram Viewer and Google Trends, indicated the increasing curiosity in this theme in English books and search engines. The analysis of the dynamic of publications in Scopus showed a ten-time increase in research focusing on business, innovation and digital transformation. The performance analysis indicated the top 10 countries with the highest contribution to the research topic. The study then employed citation analysis to identify the most influential publications on the research topic in 2018–2023. Using the VOSviewer, the co-occurrence analysis identified the main thematic clusters of keywords and the evolution of the research themes over the past six years.*

Keywords: *digital transformation, digitalization, bibliometric analysis, trend analysis, business.*

Анотація. *В цьому дослідженні було проведено бібліометричний аналіз для систематичного огляду наукової літератури, присвяченої впливу цифрової трансформації та діджиталізації на бізнес та інноваційні дослідження. Загалом було проаналізовано 700 статей у Scopus, пов'язаних з темою дослідження. Аналіз трендів цифрової трансформації та діджиталізації за допомогою Google Books Ngram Viewer та Google Trends показав зростання інтересу до цієї теми в англомовних книжкових виданнях та пошукових системах. Аналіз динаміки публікацій в Scopus показав десятикратне збільшення досліджень, присвячених бізнесу, інноваціям та цифровій трансформації. Аналіз ефективності показав топ-10 країн, які зробили найбільший внесок у дослідження цієї тематики. Потім у дослідженні було використано аналіз цитування для визначення найвпливовіших публікацій за темою дослідження у 2018–2023 роках. Використовуючи VOSviewer, аналіз повторюваності визначив основні тематичні кластери ключових слів та еволюцію тем дослідження за останні шість років.*

Ключові слова: *цифрова трансформація, діджиталізація, бібліометричний аналіз, трендовий аналіз, бізнес.*

Formulation of the problem. The burgeoning digital landscape has emerged as a pivotal determinant of organizational success in the contemporary business environment. Digital transformation and digitalization have equipped companies with distinct competitive advantages by unveiling novel opportunities to streamline processes, enhance customer engagement, and cultivate innovative business models. Given the volatile economic conditions and intensifying market competition, digital transformation has become a critical success factor for organizations across diverse sectors of the economy. The scholarly significance of this domain lies in the capacity of bibliometric studies to elucidate scientific productivity, trends, and the developmental trajectories of specific research fields. By systematically analyzing publications, researchers can establish the salient aspects of digital transformation and digitalization that warrant further investigation. Such studies facilitate the identification of essential topics and directions, thereby informing strategies for future scientific inquiry.

Furthermore, bibliometric analysis can aid in recognizing the key authors actively contributing to digital transformation and digitalization. This, in turn, presents opportunities for collaboration, knowledge exchange, and the cultivation of scientific networks. Additionally, these studies can unveil the geographical distribution and thematic focus of research in these evolving areas, thereby informing the development of targeted research agendas.

Analysis of recent research and publications. In the context of the rapid development of modern technologies and the digital economy, studies devoted to digitalization and digital transformation occupy an essential place in the economic literature. There are a significant number of scientific works that have conducted a literature review on this issue, examining various aspects of digitalization and digital transformation, including its impact on business, innovation, marketing, finance and other sectors of the economy (Agostino et al., 2022; Annarelli et al., 2021; Bigliardi et al., 2022; Hrytsenko et al., 2021; Nadkarni & Prügl, 2021). However, due to the emergence of new

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research areas and continuous technological progress, it is necessary to constantly update literature reviews to reflect the latest trends and highlight current issues related to digitalization and digital transformation (Paul et al., 2024), as well as their influence on business and innovations (Vial, 2021). This will contribute to understanding the essence of digitalization, identifying new opportunities for business and developing strategies that meet the modern challenges of the digital economy (Ojala et al., 2022). In digital transformation, different terms are used, which have different nuances and are not interchangeable (Gong & Ribiere, 2021). "Digitization" refers to the technical process of converting analogue data into a digital format. This is the initial stage that creates the foundation for further digitalization. In contrast, "digitalization" describes the broader changes and transformations in organizations' business models due to the introduction and integration of digital technologies. The primary goal of digitalization is to enhance business productivity and scalability by leveraging digital capabilities. (ILCUS, 2018; Leão & da Silva, 2021; Sijabat, 2022). Digitalization empowers organizations to create innovative products, services, and business models by harnessing the synergistic potential of emerging digital technologies. The strategic integration of capabilities, such as cloud computing, artificial intelligence, and big data analytics, enables enterprises to reimagine their value propositions and unlock new avenues for growth and competitive differentiation (Koblianska et al., 2023; Rachinger et al., 2019).

As expounded by Tilson, the concept of digitalization encompasses a sociotechnical process that transcends the mere application of digitization techniques. This broader phenomenon involves the strategic integration of digital technologies, which become the foundational infrastructure underpinning the transformation of traditional business models (Tilson et al., 2010). For example, Spotify is an example of digitalization, as it has changed the way consumers listen to music and the business model of traditional players in the industry (introduction of subscription payment model, music recommendations, royalty payment process) (Kathan et al., 2016; Saarikko et al., 2020). Another example is companies that operate on a sharing model, where multiple customers have access to and can use the product (Curtis & Mont, 2020). The income of such companies depends on the short-term rental of the product and not on its sale. These companies are actively using digital technologies for their operations, which leads to a change in their business models due to digitalization (Laukkanen & Tura, 2020). The concept of "digital transformation" diverges from the notion of "digitalization", as it necessitates the strategic integration of both digitization and digitalization processes to drive the improvement or creation of novel business models (Grivas & Graf, 2020). Digital transformation encapsulates a multifaceted sociocultural process in which organizations undergo a strategic realignment to adapt to the evolving demands of the digital landscape, ensuring their long-term viability and relevance (Saarikko et al., 2020). Digital technologies play an essential role in the digitalization of business in all areas (Broccardo et al., 2023). The pursuit of digital business improvement encompasses a strategic organizational endeavor to enhance customer experience and engagement and optimize internal business processes through leveraging digital technologies (Ntamo et al., 2022). This can open up new opportunities and ways of working and impact the quality of life and life satisfaction (Kubatko et al., 2022).

Conversely, companies that do not adapt to digital transformation may face rapid competition and lose competitiveness in the market (Rossato & Castellani, 2020). Digitalization significantly impacts today's market and is profoundly transforming it, leading to a speed of change as one of its essential characteristics. This process is accompanied by an increasing level of interconnection and constant variability in various aspects – physical, social and digital (Urbach et al., 2019). Digital technologies help to restructure economic systems based on subtractive principles to an additive economy (Melnyk et al., 2023). Scientific studies confirm that the successful implementation of digital transformation requires companies to take a strategic approach and focus on critical aspects such as leadership, openness, collaboration and flexi-bility (Jacobi & Brenner, 2017). Companies that effectively adopt digital technologies and develop new business models achieve a competitive edge and secure their sustainability and growth in a rapidly evolving digital landscape (Horobchenko & Voronenko, 2018; Tu et al., 2023; Zhou et al., 2023).

Method. In order to study the popularity of the concepts "digitalization" and "digital transformation" among authors, a comparative analysis was performed using the Google Books Ngram Viewer tool. This tool provides information on the frequency of mentions of these terms in English-language books during a given period, expressed as a ratio to the maximum number of mentions during that period. The analysis results showed the widespread use of "digitalisation" and "digital transformation" in English literature worldwide between 2009 and 2019. The "Google Books Ngram Viewer" tool made it possible to estimate the frequency of mentions of these concepts and their relative popularity during the studied period. The analytical tool Google Trends is widely used to analyze the popularity of terms among users of the Google search network. This tool provides the relative popularity of a particular search query over a specified period by converting the results to a weighted scale. This approach allows us to compare two search queries regardless of relative data and evaluate their level of popularity.

The first stage consisted of conducting a data search in the Scopus database, which is the most voluminous and informative database. Scopus offers comprehensive publication details, encompassing full article titles, precise journal names, keywords, and an entire list of authors. The construction of a sample of research works for analysis was carried out in five stages. In the first stage, a search was made in the Scopus database by the innovation AND business AND "digital transformation" OR innovation AND business AND digitalisation request, which led to the finding of 2,862 documents. In the second stage, the publication year of works was limited from 2018 to 2023, which decreased the volume of works to 2,576. In the third stage, the subject area of studies was limited to business, management and accounting, which led to the abandonment of 1,251 works. The next stage was a restriction to the type of document – only articles, which shortened the number of publications to 713. At the last stage, there were restrictions on English-language articles, which led to the selection of 700 publications (Figure 1).

A sample of scientific articles containing 700 articles was used for cluster analysis of keywords using the VOSviewer software. In total, these articles contain 2,937 key-

words. A minimum number of keyword repetitions of 10 was set to enhance visualization and focus on the most essential and relevant keywords. Moreover, a thesaurus containing ten keywords was applied to exclude irrelevant study keywords (e.g., "case study", "literature review," and "systematic literature review") and to address issues in plural and singular form (e.g., "business models" and "business model") and different spelling the same keyword (e.g., "digitalisation" and "digitalization"). As a result of this approach, the number of keywords was reduced to 56. This allowed us to concentrate on the most essential and relevant keywords in the context of cited articles. This approach contributes to a better elimination of the key topics that researchers focus on in their research.

Results.

The digital transformation and digitalization: a trend analysis.

According to the analysis presented in Figure 2, the relative frequency of mentions of "digitalisation" in the literature from 2009 to 2019 is higher than that of "digital transformation". Both terms have seen significant growth in this period, with "digitalisation" starting to grow strongly from 2015, while "digital transformation" has shown increasing popularity since 2016. These results indicate the importance and relevance of digitalization and digital transformation as a research area.

According to the analysis in Figure 3, the term "digital transformation" is more prevalent in the Google search engine than "digitalisation". This indicates the increased interest of users in digital transformation. Noticeably, both requests show seasonal features: from the second half of December to the first half of January, there is a decrease in interest in both terms every year.

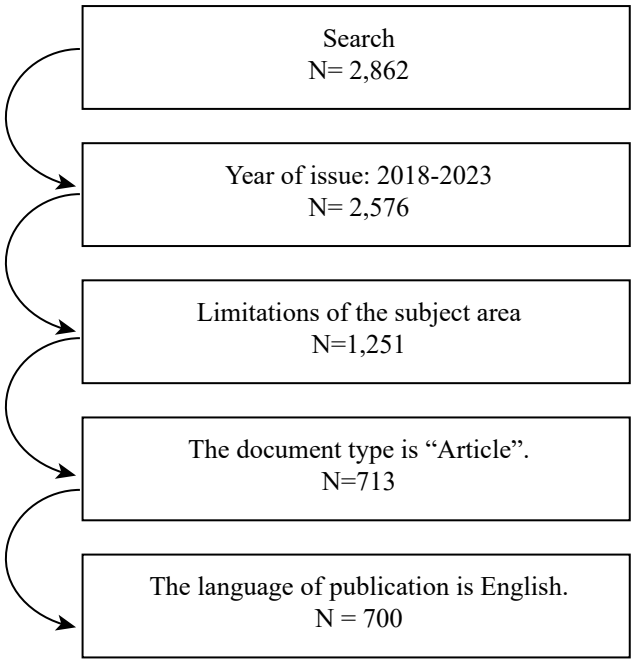

Figure 1 – Stages of Data Sample Collecting

Table 1 showcased the most cited publications on business, innovation and digital transformation based on the total citations number in the Scopus database. The highly influential article "Digital transformation: A multidisciplinary reflection and research agenda" (Verhoef et al., 2021) discusses digital transformation's impact on business model innovation, consumer behavior, and market disruption, identifying three stages-digitization, digitalization, and digital transformation-

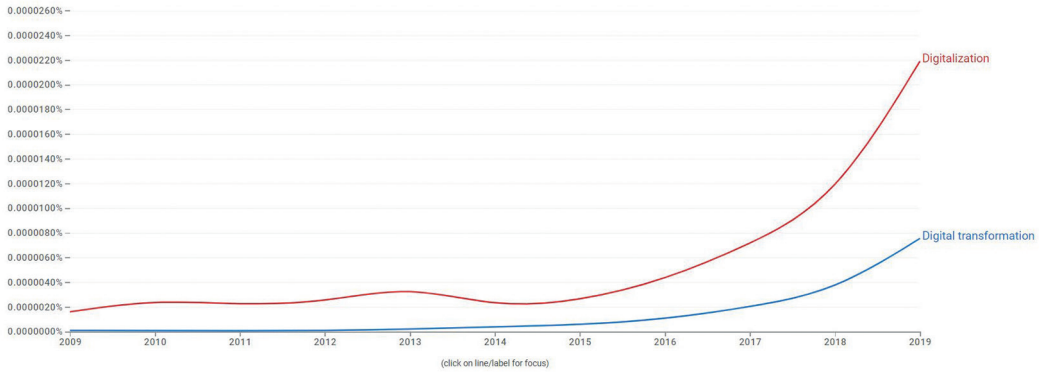

Figure 2 – Results of the analysis of the frequency of mentions of "digitalisation" and "digital transformation" published in English-language books worldwide for 2009–2019. (Google)

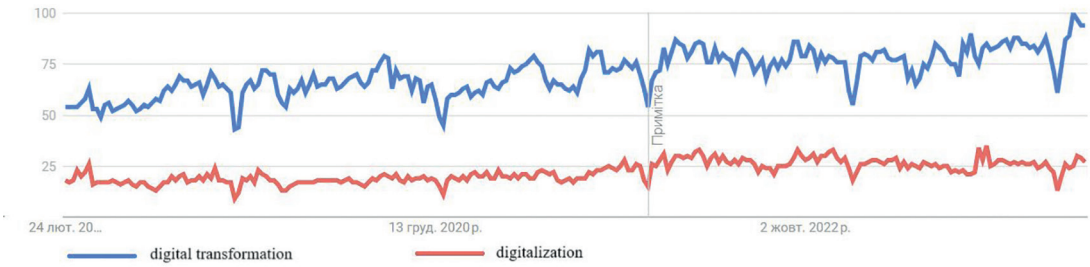

Figure 3 – Analysis of the popularity of the search queries "digitalisation" and "digital transformation" in the Google search engine for 2019–2023. (Google)

Table 1 – The most cited publications (Scopus)

Authors	Title	Year	Source Title	Cited by
Li F.	The digital transformation of business models in the creative industries: A holistic framework and emerging trends	2020	Technovation	278
Kohtamäki M.; Parida V.; Oghazi P.; Gebauer H.; Baines T.	Digital servitisation business models in ecosystems: A theory of the firm	2019	Journal of Business Research	457
Matarazzo M.; Penco L.; Profumo G.; Quaglia R.	Digital transformation and customer value creation in Made in Italy SMEs: A dynamic capabilities perspective	2021	Journal of Business Research	365
Verhoef P.C.; Broekhuizen T.; Bart Y.; Bhattacharya A.; Qi Dong J.; Fabian N.; Haenlein M.	Digital transformation: A multidisciplinary reflection and research agenda	2021	Journal of Business Research	1258
Rachinger M.; Rauter R.; Müller C.; Vorraber W.; Schirgi E.	Digitalisation and its influence on business model innovation	2019	Journal of Manufacturing Technology Management	468
Warner K.S.R.; Wäger M.	Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal	2019	Long Range Planning	936
Bogers M.; Chesbrough H.; Moedas C.	Open innovation: Research, practices, and policies	2018	California Management Review	436
Khin S.; Ho T.C.F.	Digital technology, digital capability and organisational performance: A mediating role of digital innovation	2019	International Journal of Innovation Science	272
Kohtamäki M.; Parida V.; Patel P.C.; Gebauer H.	The relationship between digitalisation and servitisation: The role of servitisation in capturing the financial potential of digitalisation	2020	Technological Forecasting and Social Change	295
Frank A.G.; Mendes G.H.S.; Ayala N.F.; Ghezzi A.	Servitization and Industry 4.0 convergence in the digital transformation of product firms: A business model innovation perspective	2019	Technological Forecasting and Social Change	541

while outlining necessary growth strategies and organizational capabilities for successful implementation.

The influential article "Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal" (Warner & Wäger, 2019) examines how traditional firms develop dynamic capabilities for digital transformation through technologies such as mobile, artificial intelligence, and IoT, highlighting the ambiguous use of the term "digital transformation" and proposing a process model with nine micro-foundations to identify contextual factors that affect implementation.

The study "Servitization and industry 4.0 convergence in the digital transformation of product firms: A business model innovation perspective" is the third most influential article, with 541 citations. It develops a framework that integrates servitization and Industry 4.0 through the lens of business model innovation. The authors identify three levels of servitization (smoothing, adaptation, and replacement) and three levels of digitalization (low, medium, and high). By aligning these levels, they propose nine configurations categorized as manual, digital, and related to Industry 4.0 (Frank et al., 2019).

The fourth most cited publication is "Digitalization and its influence on business model innovation" (Rachinger et al., 2019), with 468 citations. The study reveals that while digitalization is widely viewed as essential, the value proposition and the position within the value network shape perceptions of opportunities for business model innovation. Additionally, organizational capabilities and employee competencies are identified as future challenges for industries. This research contributes empirical insights to the understanding of digitalization and business model innovation.

The study "Digital servitisation business models in ecosystems: A Theory of the firm" (Kohtamäki et al., 2019) has 457 citations and examines digital servitization through firm theory. It employs four theoretical frameworks to analyze how digital technologies transform business models of solution providers and influence firm boundaries within ecosystems like ports and mines. The research highlights that digital technologies impact not only individual firms but also require adaptations in the business models of other ecosystem participants, emphasizing the need for an ecosystem perspective.

The study "Open innovation: Research, practices, and policies" (Bogers et al., 2018) has 436 citations. It is the sixth most cited article and describes open innovation at the intersection of research, practice and policy. It discusses some major trends (e.g. digital transformation), challenges (e.g. uncertainty) and potential solutions (e.g. EU funding programs) in the context of open innovation and innovation policy.

The study "Digital transformation and customer value creation in made in Italy SMEs: A dynamic capabilities perspective" (Matarazzo et al., 2021) is the seventh most cited article, with 365 citations. It examines the impact of digital transformation on customer value creation in Italian SMEs, focusing on the food, fashion, and furniture sectors. The authors analyze six local SMEs to explore how dynamic capabilities facilitate digital transformation. Findings indicate that digital tools enhance business model innovation, create new distribution channels, and improve value creation and delivery to customer segments.

The article "The relationship between digitalisation and servitisation: The role of servitisation in capturing the financial potential of digitalisation" (Kohtamäki et

al., 2020) is the eighth most influential publication, with 295 citations. It investigates how the interaction between digitalization and servitisation affects the financial productivity of manufacturing companies, helping to avoid a digitalization paradox. The study offers valuable insights for managers, emphasizing the importance of servitisation in enhancing financial performance through digitalization.

The article "The digital transformation of business models in the creative industries: A holistic framework and emerging trends" (Li, 2020), cited 278 times, examines how digital technologies drive business model innovation in the creative industries, presenting a framework that illustrates significant changes in business models and highlights the increasing use of multiple business models within a single company as a means of planning innovations.

Finally, the study "Digital technology, digital capability and organisational performance: A mediating role of digital innovation" (Khin & Ho, 2019), cited 272 times, is the tenth most influential paper. It explains how new digital technologies can create innovative digital products and services and increase productivity. It also fills the gaps in the research related to the factors contributing to digital innovation.

Co-occurrence analysis

In Figure 4, the visualization of the clustering of keywords in scientific articles shows several main clusters that can be recognized. The first cluster is green innovation and the development of business models. In this cluster, the focus is on innovation in business models and their development. The most common keywords include "business model innovation", "business models", "business development", "sustainable development", "technological development", "digital servitisation", "digital business", and "servitisation". Specifically, studies focus on:

• Analyzing frameworks that facilitate the transformation of traditional business models in response to digitalization and evolving market dynamics (Fernández-Portillo et al., 2022; Mahboub & Sadok, 2023; Reim et al., 2022).

• Investigating the integration of sustainability principles into business models and assessing their impact on long-term profitability and environmental stewardship (Kaniappan Chinnathai & Alkan, 138259; Lu et al., 2023; Principato et al., 2023).

• Assessing the interplay between innovation practices and effective business development strategies in achieving competitive advantage (Ahmad et al., 2022; Sundaram et al., 2020; Troise et al., 2023).

The second cluster is red, economy and innovative ecosystems. Keywords that dominate this cluster include "industry 4.0", "ecosystems", "internet of things", "open innovation", "value creation", "blockchain", "competition", "supply chain management", and "industrial research".

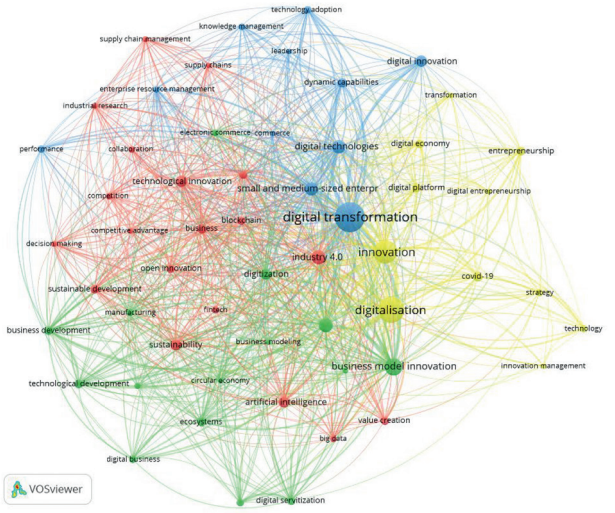

Figure 4 – Visualization of keyword clustering of selected articles (VOSviewer)

Research in that cluster encompasses a variety of topics related to the keywords, including:

• Examining how emerging technologies, such as artificial intelligence and blockchain, drive the evolution and innovation of business models across diverse sectors (Burström et al., 2021; Marikyan et al., 2022; Volberda et al., 2021).

• Analyzing how Industry 4.0 technologies transform traditional industries and contribute to economic growth and productivity (Del Giudice et al., 2021; Rocha et al., 2022).

• Investigating the role of collaborative ecosystems in enhancing value creation among firms, particularly in the context of emerging technologies (Palmié et al., 2022; Toufaily & Zalan, 2023).

• Exploring the integration of IoT technologies in supply chain processes and their effects on efficiency, transparency, and responsiveness (Colli et al., 2021; Yang et al., 2021).

The third blue cluster is digital transformation and digital technologies. The most frequently occurring keywords include "digital transformation", "digital technologies", "small and medium enterprise", "digital innovation", "digital economy", "digital innovations", "digital platforms", "digital technology" and "technology adoption". Research in this area specifically, studies focus on:

• Analyzing how various digital technologies drive innovation in business processes, products, and services across different industries (Ulatowska et al., 2023).

• Investigating the challenges and opportunities SMEs face in adopting digital transformation strategies and the impact on their growth and competitiveness (Bettiol et al.,

Table 2 – Statistical co-word analysis

Color	Cluster name	Keywords
Green	Innovation and the Development of Business Models	business model innovation, business models, business development, sustainable development, technological development, digital servitisation, digital business, servitisation
Red	Economy and Innovative Ecosystems	industry 4.0, ecosystems, internet of things, open innovation, value creation, blockchain, competition, supply chain management, industrial research
Blue	Digital Transformation and Digital Technologies	digital transformation, digital technologies, small and medium enterprise, digital innovation, digital economy, digital innovations, digital platforms, technology adoption
Yellow	Digitalization, Technological Innovation, and COVID-19	digitalisation, innovation, COVID-19, entrepreneurship, technological innovation, business, dynamic capabilities, performance, technology, strategy, innovation management, business transformation

2023; Soluk et al., 2023; Uddin et al., 2024; Wang & Esperança, 2023; Zheng et al., 2023).

• Identifying and analyzing the barriers that organizations face when implementing digital transformation initiatives and strategies to overcome them (Ionescu et al., 2022; Volberda et al., 2021b; Zulu et al., 2023).

• Documenting specific case studies of organizations that have successfully navigated digital transformation, highlighting best practices and lessons learned (Heshmatisafa & Seppänen, 2023; Klos et al., 2023; Mishra & Shukla, 2023; Sabatini et al., 2023; Santarsiero et al., 2023).

The last fourth cluster is yellow and focuses on digitalization, technological innovation and COVID-19. This cluster examines the impact of the COVID-19 pandemic on digitalization and innovation in various industries. It explores strategies for the successful implementation of new technologies in companies. Keywords such as "digitalisation", "innovation", "COVID-19", "entrepreneurship", "technological innovation", "business", "dynamic capabilities", "performance", "technology", "strategy", "innovation management", and "business transformation". Research in that cluster encompasses a variety of topics related to the keywords, including:

• Analyzing how the pandemic accelerated digitalization across different sectors and its long-term implications for business operations (Molleví Bortoló et al., 2023; Schiavone et al., 2023; Volosovych et al., 2021).

• Assessing how firms developed dynamic capabilities to navigate the challenges posed by COVID-19 and their impact on organizational performance (Almeida & Wasim, 2023; Mishrif & Khan, 2023).

• Examining best practices in innovation management that enabled organizations to remain resilient and responsive during the COVID-19 crisis (Akpan et al., 2023; Cecere & Bernardi, 2023).

Overall, the distribution of keywords across the clusters is relatively uniform; however, the blue cluster, corresponding to the theme of Digital Transformation and Digital Technologies, and the yellow cluster, focusing on Digitalization, Technological Innovation, and COVID-19, exhibit higher keyword counts compared to the green and red clusters. Specifically, the blue cluster contains 505 keywords, while the yellow cluster has 501. In contrast, the green cluster has 367 keywords, and the red cluster contains 399.

Figure 5 visualizes the evolution of the "business-innovation-digital transformation" research theme in 2018–2023. Three groups of keywords, which reflect the three time periods of the theme evolution, were identified based on the average year of publication. The first group contains 12.5% of the total keywords, and the average year of publication is less than 2021. The second group unites 58.9% of the keywords most mentioned in 2021–2022. The third group presents 28.5% of the total keywords with an average publication year of over 2022. Thus, the keywords "business modelling", "transformation", "technology", "internet of things", "big data", "business model", and "industry 4.0" are in the first group. Of these, four keywords belong to the second cluster, economy and innovation ecosystems; two to the fourth cluster, digitalization, technological innovation and COVID-19; and one is part of the third cluster, digital transformation and digital technologies. This may indicate a lower interest of researchers in these topics than other clusters. The third group includes the following keywords, "leadership", "sustainability", "covid-19", "technological development", "digital platform", "open innovation", "collaboration", "economics", "blockchain", "circular

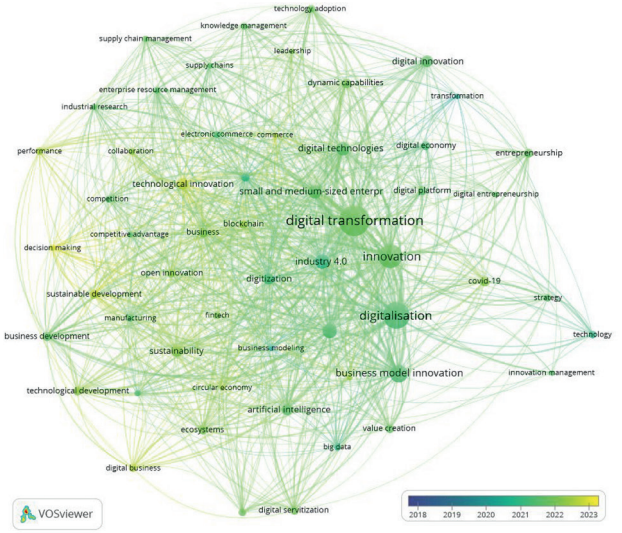

Figure 5 – Visualization of the evolution of research theme in 2018–2023 (VOSviewer)

economy", "performance", "digital business", "commerce", "sustainable development", "technological innovation" and "decision making". Of these, six keywords are from the first cluster of innovation and business model development, two from the second cluster are economy and innovation ecosystems, one from the third cluster is digital transformation and digital technologies, and seven are related to the fourth cluster, digitalization, technological innovation and COVID-19. In general, according to the average year of publication, the first group of keywords includes seven words, 12.5% of the total number of researched keywords; the share of the second group is 58.9%, and the third group is 28.5%. This indicates the growing interest of researchers in the topics of the third group. These topics have significant implications for today's organizations and are relevant for research. The data analysis indicates that specific issues and research areas attract more attention in the scientific community, while others may have a lower level of interest. It is worth noting that these results reflect publication trends and may change over time as researchers continually expand their research focus.

Conclusions. This study applied bibliometric analysis methods to review the influence of digital transformation and digitalization on business and innovation research published in the Scopus database in 2018–2023.

Trend analysis results showed that the "digitalisation" keyword had a twice higher frequency than "digital transformation" in English books from 2009 to 2019, according to the Google Books Ngram Viewer. According to Google Trends, the "digital transformation" keyword is a more searched request than "digitalisation" in 2019–2023.

The "business-innovation-digital transformation" cooccurrence network identified four main thematic clusters of keywords. The first cluster focused on innovation in business models and their development; the second cluster covered economy and innovative ecosystems; the third cluster named digital transformation and digital technologies; and the fourth cluster – digitalization, technological innovation and COVID-19.

The evolution of the "business-innovation-digital transformation" research theme over the past six years includes three time periods such as 2018–2021, 2021–2022 and 2022–2023, with 12.5%, 58.9% and 28.5% of total keywords, respectively.

However, this paper is not free from limitations, enabling further research. First, the data sample was limited to only one subject area and the Scopus database. Thus, additional research can explore other subject areas, identifying other countries' performance and cited publications. Second, the selected timespan of the research was limited to only 2018–2023. Further research might cover a longer timespan identifying new keywords, thematic clusters, and the evolution periods of the research theme.

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