




Digital Transformation of Organizations - The Emerging Topic of the 2000s

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Abstract: The use of digital tools is a reality nowadays, which not only cannot be ignored, but which organizations must take advantage of, transforming their internal processes into more efficient ones, to remain competitive. These transformations are also inherently reflected in academic research, and unprecedented interest can be observed. The purpose of this paper is to map the research area on digitization and digital transformation and to identify the factors that contribute to the digital transformation of organizations through a systematic review. Also, through this research we have highlighted the qualitative evolution of research in this area of interest for research for two periods of time (1) 2014-2019 and (2) 2019-2024 and subsequently the conceptual link between research from the whole analyzed period and their trend. The second part of the research is dedicated to a systematic review to reveal the driving factors for digital transformation and digitization in organizations in the period 2020-2023 to provide insight to practitioners who are interested in this process. The results of the study provide information to organizations concerned with digital transformation in the post-pandemic period and complement the literature in this field. As an element of originality of the research, in addition to combining the two methods of bibliometric analysis and systematic review, the paper presents the driving factor for the digital transformation (in a simplistic way) but offers help to researchers who want to carry out more detailed and in-depth research in this field.

Keywords: digital transformation, organization, ecosystem, systematic review.

Introduction

Accelerated technological development has revolutionized society and continues to influence and change the way organizations operate. Digitization and digital transformation have been seen in organizations since the 1950s and have brought about changes in all areas of activity worldwide. In the digital age, it is important for every country to be innovative so that the economy, organizations, and people can adapt to the increasing amount of information and digital innovations. At the same time, the evolution of information systems and technology in general, has favored the progress of the digitalization of the industry, thus causing organizations to increase investments in solutions and tools that allow the automation of processes (Barna, 2021).

Digital transformation can be defined as an organizational strategy aimed at leveraging digital resources and the use of new digital technologies (eg. automation, hardware and software development, artificial intelligence, cloud services, etc.), in order to improve important aspects of the business, such as customer experience and organizational communication, but also in order to streamline operations and create new business models (Fitzgerald, Kruschwitz, Bonnet, & Welch, 2013). As a result of the fact that

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digitization allowed greater accessibility of information and at the same time, created new opportunities for communication, it created the paradigm of digitization, which made information technology essential for competitiveness and customer satisfaction (Mithas, Tafti, & Mitchell, 2013). As a result, organizations have increasingly focused on aligning their strategies, mission, and goals with information technology premises to achieve important benefits such as efficient management of resources and quality of products and services. At the organizational level, the goal of digital transformation is continuous optimization, and a digitalized company is more innovative, better performing, people-oriented, customer-centric, more efficient, and better able to capitalize on development opportunities (Gobble, 2018).

The effects of the pandemic have been a challenge, both for the economy and society in general, as well as for organizations and individuals within them. Organizations have had to redesign their organizational activities and have increasingly integrated digital technology into their activities and processes. It is important for the organization that is in this process to effectively manage this stage and for those that intend to move from traditional to online to have an effective strategic direction. The purpose of this research is to analyze what is the scientific interest shown in this concept and what are the factors that led to the pandemic of the digital transformation process within organizations. To achieve this objective, the research proposes to answer two questions, such as:

Q1: What was the way of manifestation and the evolution over time of the scientific interest in the digital transformation of organizations?

Q2: What are the key factors that have led to digital transformation in organizations?

As a result, the study aims to answer the research questions through bibliometric analysis and a systematic review. In the first part of the paper, a synthesis of the specialized literature is carried out, followed by the presentation of information related to the specific methodologies of bibliometric analysis and systematic analysis. Later, the bibliometric results are presented and then the results of the systematic analysis, respectively, the determining factors of the digital transformation are presented. The last section of the paper presents a discussion of the study results and conclusions.

Literature Review

In the new paradigm of digital transformation, organizations must have standards specific to new technologies and focus on developing new skills and competencies needed in the digital transformation process. Digitization within organizations can fundamentally influence business processes, company capabilities, products and services, but also organizational culture and employee performance (Pradana et al., 2022).

Furthermore, the effects of the pandemic constituted a challenge, both for the economy and society in general, as well as for organizations and individuals within them. At the economic level, the effects of this phenomenon were broad and multiple, however, they manifested themselves differently from one nation to another, depending on a series of characteristics such as the degree of development specific to each country and the speed of political responses. One of the most prominent effects of the pandemic on organizations has been finding ways to maintain business continuity while keeping employees safe.

However, there are also the positive effects of the pandemic on organizations, among which the acceleration of digitization and the allocation of significant investments in various digital platforms and technological tools, as a result of the fact that the pandemic has created a great need for digital transformation, but also the desire to keep pace with

innovation (Savić & Dobrijević, 2021). At the same time, teleworking has affected work-life balance, family satisfaction, and life satisfaction.

In this context digital technologies have changed the way business is conducted, having positive effects on organizational connectivity, financial inclusion, communication and information collection, but also on operational efficiency (Schilirò, 2021). Digital transformation has influenced work processes within organizations, generating new ways of working (telework). As a result, organizations had to focus on establishing a flexible work schedule, on improving the relationship between people, organizational culture and management, but also on the field of social communication technology (the use of the Internet and video conferencing, but also collaboration tools) (Blok, Groenesteijn, van den Berg, & Vink, 2011). At the same time, the environment created by the digital transformation increased the danger of technological unemployment and led to the intensification of the need to update employees' skills and create new skills (Schilirò, 2021).

From the studies carried out (Pereira et al., 2022) it emerged that digital transformation has a major impact on knowledge management, but also on organizational performance. According to Teng, Wu and Yang (2022), digital transformation is positively correlated with SME performance. Specifically, for SMEs, focusing on investments in digital technologies, digital skills of employees and digital transformation strategies, are three key factors of digital transformation, which help to improve performance and maintain their sustainable development. On the other hand, knowledge management in the digital age has gained extraordinary attention, due to the growing importance of internationally qualified talent, at a time when digital is gaining more scope (Sousa & Álvaro, 2019). The process of incorporating various technologies into business operations and the drive to innovate are the building blocks of the future of work, which is rooted in knowledge management and the study of intellectual capital (Kudyba, 2020).

Method

In the following section, the methodological approaches for analysis, bibliometric analysis and systematic analysis are presented. In the first step, methodological elements specific to the bibliometric analysis were presented, and in order to overcome certain limits specific to this analysis, namely the impossibility of answering the second question of the research, systematic analysis was also introduced. The methodological elements of this approach were presented in the second section. This scientific approach was also supported in the research proposed by Dabić et al., (2020).

Bibliometric approach

The purpose of the bibliometric approach is to highlight the evolution over time of the concept of digital transformation and what are the conceptual links between the identified terms. Given the importance of this phenomenon in the last two decades, an overview of the theoretical quantitative elements that exist in this field is necessary. In this end, the Web of Science database was queried, by searching for the term "digital transformation" applying the field selection filter, thus only research from the Management, Business and Economy were extracted.

At the same time, in order to have significant data, we chose to analyze the research on the concept of digital transformation in the period 2014-2019, from which we extracted a total of 971 documents, the period 2019-2024, from which we extracted a total of 4785 documents (which where almost 5 times more documents were identified).

Bibliometric analysis is a highly rigorous method that applies statistical analysis to describe, evaluate, and monitor a larger volume of scientific data in a more objective way (Dede & Ozdemir, 2022). In order to perform bibliometric analysis, two software were used, namely VOSviewer (version 1.16.19.0) (Van Eck & Waltman, 2010) and Biblioshiny (Aria & Cuccurullo, 2017). At the same time, bibliometric analysis includes two major

directions, namely (1) analyzing the evolution of the concept of digital transformation over time (in the last 10 years), and (2) analyzing the keywords of the documents related to the concept of digital transformation.

Systematic review approach

Moreover, to identify drivers of digital transformation in organizations in the last three years, a systematic analysis was carried out. This period was chosen considering the impact that the Covid-19 pandemic had on organizations. 2021).

The PRISMA approach is widely recognized in studies that focus on content analysis, providing different guidelines for the methods and results of systematic reviews and how to report the results of these reviews (Page et al., 2021). Therefore, given the large number of scientific materials used for the bibliometric analysis, a further query of the WoS database was performed based on several criteria: (1) the keywords "digital transformation", "organization" and "digitization"; (2) materials from the period 2020-2023 were selected; (3) only article-type materials were extracted and also only open access articles; (4) last but not least, documents included in the "Management" category were extracted. In the final stage, 88 scientific materials were extracted and, following a filtering process, only 35 articles were selected for content analysis. The eliminated articles did not fulfill criteria such as (1) the purpose of the article was not in line with the aim of this paper and (2) the article was not available to the readers. Figure 1. shows the methodological steps underlying the narrative synthesis of the studies.

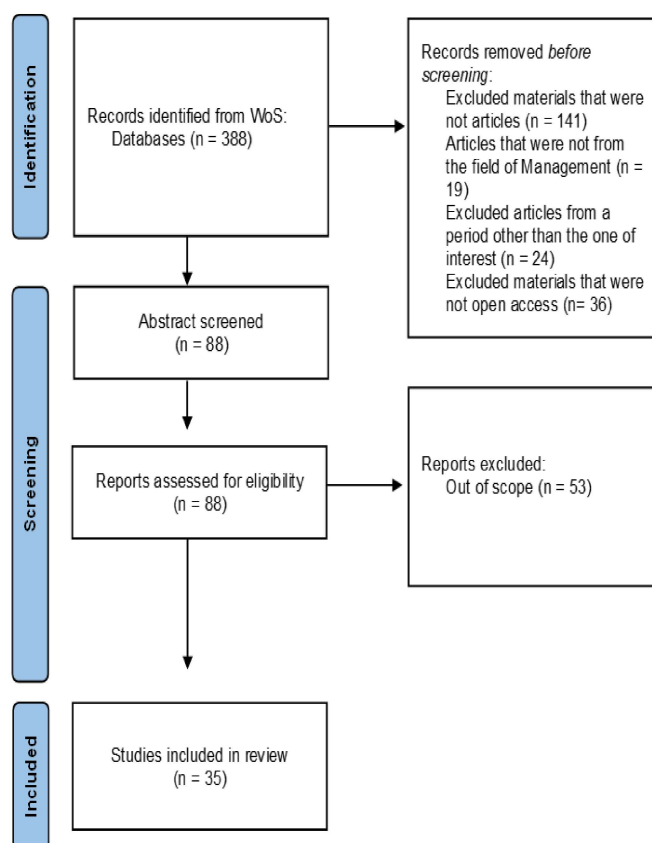


Figure 1. PRISMA approach select data
Source: authors approach ((Page et al., 2021)

Results

Bibliometric results

For the analysis of the evolution over time the analysis of research regarding the concept of digital transformation was chosen in the period 2014-2019, 43 keywords were extracted, respectively the period 2019-2024, where we extracted a total of 55 keywords.

Therefore, Figure 2 represents the evolution of the research conducted in the digital transformation sector between 2014-2019. In this figure, in line with the chronological axis on the bottom right, several colors can be identified that are assigned to a reference year. The dark blue color (which is not very present in the figure) is associated with the terms used in the first period of the analysis, and their shift to green and yellow colors indicates their evolution over time. The yellow color indicates academic concepts, and the links created between them in the 2018-2019 period. Strong links can be observed between the concept of digital transformation and other concepts such as innovation, management, digital economy, technology and even information. Analyzing the whole period, it was noted that most of the research in terms of the above-mentioned concepts were conducted between 2018 and 2019. At the same time, it can be noted that the authors' attention is directed towards identifying the links between digital transformation and strategic management of organizations.

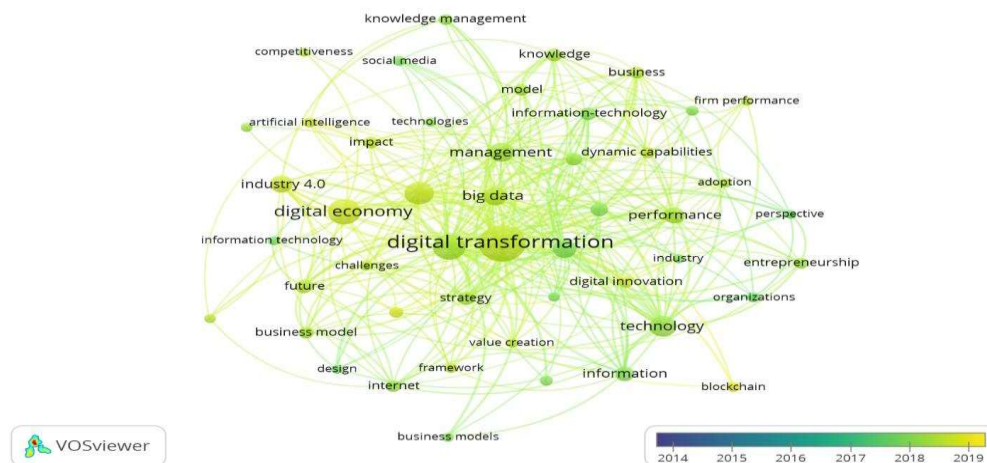


Figure 2. The evolution of research carried out in the field of digital transformation in the period 2016-2019

Source: VOSviewer (Van Eck & Waltman, 2010)

Similar to the previous case, Figure 3 represents a map of the evolution of research conducted in the field of digital transformation in the period 2019-2024. This period is marked by an increased interest of researchers regarding the concept of digital transformation. If in the period 2016-2019 there were 971 publications related to the concept of digital transformation, in the period 2019-2024, their number was almost 5 times higher, namely 4785 publications. According to the analyzed period, most documents were published in the year 2022. The strong links existing between the concept of digital transformation and other concepts, existing in the previous period, are also maintained in the period 2019-2024. However, there is an even stronger connection between the concept of digital transformation and the concept of management. In this period, the connection between the concept of digital transformation and the strategic management of organizations is much more present, noting the existence of the concepts

of strategy and competitive advantage. To a large extent, the research areas of the two periods have not changed considerably.

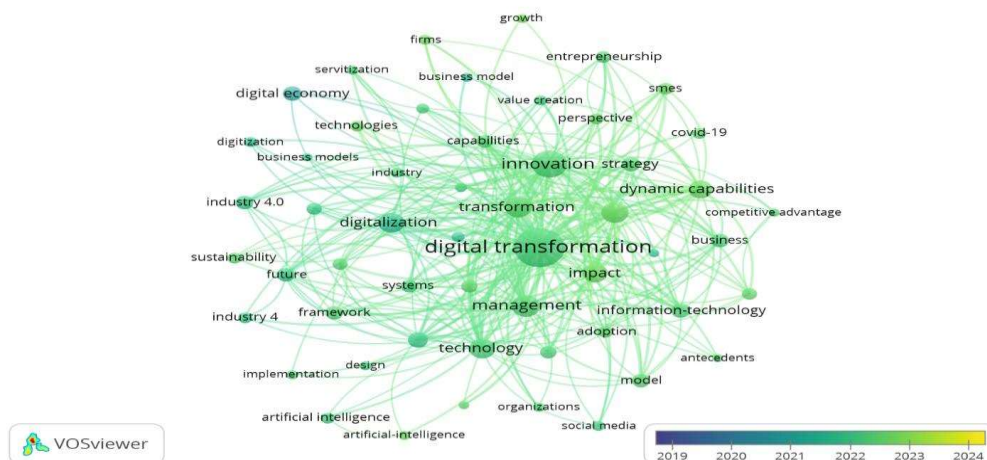


Figure 3. The evolution of research carried out in the field of digital transformation in the period 2019-2024

Source: VOSviewer (Van Eck & Waltman, 2010)

Last, Figure 4 represents a graph of the evolution of the scientific production of documents related to the concept of digital transformation, in the period 2014-2024 (993 documents). For the most part, the evolution was an upward one, with a slight decrease in the number of documents in 2021 compared to 2020. Most documents were published in 2023 (249 documents) and in the first half of 2024 (185 documents). Until 2017, the number of published documents was not a significant one, during the period 2014-2017, the number of publications was 28. There is an increased interest in research towards the concept of digital transformation, starting from 2022.

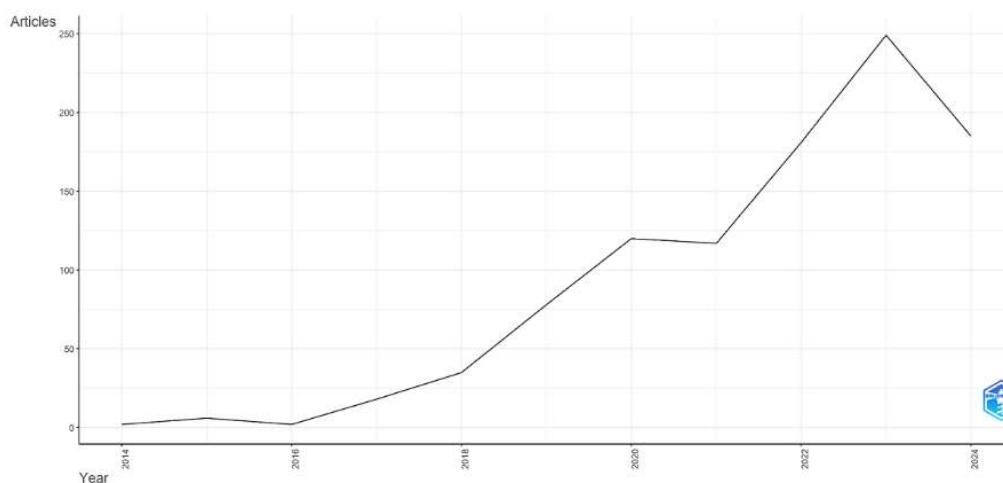


Figure 4. Annual scientific production of documents related to the concept of digital transformation, in the period 2014-2024

Source: Biblioshiny (Aria & Cuccurullo, 2017)

Moreover, in order to determine which were the most used concepts, we made a trend map which showed the most common keywords and their notoriety in scientific research from 2019 to 2023. Therefore, Figure 5 shows the most used words in the documents related to the concept of digital transformation, as well as the periods when these words were of particular interest to researchers. It is observed that in the period 2019-2021, the most used concepts in the analyzed studies referred to digital economy, leadership, knowledge management and business model. In 2022, however, the researchers focused

on the concept of digitization, but also on the concept of innovation. In the last period, namely 2023-2024, the most frequently encountered concepts were digital transformation, SMEs and COVID-19. During this period, how small and medium enterprises are approaching and implementing digital transformation, and the impact of the COVID-19 pandemic on digital transformation, were most likely two major topics of interest for researchers. There is also a trend among researchers to study digital leadership.

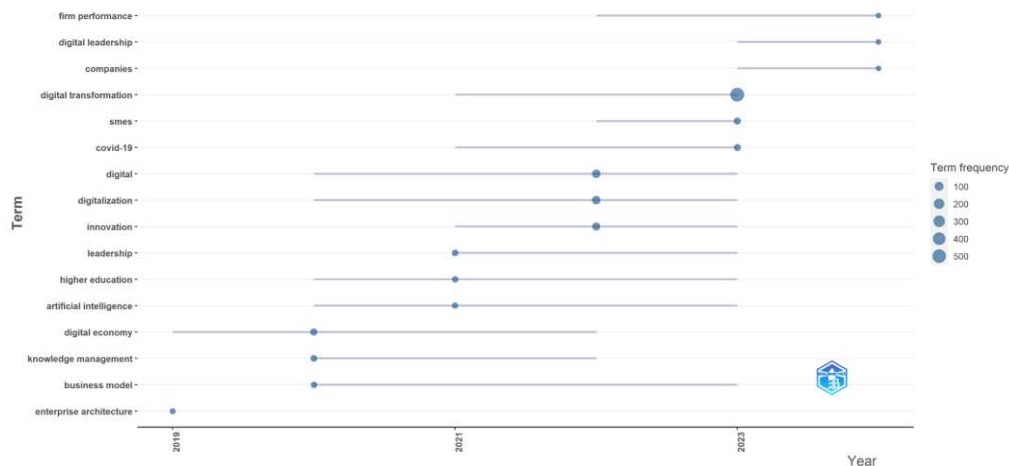


Figure 5. The trend of the most common keywords
 Source: Biblioshiny (Aria & Cuccurullo, 2017)

Next, the research presents the map of keywords connections between the main analyzed keywords. Thus, Figure 6 represents a map in the form of a network, organized by clusters of different colors, which illustrates the connections between the most relevant 70 words within the analyzed documents. The size of the circles on the map indicates the frequency with which a certain concept (keyword) appears in the analyzed documents. A larger circle signifies a central or particularly frequently discussed concept in the articles in the database. The length of the lines connecting the circles reflects the strength of the connection between two concepts. A shorter line suggests a strong connection between the concepts, indicating that they frequently appear together within the analyzed documents.

Green Cluster: brings together the 11 most important elements, focused on digital transformation and its impact on business and technology. Key terms within this cluster include concepts such as "digital transformation", "innovation", "covid-19" and "social media". This cluster suggests that digital transformation is a central topic for innovation and business development, especially in the context of the pandemic.

Red Cluster: Made up of 14 elements, this group focuses on emerging technologies and sustainability, with terms such as "big data", "artificial intelligence", "blockchain" and "sustainability". There is an interest in the future of the industry and the challenges of implementing disruptive technologies.

Blue Cluster: Includes 10 items that focus on management and dynamic capabilities, with terms such as "technology", "management", "competitive advantage" and "absorptive capacity" indicating an emphasis on integrating technology into enterprise performance and governance.

Yellow Cluster: Composed of 6 elements, the Yellow Group focuses on strategies and business models in the digital age. Important terms include "digitization", "capabilities", "business model" and "firms".

achieve resource integration as an indicator of dynamic capability for digital transformation at the organization level.

DIGITAL TRANSFORMATION	Driving factors	Source
	Digital capabilities	Fleischer & Carstens, (2022); Ellström, Holtström, Berg & Johansson, (2021); Dethine, Enjolras & Monticolo, (2020); Kraus, Ferraris & Bertello, (2023); Li, Cui, Wu, Lowry, Kumar & Tan (2023).
	Organizational resources	Dethine, Enjolras & Monticolo, (2020); Li, Cui, Wu, Lowry, Kumar & Tan (2023); Omrani, Rejeb, Maalaoui, Dabić & Kraus (2022)
	Organizational culture, vision and strategy	Leal-Rodríguez, Sanchís-Pedregosa, Moreno-Moreno, & Leal-Millán, (2023); Jöhnk, Ollig, Rövekamp & Oesterle, (2022); Ellström, Holtström, Berg & Johansson, (2021); Kraus, Ferraris & Bertello, (2023), Ulrich-Diener, Dvoutely & Spacek, (2023); Wrede, Velamuri & Dauth, (2020).
	Government support	Fleischer & Carstens, (2022); Jöhnk, Ollig, Rövekamp & Oesterle, (2022); Kraus, Ferraris & Bertello, (2023).
	Environment and ecosystems	Dethine, Enjolras & Monticolo (2020); Kronblad & Pregmark, (2022); Omrani, Rejeb, Maalaoui, Dabić & Kraus (2022); Sjödin, Kamalaldin, Parida & Islam, (2021); Li, Cui, Wu, Lowry, Kumar & Tan (2023).

Table 1. Driving factors for digital transformation
Source: Authors

Fleischer & Carstens (2022) consider that the skills of employees are important in terms of providing, processing and interpreting information and transmitting it, given that skills are needed to use digital tools. Also, Dethine, Enjolras & Monticolo (2020) highlight in their paper the relationship between SME internationalization and organizational capabilities. They believe that the organizational impact of digitization on SMEs is essential and must be reflected in a combination of digital tools/resources, skills and capabilities. Identifying and exploiting strategic resources still requires the implementation of specific capabilities. Also, Li et al. (2023) demonstrated that big data analytics capabilities support effective marketing actions, such as new product launches, by capturing and analyzing customer needs and behavior patterns, and thus can help optimize product personalization. With digital technologies, firms can modernize production lines to offer new combinations of products and services.

Organizational resources. Also, Dethine, Enjolras & Monticolo (2020) highlight the vision based on resources, these being considered critical elements in the digital transformation process. An organization's essential resources, regardless of whether they are financial, human resources, of time, play an important role in the organization and influence its economic growth. Also, when we refer to a change regardless of its nature, the organization must rely on a number of resources that can support this process. Especially, when the changes are made based on strategic objectives. In the process of digital

transformation, a series of digital resources are needed such as computers, networks, the existence of an information subsystem, and software designed to support and improve the organization's activity. In addition, digital resources can therefore be considered strategic only if a good implementation or exploitation of them within the company is considered.

Organizational culture, vision and strategy. Also, organizational culture, along with its strategic objectives, were the most used in academic works. Ulrich Diener et al. (2023) believe that strategic management and related processes should be understood as a set of commitments, decisions and actions necessary to achieve strategic competitiveness and superior profitability in a digital organization. From the perspective of Leal-Rodríguez et al. (2023) the process of organizational change or cultural transition, which involves the internalization of new values (e.g. digitalization), is conditioned by two key factors. First, it is based on the exploratory effort to identify emerging trends of change in the environment and assess their significance or impact on survival. Second, it depends on the degree of congruence or conflict with existing organizational values that either facilitates or hinders the integration of these new values into the cultural code. The institutional approach assumes that cultural change is primarily driven by environmental factors or pressures, such as the introduction of new techniques or technologies (e.g. digitalization). While some organizations may adapt to these changes, others may be left behind. Also, strategic alignment aims to balance organizational, digital transformation objectives following the overall strategic vision and digital business strategy (Jöhnk et al., 2022).

Government support. Fleischer & Carstens (2022) discuss the importance of the involvement of authorities for companies that are innovative and find themselves in the process of digital transformation. Governance mechanisms regulate the sharing of IT resources and responsibility. Thus, the authorities aim to support and expand the digital transformation strategy and objectives of the organizations. However, digital transformation requires specific governance frameworks to reduce barriers and organizational inertia, as well as to stimulate innovative capabilities (Jöhnk et al., 2022).

Environment and ecosystems. Kronblad & Pregmark, (2022) emphasize the challenges and influences that can arise from the external environment, such as legislative changes, crises and epidemics. Moreover, Sjödin et al. (2021) in a narrower but vital sector of activity, believes that efficiency, agility and innovation generated by digitization are the basis of relationships between various internal functions, ecosystems and strategic partnerships. However, the existence and relationship with digital suppliers and stakeholders determine the organization in the digital transformation process, especially in the context in which they put pressure on the organization. Moreover, the market and the environment in which the organization operates can directly determine its level of competitiveness and development. In an agile and competitive business sector, organizations are making considerably greater efforts to retain customers and achieve high revenue.

Discussion

In the last decade, digital transformation has transformed the life and activity of both people and organizations. Today, the way we shop, communicate, work and learn has fundamentally changed. Technology and its progress has also attracted the attention of researchers from several fields to determine and find out how these technologies affect us. However, although there have been changes in organizations around the world with environmental pressure, there is still a discrepancy between theory and practice.

The studies that have analyzed digital transformation in this way in the last decade have also integrated derived concepts of this word. For example, Popa, Banciu & Ștefan, (2024) carried out a bibliometric analysis on the concept of digital transformation and management. The result of the study carried out by them highlighted the fact that management plays a key role in the process of digital transformation of organizations, also the knowledge of management influences and directs this process within organizations.

Thus, according to our results, the management concept and management knowledge were identified both in the conceptual maps made in Figure 2, 3, and 5. Also, these management knowledge were identified through the prism of the systematic analysis carried out as dynamic capabilities of the organization. The same conclusions were also identified by the studies of Ko et al., (2022) who identified the fact that next to the IT infrastructure, management has the biggest contribution in this process.

More, digital capabilities has been identified as another determinant of digital transformation. This determining factor was found even from the results of the bibliometric analysis, considering that this was a concept of interest for academics. Digital capabilities and dynamic capabilities had conceptual links with concepts such as "knowledge", "performance" and "competitive advantage". Studies such as Slavković et al., (2023) also analyzed the role between digital transformation and organizational capabilities, with a focus on digital ones. The results of the study highlighted that there is a positive relationship between digital capabilities and medical digital transformation by digital citizenship. Andrade & Gonçalo, (2021) analyzed the relationship between digital transformation and strategic capabilities of organizations at the level of countries considered by emerging authors. Thus, their findings indicated that ecosystem factors determine the level of capabilities that influence digital transformation.

The results of the bibliometric analysis also showed conceptual links with other relevant concepts. Academic studies were interested in analyzing the relationship between digital transformation and strategy, competitiveness, performance, both in data set (a) and in data set (b). These results were also supported by the results of other studies such as Gobble (2018) and Kitsios, Giatsidis, & Kamariotou, (2021) who focused on determining the relationship between these two concepts.

Also, the impact of the pandemic on the organization was also discussed in quantitative studies (Popa et al. 2024) highlighting the digital transformation and the opportunities brought by digitalization in public organizations in Romania. However, according to the bibliometric analysis and the systematic review carried out, the organization's environment and ecosystem were identified as important when organizations intend to benefit from the opportunities brought by these technologies.

Conclusions

This research sought to highlight the way in which the researches analysing the digital transformation manifested over time and subsequently what were the factors that led to the digital transformation in organizations in the period 2020-2023.

Using bibliometric methods and systematic analysis, the results of the study showed that over the whole 10-year period, i.e. 2014-2024, the most scientific papers were published in 2023, i.e. 249 papers. So, it is evident in this context that the Covid-19 pandemic has put pressure on the business environment, especially on the way organizations do business, and there is an increased interest in digitization and digital transformation. However, this interest has also been shown by researchers whose role has been to provide valuable information to decision-makers or organizations, which have undergone changes or at the same time, wanted to explain new theoretical phenomena from this perspective. Also, the most used words in the academic research, such as innovation, transformation, performance, management, technology, dynamic capabilities, digital economy and strategy, were also in line with the results of the systematic review conducted on the studies of the pandemic period approximately 2020-2023, which revealed that the factors that drove digital transformation were the organization's dynamic capabilities, organization's resources, culture, vision and strategy, government support and the ecosystem of organizations. Therefore, in order to transform from a digitization point of view, organizations needed their employees to be prepared to use new digital equipment, moreover, organizations needed to prepare themselves from an infrastructure point of view, equipping them with state-of-the-art

computers, software and activity-specific devices to implement digital transformation in an organization.

The vision and culture of the organization also led to this process, without a culture open to learning and knowledge, there being reluctance to change, organizations encountered many more obstacles and made much more efforts towards digital transformation. Also the organization's strategy played a key role in this process, defining the objectives and strategic options in a way that automatically involves digitalization, but there is also a desire on the part of the organization to improve the performance of the organization through digital technologies, they knew stage by stage much better what they are the stages and steps to be followed in the digital transformation process. Also, the grants offered by the state to organizations and their support was another element of importance in the period 2020-2023 for the business environment. The implications of the state in the digital transformation process can have a major effect on organizations, especially when they can regulate operations from traditional to digital. Last but not least, the environment in which the organization operates can contribute to the digital transformation process. Suppliers and customers can drive organizations to digitalize, also environmental requirements, product sustainability and waste recycling are phenomena that can also put pressure on organizations' digitalization intention.

The managerial and practical contributions of this study are highlighted by identifying those factors that led to digital transformation in organizations and that can lead to this process in the present and future. Thus, organizations interested in the digital transformation process can consider these factors as determinants in their digitalization strategy and perform an assessment of these factors to determine which elements are missing or which are the strengths of the organization that can help in this process.

Also, the limits of the study may be characteristic primarily of bibliometric and systematic analyses, considering an evaluation of the studies used from a qualitative point of view would have nuanced the results of the study. Also, an accurate breakdown of the determinants would have provided more accurate and measurable guidance to organizations. Consequently, these limits can be considered for future studies aimed at achieving and specially building a model for evaluating the factors that contribute to the digitization process of organizations.

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