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THE SUSTAINABLE PERSPECTIVE OF DIGITIZATION, DIGITALIZATION AND DIGITAL TRANSFORMATION. A BIBLIOMETRIC APPROACH

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Rezumat. *Interesul pentru sustenabilitate și digitizare a crescut semnificativ in ultimii ani, cu precădere asupra legăturii dintre cele două, deoarece prin intermediul digitalizării se pot realiza noi modele de business, respectiv se pot modifica cele deja existente, cu scopul de a rezista în fața schimbărilor din mediul de afaceri, implicit pentru a spori sustenabilitatea. Pentru a analiza mai în detaliu relația dintre sustenabilitate, digitizare, digitalizare și transformare digitală, a fost realizată o analiză bibliometrică. Datele acesteia au fost obținute prin intermediul bazei de date Web of Science Core Collection prin introducerea unor cuvinte-cheie specifice temei alese. Astfel, au fost analizate 166 de publicații scrise în limba engleză din perioada 2004-2023. Cu ajutorul analizei bibliometrice, au putut fi observate și analizate evoluția în timp, legăturile dintre cuvintele-cheie, precum și importante aspecte cu privire la structura social și intelectuală a domeniului de cercetare.*

Abstract. *The interest in sustainability and digitization has grown significantly in recent years, especially on the link between the two concepts, because through digitization new business models can be created, respectively existing ones can be modified, with the aim of resisting the changes in the business environment, implicitly to increase sustainability. To analyze in more detail the relationship between sustainability, digitization, digitization and digital transformation, a bibliometric analysis was carried out. Its data were obtained through the Web of Science Core Collection database by entering keywords specific to the chosen theme. Therefore, 166 publications written in English from the period 2004-2023 were analyzed. With the help of the bibliometric analysis, the evolution over time, the connections between the keywords, as well as relevant features of social and conceptual structure of research field, could be observed and analyzed.*

Keywords: sustainability, digitization, digitalization, digital transformation, bibliometric analysis

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1. Introduction

Sustainability is a vast concept that does not only refer to ecological areas, but includes the protection and conservation of resources from a social and economic perspective, making its presence felt in the business environment at the present time more than ever [1]. The United Nations Organization [2] has focused on the topic of sustainability since the last century, in 1922 urging more than 178 countries to adopt the measures provided for by Agenda 21, which had as its main objective the establishment of a partnership for sustainable development throughout the world, protecting in this way the environment and increasing the life quality of the population. It is no secret that digitization has the ability to transform business models, the action of digital technologies can be noticed throughout organization's processes, and as a result of the ability and transformational power of digitization, sustainability can be achieved more easily [3]. Therefore, this paper aims to answer the following questions regarding the topic of the relationship between sustainability and digitalization:

RQ1. What was the evolution over time of the theoretical concerns regarding the interdependence between sustainability and digitization, digitalization, and digital transformation?

RQ2. What were the main authors, countries, and fields that participated in the development of the theme?

RQ3. What is the conceptual structure of the research carried out up to the present moment on the topic of interdependence between sustainability and digitization, digitalization, and digital transformation?

To answer these research questions, of the purpose of this research is to examine how the subject related to the sustainable perspective of digitization, digitalization and digital transformation has developed over time, who were the main authors and countries whose ideas stood out in its framework, but also which areas this subject managed to penetrate and complete.

2. Theoretical background

2.1. Sustainability

Sustainability is one of the terms that has been spoken most during the past two decades. It appears that nothing cannot be referred to as "sustainable"; everything may either be hyphenated or coupled with it. Sustainable economies, businesses, and sustainable development all exist today [4]. They have similar meanings but have slightly distinct definitions [5]. Maintenance of wellbeing over a lengthy, possibly indefinite period of time may then be characterized as sustainability. This mostly addresses the triple bottom line's environmental component, despite the fact that sustainability and the environment are not the same thing.

One of the fundamental principles of sustainability is environmental sustainability, which requires that efforts to meet our needs do not degrade the quality of the environment and that the ecosystem should be preserved for the benefit of future generations. Environmental sustainability principles can be incorporated into business practices to increase the value of companies and digitization [6]. Economic sustainability is another crucial sustainability principle. This idea concentrates on the fraction of the natural resource base that supplies physical inputs for production, both renewable and exhaustible [7].

To ensure that the quality of life for future generations does not deteriorate, sustainability is generally broadly defined as a situation in which the total amount of natural and man-made resources stays at least constant for the next few decades. When evaluating the potential effects of a proposed program or project, it is ideal for them to have an impact on people's well-being as well as have a positive or at least neutral impact on the state of resources in general for the future. In this instance, we can use the term "sustainable development" [8]. Therefore, in the context of increasing economic, social, and environmental challenges, governments, companies, and educational institutions are required to encourage, develop, and implement sustainable competences, sustainable behaviors, and sustainable practices [9].

2.2. Three phases of digital transformation: digitization, digitalization, and digital transformation.

Digitization. Digitization is the initial phase. Khan et al. [10] and Verhoef et al. [11] defined digitization as the process of converting various informative formats, such as text and image, into digital ones. In essence, digitization is the process of converting analog information into digital information that computers can store, process, and send [12]. With the ultimate goal of learning newly created knowledge and adding value to stakeholders, digitization is the process of digitally allowing analog or tangible documents for the goal of integrating these artifacts into business operations [13].

Since digitization has advanced, anyone can store, access and share any document at anytime from anywhere in the world, compared to the past when accessing a document requires physically going to its location. Multiple people can access the same document at once without any problems. Therefore, access to information resources is facilitated through digitization [10]. Digitization includes more than the use of digital technologies for data transfer, computations, and other functions. The disruptive effects of digital technologies on business and society are covered under digitization [14]. Digitization clearly affects the economy and society on a large scale by reducing unemployment, increasing quality of life, and increasing access to information and other public services. A crucial aspect of the digitization process is the cost effectiveness of information production, administration, and exchange, which supports long-term economic growth [10].

Digitalization. Digitalization is the next phase. Digitalization is the process of making interactions, business functions, and (more) business models digital. This usually results in a hybrid of digital and physical elements, such as in omnichannel customer support or integrated marketing, which combines autonomous and manual procedures [15]. According to Brynjolfsson and McAfee [16], digitalization is the sociotechnical process of using digitalized products or systems to create new organizational practices, business strategies, or commercial items.

Additionally, Bjorkdahl [17] offers more information. This can be seen as a growth in the production, analysis, and use of data to improve internal business efficiency, as well as expand the business by providing customers with added value by switching from analog to digital formats. For instance, digitalization helps manufacturing organizations build products more quickly while decreasing the need for prototyping because creating and visualizing on a computer is simpler and everything is interactive. According to Zangiacomi et al. [18], an essential aspect to consider in a digitalization process is the proper sharing and integration of knowledge and skills within and outside organizations. Firms are challenged to develop the skills and competencies needed to properly manage the transition to the new I4.0 paradigm. Beyond the rather large financial investment, a challenge is the availability of qualified staff at all levels of the hierarchy, able to cope with the increasing level of technology and complexity of operations.

Although "digitalization" and "digitization" are frequently used interchangeably, there are significant conceptual differences between the two terms. In contrast to digitization, which only describes a technology or a system of technology in terms of what it is and what it can do [19], digitalization makes it clear why a technology is helpful to a specific process or organization.

Digital transformation. Digital transformation is the last phase. Vial [20] described it as a process that aims to improve an organization by causing major modifications to its properties. It is clear from the various definitions that digital transformation is a process rather than a simple action taken to improve a certain function of a company. Organizations undergo fundamental transformations as a result of this process, opening up new opportunities for growth. In addition, rather than being a process centered on organizations, digital transformation is an event that affects business and society [20]. First, an experience for the client must be created, and then that experience must be digitalized. This is the main goal of digital transformation [5]. Furthermore, continuous optimization, a company that can recognize market development and act quickly, is the aim of a digital transformation. That kind of change rarely occurs organically and is not an accident [21]. Digitization, digitalization, and digital transformation are the three phases of digital transformation. A company's digital assets, organizational structure, growth goals, and metrics must meet specific requirements at each level. In addition to having digital assets, businesses seeking to

go through a digital transformation also need to build or acquire capabilities for digital networking, big data analytics, and agility [11].

2.2. Digitalization - the key to a sustainable future

The concept of a digital transition describes the change from analog to digital processes that enables digital tools to model processes and activities, enhancing productivity and performance. Furthermore, the potential to create and implement sustainable solutions has increased as a result of the digital revolution. In light of this, the digital transition entails a technology revolution that can improve industrial sustainability through intelligent management systems that can perform a variety of tasks, including increasing energy and resource efficiency and decreasing waste. The increased demand for creative and sustainable ecosystems is a key factor linking the digital shift to sustainability [22].

All of this demonstrates that digitalization is a new game changer and has the ability to greatly advance inclusive growth by fostering a favorable socioeconomic climate. By placing them on a social platform, it has helped, empower, connect, and interact with individuals. With all of this, it has changed the way our economy grows due to its many different components and foundations. Digitalization is a very good step in the direction of building a true virtuality for the realization of inclusive, sustainable growth [23]. The market constantly changes, as do consumer needs, and the digital era simply accelerates all of that; therefore, the concept and implementation of sustainable digital transformation are never complete. Organizations need to develop an industry-specific long-term digital transformation plan that starts from the outside and connects the front, middle and back offices. Digitalization of a smooth digital marketing firm's business model can be achieved by reducing friction during the sustainable digital transformation process while improving connectedness, agility, and transparency [24].

3. Materials and Methods

For studying and analyzing large amounts of scientific data, bibliometric analysis is an appreciated and accurate approach. It allows us to explore the subtleties of a particular field's evolutionary history while illuminating its frontiers [25]. Recent years have seen a huge increase in the use of bibliometric analysis in business research [26]. This growth can be attributed to two factors: (1) the development, accessibility, and availability of bibliometric software (e.g.: VOSviewer); and (2) the cross-disciplinary pollination of the bibliometric methodology from information science to business research. More significantly, the appeal of bibliometric analysis in business research is not a passing trend but rather a reflection of its value in processing massive amounts of scientific data and creating high research impact [25].

To perform the bibliometric analysis, a data set was extracted from the Web of Science Core Collection database [27], searching based on the keywords “sustainability” and ‘digitization’ or “digitalization” or “digital transformation”, setting them as to be found in the title of the

works. Documents such as article, proceeding paper, review article, early access, from the period 2004 - 2023, written in English were taken into account, resulting in a total of 166 publications, aspects presented in Table 1.

Table 1. The Methodological Framework of the research

Scientific Database	Web of Science Core Collection
Keywords	"Sustainability" and "Digitization" or "digitalization" or "digital transformation"
Search field	Title
Document type	Article, Proceeding Paper, Review Article, Early Access
Years	2004 - 2023
Language	English
Number of results	166

Source: authors' conception based on data provided by the Web of Science Core Collection [27]

4. Data Analysis

The analysis of the bibliometric data was carried out from the perspective of the evolution over time of the publications related to sustainability and digitization, digitalization and digital transformation, the authors keywords, the Web of Science categories, the countries that collaborated in order to develop this topic and the methodology and main results of the ten most cited documents.

4.1. Evolution of research over time

The evolution over time of publications related to sustainability and digitization, digitalization, and digital transformation has, as expected, an upward trend (figure 1). However, an interesting situation is noted, represented by the fact that the first research on this topic was published in 2004, in the Program-Electronic Library and Information Systems journal, with Haji Suhaimi Bin Haji Abdul Karim as the author. Karim [28] highlights in his article that in Brunei, the implementation of ICT-type projects facilitates the development of the virtual library system necessary to improve access to the digital world, while also taking into account the issues of economic sustainability.

After exactly ten years, in 2014, Richard Worthington [29] published the next research on this topic, in which he talks about how digitalization contributes to sustainable production systems, how the concept of digitization interacts with a democratic regime and the role of digitization

in the system of allocating available resources sustainably. Following a break of only one year, in 2016, the third research is published, belonging to Simon C. Vlachos [30], which brings to the fore the digitalization of the business environment but also change management, highlighting these concepts in the field of construction in the Swiss state.

After this dispersed over time, but promising beginning, research on the targeted topic is becoming more and more numerous. Currently, there is an increased interest in the links between sustainability and digitalization, but also in other new concepts in this sphere of knowledge. For example, the first work of the current year, belonging to Sahu et al. [31], highlights the relationships between firms, digital transformation, and the capabilities of supply chains based on the principles of Blockchain technology. A justification for such an evolution of publications in recent years can also take into account the effects of the Covid 19 pandemic, concretized in the need for forced and rapid accommodation with digitalization processes [32].

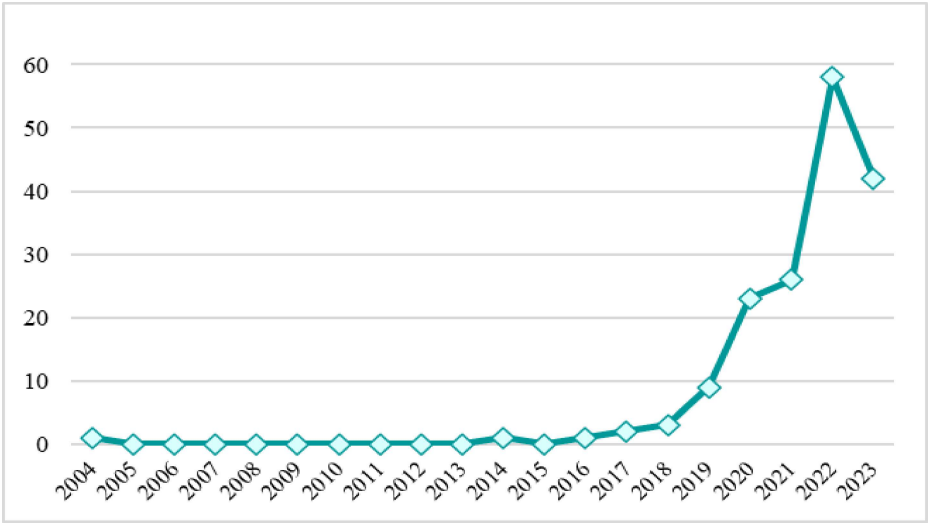


Fig. 1. The evolution of research publications
Source: Data provided by the Web of Science Core Collection [27]

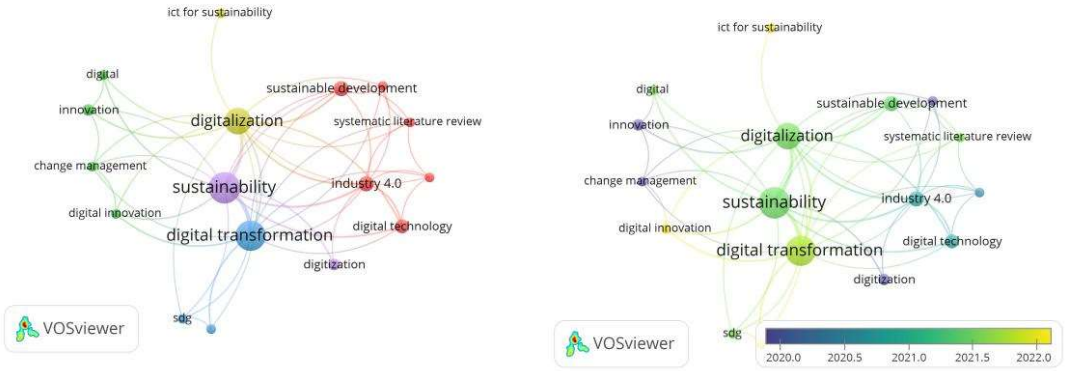
4.2. The evolution of the bibliographic network of research author keywords

Using the VOSviewer program [33], a bibliometric map of the 17 authors keywords was created that respected the condition related to the frequency of use at least twice. The presence of five clusters can be observed in Figure 2.a, as follows: the first cluster, the yellow one, includes 2 nodes, these being represented by the keywords "digitalization" and "ICT for sustainability", thus making the connection between the importance of the sustainable side of information technology and communications within digitalization, ICT having the capacity to make a positive contribution to sustainable development [34].

Cluster number two, the red one, is a more extensive one, which includes 6 strongly connected nodes, respectively, "sustainable development", "big data", "systematic literature review", "industry 4.0", "environmental sustainability" and "digital technology", highlighting the interest of researchers in the creation of systematic review articles regarding the integration of technology in industry, in the presence of a sustainable environment. The third cluster, the purple one, includes 2 nodes, "sustainability" and "digitization", the first of which is the most relevant within the bibliometric map created, thus emphasizing the fact that to obtain benefits within societies, economies and public sectors through digitization [35] a significant sustainable component is needed.

The fourth cluster, the blue one, includes 3 nodes, respectively "digital transformation", "sdg", "sustainable development goals" and shows the fact that the objectives of sustainable development can be promoted and creatively implemented by digital transformation practices, this being seen as a process that uses digital technologies with the aim of improving the ways in which public administrations and companies act and provide services to the population [36],[37]. The last cluster, the green one, includes 4 nodes, implicitly "digital", "innovation", "change management", "digital innovation" and shows the close connection between change management that helps organizations to obtain the much-desired competitive advantage and the innovation as a result of such an organizational culture [38].

The second bibliometric map, which can be observed in Figure 2.b, is similar to the first, built based on the authors' 17 keywords of the authors, but it shows how their use has evolved over time. Therefore, it is noted that the term "innovation" was used at the beginning of the period related to the development of the subject, referring to the sustainable perspective of digitization, being followed by "change management", "big data", "digitization", "industry 4.0" and "digital technology". "Digitalization", on the other hand, was approached a little later, along with "sustainability" and "sustainable development", a suitable argument in this being that digitization is a concept with an accentuated technical background while digitalization refers to the socio-technical conditions necessary for the use of digital technologies, highlighting at the same time the impact on human resources, companies and societies [39].



a. Network visualization *b. Overlay visualization*

Fig.2 Authors keywords map
Source: Authors' conception with the help of VOSviewer [33]

Among the most recently used terms are "digital transformation", "digital innovation", "sustainable development goals" and "ICT for sustainability", representing newer concepts, digital transformation being seen as a process that drives digital technologies, with an impact on organizational elements, structure and strategy, the evolution of these technologies having a positive influence on the environment and people's health [6].

4.3. The geographical perspective of the research according to the number of publications

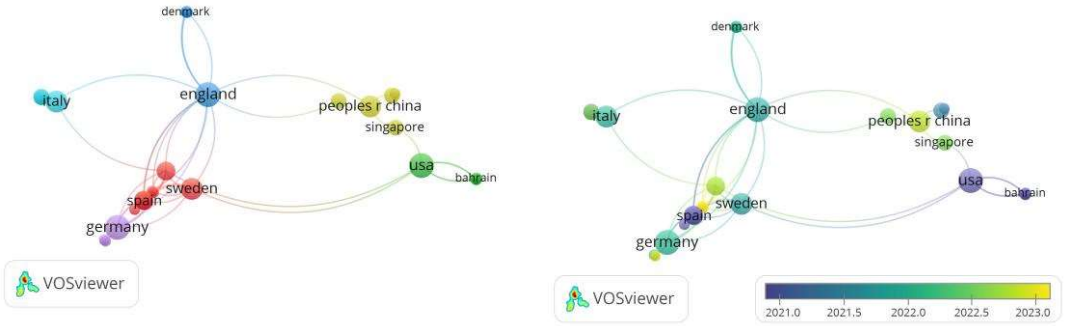
The classification of documents based on the link between sustainability and digitization, digitization and digital transformation by country of origin is presented in an interesting way due to the fact that ten nodes are represented by European countries, led by Italy. The reason underlying this situation is explained by the fact that, over time, the European Union has encouraged the member states to be as anchored as possible in environmental protection actions. The Environment Policy was born in Paris in 1972, now supporting multiannual programs and strategies developed for the application of environmental protection principles. Furthermore, in 2019, the European Commission launched the European Green Deal, which is the foundation of its economic development strategy [40]. China also has a strong position on this topic despite the fact that it is one of the world's biggest polluters [41], being followed by Russia, India, and the United States.

To examine the collaborations between countries and to realize the social structure of the bibliometric analysis, the coauthor analysis [42] was used in the VOSviewer software program, resulting in 28 connected nodes represented by the countries whose authors showed interest in the importance of sustainability and the topic of digitization, presented in Figure 3.a. Therefore, the existence of six clusters can be observed, respectively: (1) the yellow

cluster, which includes five countries, namely China, Singapore, South Korea, Australia and the United Arab Emirates; (2) the green cluster, represented by United States, Saudi Arabia, Jamaica, India and Bahrain; (3) the red cluster including the countries Canada, France, Norway, Sweden, Spain, Switzerland, and Wales; (4) the purple cluster comprising Germany, Austria and Finland; (5) the turquoise cluster with countries such as Italy, Portugal, and Turkey, and (6) the blue cluster with England, Ireland, Northern Ireland, Denmark, and Iraq.

Among the reasons underlying the establishment of this collaborative relationship between the authors and the states can be, mainly, the proximity from the geographical perspective, noting that in most cases the researchers preferred to cooperate with other researchers from nearby states, examples in this sense being: France, Spain and Switzerland; Norway and Sweden; England, Ireland, Northern Ireland and Denmark; China and South Korea; Austria and Germany; Italy and Portugal. It is also noted that the authors preferred to collaborate not only with neighbors, but also with other authors from the same continent. The collaboration patterns may also be justified by cultural specificity, researchers being more open to working together with other people with a similar culture. Examples in this case are: China, Singapore, and South Korea; England, Ireland and Northern Ireland; Norway and Sweden; Italy and Portugal; Austria and Germany.

Furthermore, in the social structure analysis was deepened by observing the evolution over time of the collaborations (Figure 3.b). Thus, it is noted that the beginning of interest in sustainability through digitization takes place between 2019-2020, in the western part of the globe, Canada and the United States of America being among the first countries to stand out with research of this kind, but Switzerland is the one who takes the initiative and launches this research topic. The following countries that take up this trend are Turkey, United Arab Emirates, South Korea, Saudi Arabia, Jamaica, India, England, Spain, and Sweden, a fact that demonstrates the degree of actuality and the importance of the research topic, the involvement in its approach being one very geographically dispersed. Norway, Austria, France, Wales, China, Singapore, Australia, and Portugal are among the last countries that participated in this process to complete the theme with the newly discovered information.



a. *Network visualization* b. *Overlay visualization*

Fig.3 Co-authorship map by country
Source: Authors' conception with the help of VOSviewer [33]

4.4. Classification according to Web of Science Categories

Table 2 presents the top of the Web of Science categories according to the number of publications related to each research area. Thus, we observe the fact that the most documents (68) are associated with the field of Environmental Sciences; in the second place are the 66 publications related to Green Sustainable Science Technology, while the third place is occupied by the field of Environmental Studies with 62 papers. In addition, Business and Management research areas are noteworthy, which are also well rated and Engineering Electrical Electronic is at the bottom of the list with only 6 publications associated.

Table 2. Ranking of publications according to the Web of Science Categories

No.	Web of Science Categories	Number of publications	Share of 166 (%)
1.	Environmental Sciences	68	40.964%
2.	Green Sustainable Science Technology	66	39.759%
3.	Environmental Studies	62	37.349%
4.	Business	23	13.855%
5.	Management	17	10.241%
6.	Engineering Environmental	11	6.627%
7.	Economics	10	6.024%
8.	Computer Science Information Systems	7	4.217%
9.	Computer Science Interdisciplinary Applications	6	3.614%
10.	Engineering Electrical Electronic	6	3.614%

Source: Data provided by WOS Core Collection [27]

The ranking is justified because it was built taking into account the articles that are part of the general topic of interdependence between sustainability and digitization, digitalization, and

digital transformation, the emphasis being on the importance of the sustainable component that refers to the conditions that participate in reducing the impact that people's activities have on the environment in order to protect natural resources [43]. We can also see that the environment is a key element of the theme that considers the ways in which digital technologies can be used for its defense [44]. Furthermore, numerous papers framed in the fields of business and management support the managerial implications of the connection between sustainability and digitization.

4.5. Most cited documents and their main results

Table 3 shows the five most cited documents and their main results. The first aspect to note is the year of publication.

Table 3. List of the ten most cited documents

No.	References	Authors	Journal	Publication year	NC	Main results
1	[1]	Ghobakhloo, M.	Journal of Cleaner Production	2020	469	The opportunities offered by the digital revolution for sustainability are both increasing production efficiency and business model innovation, as well as reducing harmful emissions and improving social well-being.
2	[45]	Kayikci, Y.	15th Global Conference on Sustainable Manufacturing	2018	124	Agricultural business has evolved through process automation, control and operational management, which has supported sustainability and development within supply chains.
3	[46]	Castro, G.D., Fernandez, M.C.G., Colsa, A.U.	Journal of Cleaner Production	2021	112	Research on the SDGs is characterized by certain shortcomings that have in view the erroneous understanding of their complexity, deficiencies in the design processes, impediments in implementation, and inadequate evaluation.
4	[3]	Isensee, C., Teuteberg, F., Griese, K.M., Topi, C.	Journal of Cleaner Production	2020	109	Between organizational culture, sustainability, and digitalization there is an interdependence relationship that needs to be understood by SMEs that could use this tool in favor of their interests.
5	[6]	Feroz, A.K., Zo, H.J., Chiravuri, A.	Sustainability	2021	106	The article identifies with the help of a systematic review of the literature the disruptions caused by digital transformation in terms of sustainability.
6	[47]	Denicolai, S., Zucchella, A., Magnani, G.	Technological Forecasting and Social Change	2021	94	The preparation of Artificial Intelligence has a positive impact on the level of international performance of SMEs, digitalization and sustainability becoming competing growth paths at the time of internationalization of the company.

7	[48]	Ordieres-Mere, J., Remon, T.P., Rubio, J.	Sustainability	2020	65	The increase in the digitalization of airports and the adoption of Industry 4.0 participate significantly in increasing the level of sustainability of air transport, being necessary that in the case of adopting improvements in this sense, they are adopted by the company as explicit knowledge.
8	[49]	Miceli, A., Hagen, B., Riccardi, M.P., Sotti, F., Settembre-Blundo, D.	Sustainability	2021	60	Agile strategic processes driven by digitization create strategic resilience that can lead to the sustainability of the organization's environment.
9	[50]	Kunkel, S., Matthess, M.	Environmental Science & Policy	2020	57	Policies regarding both the direct and indirect environmental impact of ICT in industry express vague expectations that focus on the positive indirect effects of ICT rather than its direct negative impact.
10	[51]	Chen, X.X., Despeisse, M., Johansson, B.	Sustainability	2020	51	Through increasing resource efficiency and the use of Industry 4.0 during the product life cycle, digitalization has a positive influence on environmental sustainability, the negative sides of digitization referring to increased resource and energy use, waste and emissions, and the disposal of hardware.

NC - number of citations

Source: Data provided by the WOS Core Collection [27]

We note that only one article was published in 2018 [45], while the others were published in the years 2020-2021, a period in which interest in this topic has been growing. One argument for this is the Covid-19 pandemic, which is accelerating the digitalization process, and another argument is given by global warming and its strong impact. Therefore, the researchers wanted to see what the link is between digitization, digitalization, digital transformation, and sustainability, in particular, environmental sustainability [45, 49, 50]. The most cited articles show what the benefits of the digital revolution are on sustainability and what the consequences are at both micro and macro levels [1, 51]. Moreover, because environmental sustainability is one of the most important issues at the moment, all papers addressed this topic in relation to digitization. Moreover, all papers are interested in building new business models or adapting existing ones to the changes occurring in the business environment [1, 3, 45, 48]. The positive effects of digitalization in relation to environmental sustainability are highlighted, as there is still a certain reluctance among organizations to opt for full digitization or as much of it as possible [3, 50]. Their attitude to change is an essential aspect in dealing with an environment that is changing extremely fast, but equally important is how the environment reacts, as there needs to be a balance [45, 46]. The relationship between digitalization and sustainability is directly proportional because

the more technology has advanced and the more companies have embraced digitalization, the greater the interest in sustainability [1, 3, 47-49]. Only in this way can the direct and indirect short, medium, and long-term effects of digitalization be seen.

Conclusions

Two of the most commonly used terms nowadays are sustainability and digitization. From a social and economic perspective, sustainability refers to resource protection and conservation and is more prevalent than ever in the business area today. Digitization is the process of transforming analog data into digital data that computers can preserve, analyze, and transmit. Digitization may change business models because digital technologies have an impact on all organizational activities, and sustainability can be achieved more easily. This study aims to investigate how the relationship between sustainability and digitization has changed over time, as well as which countries and main authors contributed to its framework and which regions this topic was able to reach and cover. A database taken from the Web of Science Core Collection was used to perform a bibliometric analysis for this research. When several keywords related to the subject of the investigation were entered, 166 publications in English from 2004 to 2023 were identified.

The main results of this study demonstrate that although interest in examining the relationship between sustainability and digitization has existed since the dawn of the 21st century, it has only recently grown significantly. According to the Web of Science categories, the most significant papers appear to be those that deal with environmental sciences and sustainable green science. Additionally, it appears that most of the articles originate in Europe, with Germany, China, and Italy at the top of the list. In addition, the publications that have received the greatest citations come from the Covid-19 epidemic, a time when interest in digitalization also increased and people were more aware of what was going on around them. Because of this, the topics covered in these papers include the advantages and disadvantages of the relationship between sustainability and digitization and potential new business models.

Through this bibliometric analysis, it is possible to observe the increased interest in this topic in Europe, Asia, and the USA, as well as its evolution over time. The authors' concerns have evolved over time; at the moment, the most crucial topics are the effects of digitization on sustainability and ways for businesses to adapt to changes in the business environment. The small sample size of documents examined (166) and the use of a single database (Web of Science) are the limitations of this research. To determine whether there are patterns and whether they corroborate the findings of this work, the sample size of publications should be increased, and other databases should be examined. In addition, it is important to examine the reasons and consequences of

the relationship between sustainability and digitization for the environment and organizations.

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