Digital Transformation and Productivity: A Bibliometric Analysis

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Introduction

World history is shaped by transformations triggered by technological developments. The process we are going through is called Industry 4.0 or the fourth industrial revolution. Germany's new industrial breakthrough emerged at the Hannover fair in 2011 and gained popularity with the concept of "industry 4.0" (Krykavskyy et al., 2019). The concept of Industry 4.0 is named differently in various countries. For example, the concept is called "advanced manufacturing partnership" in the USA, "the future of manufacturing" in the UK, "the future of factories" in the European Commission, "innovation in production 3.0" in South Korea, and "made in China 2025" in China (Liao et al., 2017). This process necessitates a digital transformation in almost every aspect of life (Frederick, 2016). Digital transformation (DT) aims to restructure the organization's processes by applying digital technology to achieve benefits such as greater productivity, cost savings, and innovation. This transformation, which includes the human mind at the top and includes many technologies such as the internet of things, cloud computing, blockchain, big data, and artificial intelligence, brings radical changes in business processes and social life. In addition to being more prominent in the production sector, digital transformation also affects other economic areas such as health and education. Thanks to digital transformation, a doctor can quickly review the x-rays and inform his patient in another country. In addition, students can choose courses from various universities with distance education, receive education on their own interests, and access information quickly. Day by day, individuals and companies adopt the technology by asking 'how can I be more productive?', and aim to increase productivity thanks to advanced technologies. Due to the diversity of digital technologies and their applications, digital transformation is present in almost every field such as healthcare, education, manufacturing, retail, automotive, mining, and telecommunications (Lerch et al., 2015; Rachinger et al., 2019). Therefore, there has been a significant increase in the number of academic research on digital transformation. In the past, many literature review studies have been conducted in the field of DT (Chawla & Goyal, 2021; Cortes-Sanchez, 2019). However, it is noteworthy that there are not enough studies on digital transformation and productivity. This study aims to fill this gap by summarizing productivity-related documents in the digital transformation literature using the bibliometric analysis technique. Bibliometric analysis is the numerical analysis of publications produced by individuals or institutions in a certain area, period, and region, and the relations between these publications (Martinez-Lopez et al., 2018; Saha et al., 2020). Revealing the general situation of the current field requires identifying the popular keywords, prominent authors, studies, publishers, organizations, and countries in the field of digital transformation and productivity.

Therefore, answers to the following questions are sought.

RQ1. What is the contribution of digital transformation and productivity studies to the field?

RQ2. What are the popular keywords standing out in the field, and which keywords have come to the fore recently?

RQ3. What are the prominent authors, studies, and publications?

RQ4. What are the prominent organizations?

RQ5. What are the prominent countries and what is the status of co-authorship between countries?

Method

The bibliometric analysis summarizes published information through quantitative statistics, including the rank of most productive researchers, the geographic distribution of authors, the rank of most productive institutions, the number of publications and citation growth, etc. In addition, it is a research method that includes techniques based on the measurement of processes and features related to documents (Thelwall, 2008). The data of this study was taken from the Scopus database. The Scopus database includes more than 5000 publishers worldwide, including Elsevier, Emerald, IEEE, Sage, Springer, Taylor & Francis, and Wiley Blackwell (Gurcan et al., 2021). A scan sequence was used to obtain the data. The terms (("digital transformation" OR "digitalization" OR "digitalisation" OR "digital enabler") AND ("productivity" OR "productiveness")) were searched in Scopus database within the research titles, abstracts, and keywords. For the analysis, the studies between the years 2011-2021 were searched without index and year limit. Only published studies were considered in the filtering process. Filtering processes resulted in 697 studies.

The data set including the publication year, title, author name, publisher number of citations, and keywords of the study was analyzed through VOSviewer. This software was used for the analysis and creation of maps using VOS clustering and mapping methods. Cobo et al., (2015) found that VOSviewer and Cite Space software are frequently used in the comparison of various visualization tools for scientific mapping. VOSviewer is a relatively easy-to-use tool that provides the basic functions needed to visualize the bibliometric network (Van Eck & Waltman, 2010).

Keyword association and citation analyzes were performed using the meta-data set. A threshold value was used to create more meaningful maps. Co-occurrence analysis of keywords reveals the evolution of the research field over time (Zhao, 2017). Citation analysis provides important data to identify interdisciplinary similarities and differences between prominent publications, journals, and authors (Wohlin, 2008). Performing citation-based analyzes in a field helps to recognize important developments in a discipline or a scientific field. These analyzes provide the historical perspective of scientific progress and help define the main actors of a scientific field (Heradio et al., 2016). The findings of the analysis are presented as maps, figures, and tables.

Findings

General Descriptive Statistics

Figure 1 presents the distribution of digital transformation and productivity studies by citation/year and publication year. The blue columns show the number of publications and the orange line the citations. When Figure 1 is examined shows that the studies are increasing and they are cited more than in the previous year. In addition, digital transformation and productivity studies are mostly published in the fields of "Engineering", "Computer Sciences", and "Business, Management, and Accounting", respectively.
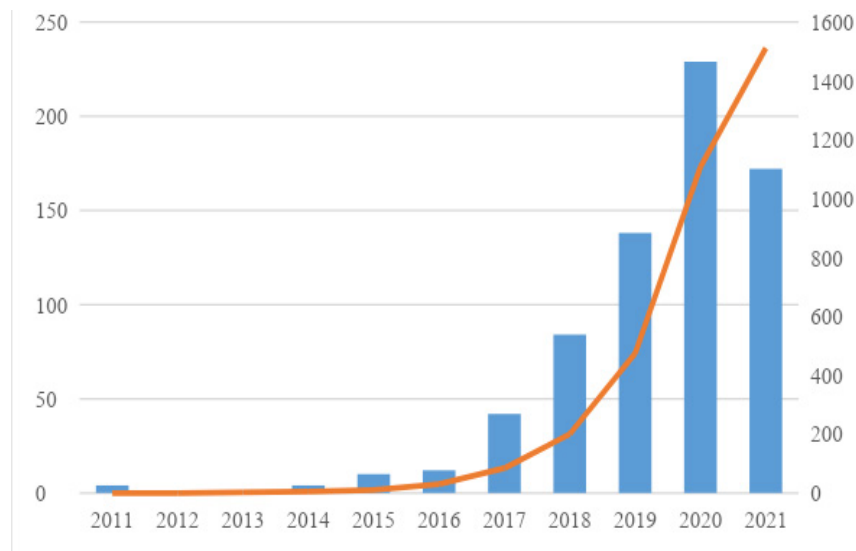

Figure 1. Number of Publications and Citations

Bibliometric Analysis

Keyword Analysis

A total of 2001 keywords were used in the data set that consists of 697 publications. The keywords used in the query are excluded. Co-occurrence analysis was performed with keywords that were repeated at least 5 times. A total of 58 keywords that meet this criterion formed seven different clusters as seen in Figure 2.
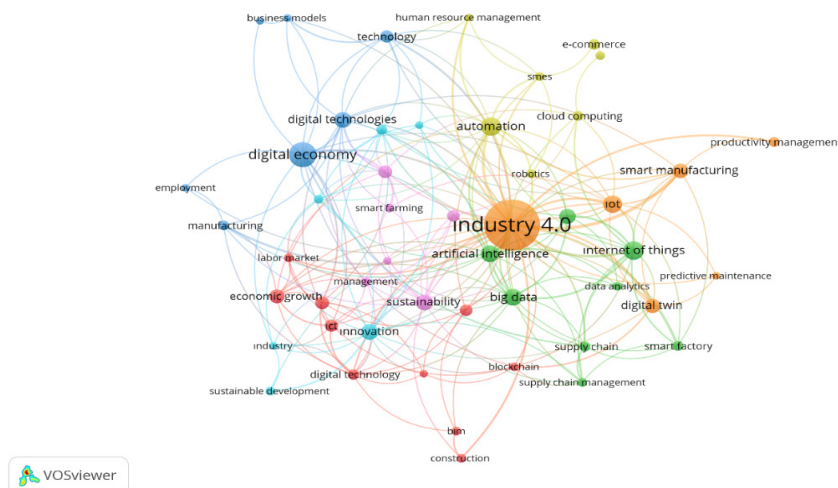

Figure 2. Keyword co-occurrence map

As seen in the co-occurrence network visualization map in Figure 3, these keyword clusters provide an idea of common topic links in research. The red cluster is the largest. The most repeated keywords are blockchain, economic growth, digital technology, labor productivity, labor market, competitiveness, structure, human capital, information and communication technology (ICT), and building information modeling (BIM).

The most repeated keywords in the second green cluster are artificial intelligence, machine learning, and the internet of things, big data, smart factory, data analytics, supply chain, and supply chain management. The most frequently repeated keywords in the third (blue) cluster are business models, business, manufacturing, e-government, technology, digital technologies, and digital economy.

The most used words in the fourth (yellow) cluster are automation, robotics, cloud computing, covid-19, e-commerce, human resources management, and SMEs. The most repeated keywords in the purple cluster are management, knowledge management, sustainability, augmented reality, agriculture, and smart agriculture. Industry, innovation, transformation, performance, sustainable development, and information technologies are the most repeated keywords in the sixth cluster (turquoise). Finally, the seventh cluster (in orange) highlights the keywords industry 4.0, predictive maintenance, productivity management, and smart manufacturing. It is clear in Figure 3 that the clusters converge and the circles are close together, indicating that researchers in related clusters are more likely to cite similar situations. Trending research topics by year can be identified from an overlay visualization map of keywords (Figure 3).
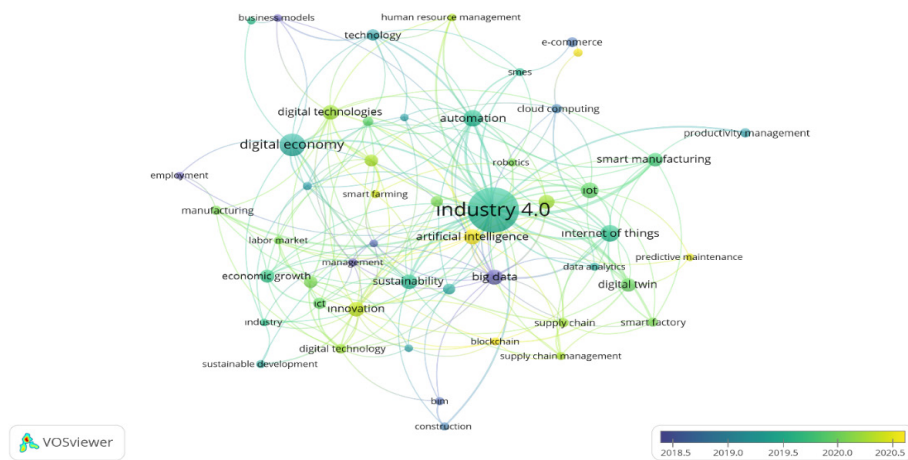
Figure 3. Overlay visualization map of keywords by year

According to Figure 4, the trends in digital transformation and productivity studies are shifting towards topics such as artificial intelligence, blockchain, covid-19, and predictive maintenance. These findings show that these issues have attracted researchers in recent years.

Citation Analysis

Citation analysis involved 1990 authors who contributed significantly to the field. Table 1 summarizes the authors who contributed to this field with at least three documents.

Table 1. Prominent authors

Rank	Author	Documents	Citations
1	Jeske, Tim	8	21
2	Weber, Marc-André	8	19
3	Lennings, Frank	7	21
4	Stowasser, Sascha	6	19
5	Bauer, Wilhelm	3	99
6	Carlsson, Christer	3	18
7	Sharma, Sumita	3	39
8	Skoogh, Anders	3	48
9	Subramaniyan, Mukund	3	48
10	Würfels, Marlene	3	13

According to Table 3, Tim Jeske and Marc-André Weber stand out as the authors with the most publications. Other prominent authors are Frank Lennings, Sascha Stowasser and Wilhelm Bauer. In addition, citation analysis was performed on the documents obtained to discover the most influential publications in the digital transformation and productivity field. Table 2 shows the 11 most contributing studies. These studies have been cited 50 or more times.

Table 2. Prominent publications

Authors/ Year	Research Title	Publisher	Citations
Dimitrov, 2016	Medical internet of things and big data in healthcare	Healthcare Informatics Research	350
Nagy et al., 2018	The role and impact of industry 4.0 and the internet of things on the business strategy of the value chain-the case of Hungary	Sustainability (Switzerland)	149
White, 2012	Digital workplaces: Vision and reality	Business Information Review	97
Bauer et al., 2015	Transforming to a Hyper-connected Society and Economy – Towards an "Industry 4.0"	Procedia Manufacturing	95
Kah et al., 2013	Advanced gas metal arc welding processes	International Journal of Advanced Manufacturing Technology	89
Li et al., 2019	Blockchain in the built environment and construction industry: A systematic review, conceptual models and practical use cases	Automation in Construction	81
Mechtcherine et al., 2019	Large-scale digital concrete construction – CONPrint3D concept for on-site, monolithic 3D-printing	Automation in Construction	68
Evangelista et al., 2014	The economic impact of digital technologies in Europe	Economics of Innovation and New Technology	63
Abad-Segura et al., 2020	Sustainable management of digital transformation in higher education: Global research trends	Sustainability (Switzerland)	55
Heilig et al., 2017	Digital transformation in maritime ports: analysis and a game theoretic framework	NETNOMICS: Economic Research and Electronic Networking	53
Kim, 2020	The Impact of COVID-19 on Consumers: Preparing for Digital Sales	IEEE Engineering Management Review	51

As seen in Table 2, the research conducted by Dimitrov (2016) draws attention as the most popular article with the highest number of citations (350). His article focuses on the internet of medical objects and big data in the healthcare field. It also highlights the importance of the application of wearable devices and mobile technologies in the field of health. In another study by Heilig et al. (2017), the authors presented an overview of the development and current state of digital transformation in modern seaports to identify current potentials and barriers. Greenwood & Kassem (2019) revealed the adoption of blockchain technology in the construction industry, which is one of the components of digital transformation, and the current state of the construction industry. Abad-Segura et al. (2020) investigated research trends in terms of sustainable management of digital transformation in higher education. The research conducted by White (2012) investigated how the digital workplace perceptions of employees in businesses changed over time and the reasons that made it a critical strategic direction for businesses. They also claimed that necessary elements of the digital workplace could be realized by combining applications based on mobile, big data, cloud computing, and searching. Evangelista et al. (2014) examined the economic impacts of digital technology in Europe by distinguishing between different aspects of the digitalization process. Another important study conducted by Nagy et al. (2018) examined how businesses in Hungary interpret the Industry 4.0 paradigm, in which processes they use the Internet of Things (IoT) tools, and what critical problems they encounter in the adoption of Industry 4.0. They used the value chain model proposed by Porter (1985) to examine the impact of Industry 4.0 on businesses. Kim (2020) has extensively analyzed the impact of digital transformation on productivity and corporate culture during the Covid-19 process. Citation analysis was conducted to determine the publishers of publications that contributed to this area. Many publications have contributed to the field of digital transformation and productivity, demonstrating how popular the topic is in the literature. 19 of 434 publishers published at least 5 studies in this field. The 10 most cited publishers on digital transformation and productivity are reported in Table 3.

Table 3. Prominent publishers

Rank	Publisher	Documents	Citations
1	Sustainability (Switzerland)	20	389
2	Procedia Manufacturing	13	169
3	Advances in Intelligent Systems and Computing	22	59
4	Procedia CIRP	6	46
5	Procedia Computer Science	6	35
6	International Journal of Environmental Research and Public Health	6	35
7	Lecture Notes in Business Information Processing	5	24
8	IOP Conference Series: Earth and Environmental Science	14	20
9	Lecture Notes in Computer Science	5	17
10	E3S Web of Conferences	13	14

In addition, citation analysis was conducted to identify the institutions that contributed the most. Digital transformation and productivity studies are carried out in 1169 institutions around the world. The Plekhanov Russian University of Economics and the State University of Management are top-performing institutions in this field of study (Table 4).

Table 4. Prominent organizations

Rank	Organisation	Country	Documents	Citations
1	Plekhanov Russian University of Economics	Russian	5	8
2	State University of Management	Russian	5	5
3	University of Almeria	Spain	4	140
4	Chalmers University of Technology	Sweden	4	68
5	Financial University	Russian	4	2
6	Kiel University of Applied Sciences	Germany	3	5
7	Samara State University of Economics	Russian	3	3
8	Institute for Advanced Management Systems Research (IAMSR)	Finland	2	18
9	Crowdsourcing Week	USA	2	13
10	Nizhny Novgorod State Engineering and Economic University	Russian	2	6

100 countries contribute to digital transformation and productivity studies. Table 5 shows the 12 most influential countries with at least 15 studies. Russia stands out as the country that publishes the most documents on the field. Russia is followed by Germany, the USA, India, and England, respectively.

Table 5. Prominent countries

Rank	Country	Documents	Citations
1	Russian Federation	124	204
2	Germany	96	598
3	United States	44	319
4	India	39	107
5	United Kingdom	33	311
6	Finland	27	183
7	Italy	27	237
8	China	26	127
9	Spain	23	164
10	Malaysia	17	85
11	Sweden	16	113
12	Türkiye	15	39

Figure 5 shows the co-authorship network of countries with at least five studies (36 countries) according to the co-authorship analysis by country. Collaboration clusters are represented by colors. It means that countries represented by the same color cooperate more than countries in other clusters. The size of each circle indicates the number of publications in countries. For example, Russia has the widest circle as it contributes more in terms of publications. The co-authoring link is indicated by lines. A thick line between any two countries shows that there is a lot of co-authorship.
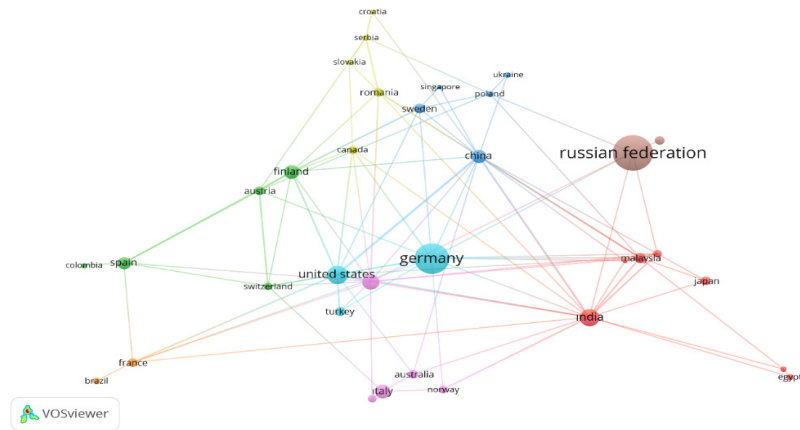
Figure 4. Country co-authorship in digital transformation and productivity

In Figure 4, India and Malaysia stand out in the red cluster with the most cooperation among countries. In the green cluster, China is ahead of Finland and Sweden in terms of cooperation. Canada and Romania are at the forefront of the cooperation formed in the blue cluster. In addition, the United Kingdom and Italy in the yellow cluster, Spain in the purple cluster, Germany, the USA, and Türkiye in the turquoise cluster, Brazil and France in the orange cluster, and Russia and South Africa in the brown cluster form cooperation clusters. Only 2 of these 36 countries (Kazakhstan and South Korea) have no cooperation with other countries.

Discussion and Conclusion

This study aimed to reveal influential authors, studies, publishers, organizations, and trending topics by using a metadata set of published research in the field of digital transformation and productivity. 697 studies obtained from the Scopus database were analyzed. Since the Industry 4.0 paradigm emerged in Germany in 2011, this study focused on digital transformation and productivity studies published between 2011-2021. The distribution of studies by year shows that there is a continuous increase in the number of publications. There has been a big leap in the field since 2017 and this increase is continuing as of October 2021. In addition, the slope line shows that the publications are gradually increasing. According to the co-occurrence analysis of the keywords, prominent keywords were "industry 4.0", "artificial intelligence", "big data", "internet of things", "digital economy", "smart manufacturing", "innovation", "economic growth", "digital twin" , "digital technologies", and "sustainability". This is an important finding in terms of determining the research topics that form the basis of the field of DT and productivity and the trend research topics in the field. The most used keyword in the field of DT and productivity is "industry 4.0". It is not surprising that this keyword ranks first. The fourth industrial revolution was initially considered a digital revolution in manufacturing. However, today it is defined as the digital transformation of the entire industrial value chain (Culot et al., 2020). Digital transformation within the scope of Industry 4.0 refers to the application of certain digital technologies (Indri et al., 2018). It is noteworthy that the concepts of "internet of things", "big data", "digital twin", and "smart manufacturing" come to the fore in the findings because the driving force of the fourth industrial revolution is digitalization, and the technologies that will make this possible have existed for a long time and have application examples. They are also technologies where new developments are experienced and advanced targets exist.

The internet of things, which is at the forefront of the basic technologies of digital transformation, is based on the principle that the object with sensors that measure or detect certain situations constantly transmits information and takes an action by evaluating this information. Big data aims to evaluate data obtained from different sources such as corporate and customer-based management systems and to standardize real-time decision-making processes. Data, in particular, is considered as the oil of our age and it is a known fact that it is very valuable. If you have data, it gives you the chance to write, test, and verify algorithms. You can generate information using data and then convert it into value. You can make periodic behavioral analyzes of the data and make predictions for the future, so you can come up with a new product idea or create a new market possibility or customer profile. The ultimate goal in the world that digital transformation will create is for every object to have a "digital twin" that is exactly like its structure in the real world. Thus, many scenarios can be simulated in the virtual world. In fact, while a product you put on the market is used by your customer, it can also be experienced in the virtual world with the help of real data coming from the field. Industry 4.0 systems make processes more sustainably efficient. It eliminates repetitive work with automation, embraces human nature, and satisfies employees with more innovative and productive work. Good production planning, standardized work, and expanded productivity reduce the number of people required to complete a task. Managing has been made much less demanding. It eliminates the unnecessary workload of people, creating free time to improve their skills and implement new systems. Digitizing traditional manual-based processes and eliminating waste from production and warehouse operations improves productivity. Increased productivity saves money. This money can be invested in product development to create innovative products of higher quality. Much of the waste comes from overproduction, over processing, defects, and waiting. Elimination of waste with production execution systems, quality management systems, and warehouse management systems ensures increased productivity. Recently, prominent keywords have been "artificial intelligence", "blockchain", and "Covid-19". Artificial intelligence and Blockchain stand out as the main technologies of digital transformation. Artificial intelligence enables the fulfillment of tasks performed by humans. In other words, artificial intelligence makes the computer think like humans. The working principle of artificial intelligence is to combine large amounts of data with fast, repetitive processes and smart algorithms, allowing the software to learn automatically from the patterns or features of the data. Blockchain technology, on the other hand, is a technology by which security is maximized by keeping the data in defined users connected to the network instead of a central location as in traditional databases and making it mathematically impossible to change these records. It is not surprising that the term COVID-19 has recently become a popular topic in studies on digital transformation. Soon after the spread of work-at-home with the COVID-19 outbreak, managers realized that they could rely on technology to minimize the impact of the outbreak on their organizations and operations because it has become a necessity, not a choice, to move a significant part of the work to the online environment for the current processes to continue without any interruption and for all stakeholders to work together without communication problems. Therefore, many companies that stopped or suspended their physical operations during the outbreak had to start their late digital transformation.

This study determined that Tim Jeske and Marc-André Weber are the authors with the most publications in the field of DT and productivity and their contributions to the field continue. The most cited authors are Wilhelm Bauer (99), Anders Skoogh (48) and Mukund Subramaniyan (48).

Tim Jeske is a contributing author at the IFAA Institute for Applied Industrial Engineering and Ergonomics. He is recognized for his research contributions in the fields of Industry 4.0, digitization, and production/process optimization. In addition, he continues to contribute to the literature with his research titled "Development of Digitalization in Production Industry - Impact on Productivity, Management and Human Work" published in 2021. In addition, Marc-André Weber, Professor in the Department of Management Studies at the University of Applied Sciences of Kiel, stands out with his eight studies. He published studies in the fields of factory planning, production systems, lean management, quality management, and industry 4.0. He continues to contribute to the field with his research titled "Human-Robot-Collaboration in the Context of Productivity Development and the Challenges of Its Implementation: A Case Study" published in 2020.

The most influential studies were identified by citation analysis. Studies have generally focused on the application of industry 4.0 components in healthcare sectors, as well as the advantages of DT to institutions. Dimitrov (2016) examined the use of the internet of things (IoT) and big data in the field of health in the most cited article titled "Medical internet of things and big data in healthcare" published in the Healthcare Informatics Research Journal. The article titled "Blockchain in the built environment and construction industry: A systematic review, conceptual models and practical use cases" published by Li et al. (2019) in Automation in Construction journal is one of the top 10 publications and has attracted attention recently. The author identifies recent challenges facing the construction industry and introduces current attempts to explore blockchain as part of the solution to some of these challenges. The fact that a study on Blockchain is in the top 10 points to the emergence of new technologies in the field and therefore the importance of studies on emerging new concepts. Businesses have become tend to digital transformation with the emergence of the covid-19 case affecting daily life. Kim (2020) examined the impact of digital transformation in businesses on productivity and corporate culture. It is important for new researchers in the field to use the articles in Table 2, especially in their theses or other studies, to establish the theoretical framework for DT.

According to the citation analysis conducted to determine the most influential publications, Sustainability was the journal that stood out in terms of citation count. In addition, Advances in Intelligent Systems and Computing is the journal that publishes the most research. The number of studies published by a particular publisher and the citations it receives show the influence of the most productive publisher (Dzikowski, 2018). Overall, these findings indicate that most of the current research in the field of DT has been published in specialized journals. Therefore, it can be said that they will continue to be important journals for the dissemination of DT and productivity research in the next few years. Specialist journals play an important role in the development of the research field, as they provide a way for the dissemination of professional knowledge, encourage the exchange of ideas among researchers, and contribute to the formation of a community of scientific experts in this field (Vanderstraeten et al., 2016). Citation analysis was conducted to identify the institutions that contributed the most to DT and productivity research. The number of documents published by the institution and the citations received by the institution shows the most efficient institution effect (Dzikowski, 2018). Out of 1169 institutions, only 7 have more than three published documents leading DT and productivity research field. According to the number of citations, the University of Almeria ranks first with 140 citations. Similarly, in the ranking of institutions that have published the highest number of articles, the Plekhanov Russian University of Economics and the State University of Management are in the top 2 publishers with eight articles published.

The countries that contributed the most to DT and productivity research were determined by citation analysis and thus co-authorship between countries was determined. Only 12 out of 100 countries published more than 15 articles. According to the total citations received, Germany stands out as the most productive and contributing country. Considering the total number of publications, Russia comes to the fore. Germany, America, England, Italy, and Russia are the leading countries in studies on DT and productivity. Industry 4.0 is the name of Germany's state strategy for digital transformation. Therefore, the German government contributes more to the field due to the funds they provide to researchers. Analysis of co-authorship by country revealed that research in DT and productivity reflects cross-country collaboration. It has been concluded that the most influential countries in this respect are Russia, Germany, and the USA. There is also a strong co-authorship relationship between China and the USA. Türkiye is in the turquoise cluster. On the other hand, Türkiye has a co-authorship relationship with Germany and the USA.

This study used only the Scopus database to obtain data. This is the main limitation of the study. In addition, another limitation of the study is the use of only the above-mentioned keywords in obtaining scientific publications on digital transformation and productivity. Researchers can reach different results by using different databases by changing the research criteria.

References

Chawla, R. N., & Goyal, P. (2021). Emerging trends in digital transformation: a bibliometric analysis. Benchmarking: *An International Journal*.

Cobo, M. J., Martínez, M. Á., Gutiérrez-Salcedo, M., Fujita, H., & Herrera-Viedma, E. (2015). 25 years at knowledge-based systems: a bibliometric analysis. Knowledge-based systems, 80, 3-13.

Cortes-Sanchez, J.D. (2019), "Digital transformation in Latin America–a bibliometric landscape of a nascent field", Center for Open Science, Vol. 65, pp. 1-19.

Culot, G., Nassimbeni, G., Orzes, G., & Sartor, M. (2020). Behind the definition of Industry 4.0: Analysis and open questions. *International Journal of Production Economics,* 226, 107617.

Dzikowski, P. (2018), "A bibliometric analysis of born global firms", *Journal of Business Research*, Vol. 85, pp. 281-294.

Frederick, D. E. (2016). Libraries, data and the fourth industrial revolution (data deluge column). Library Hi Tech News, 5, 9-12.

Gurcan, F., Cagiltay, N. E., & Cagiltay, K. (2021). Mapping human–computer interaction research themes and trends from its existence to today: A topic modeling-based review of past 60 years. *International Journal of Human–Computer Interaction,* 37(3), 267–280.

Heradio, R., De La Torre, L., Galan, D., Cabrerizo, F. J., Herrera-Viedma, E., & Dormido, S. (2016). Virtual and remote labs in education: A bibliometric analysis. Computers & Education, 98, 14-38.

Indri, M., Grau, A. & Ruderman, M. (2018). Guest editorial special section on recent trends and developments in industry 4.0 motivated robotic solutions. IEEE Transactions on Industrial Informatics, 14(4), 1677-1680.

Keshaval, G., & Gowda, M. (2008). ACM transaction on information systems (1989-2006): A bibliometric study. Information Studies, 14(4), 223-234.

Krykavskyy, Y., Pokhylchenko, O. ve Hayvanovych, N. (2019). Supply chain development drivers in industry 4.0 in Ukrainian enterprises. Oeconomia Copernicana, 10(2), 273–290.

Lerch, C. and Gotsch, M. (2015), "Digitalized product-service systems in manufacturing firms: a case study analysis", Research-technology Management, Vol. 58 No. 5, pp. 45-52.

Liao, Y., Deschamps, F., Loures, E. de F. R. ve Ramos, L. F. P. (2017). Past, present and future of Industry 4.0 – a systematic literature review and research agenda proposal. *International Journal of Production Research*, 55(12), 3609–3629.

Martinez-Lopez, F.J., Merigo, J.M., Valenzuela-Fernandez, L. and Nicolas, C. (2018), "Fifty years of the European Journal of Marketing: a bibliometric analysis", *European Journal of Marketing*, Vol. 52 Nos 1/2, pp. 439-468.

Rachinger, M., Rauter, R., Muller, C., Vorraber, W. and Schirgi, E. (2019), € "Digitalization and its influence on business model innovation", *Journal of Manufacturing Technology Management*, Vol. 30 No. 8, pp. 1143-1160.

Saha, V., Mani, V. and Goyal, P. (2020), "Emerging trends in the literature of value co-creation: a bibliometric analysis", Benchmarking: *An International Journal*, Vol. 27 No. 3, pp. 981-1002.

Thelwall, M. (2008). Bibliometrics to webometrics. Jour. of information science, 34(4), 605-621.

Van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. Scientometrics, 84(2), 523-538.

Vanderstraeten, L., Haegeman, J., Corboz, P., & Verstraete, F. (2016). Gradient methods for variational optimization of projected entangled-pair states. Physical Review B, 94(15), 155123.

Wohlin, C. (2008). An analysis of the most cited articles in software engineering journals–2001. Information and Software Technology, 50(1-2), 3-9.

Zhao, X. (2017). A scientometric review of global BIM research: Analysis and visualization. Automation in Construction, 80, 37-47.

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