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AND SUPPLY CHAIN MANAGEMENT**

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## RELATIONSHIP BETWEEN THE CONCEPTS OF "DIGITAL TRANSFORMATION" AND "INDUSTRY 5.0": BIBLIOMETRIC ANALYSIS

**Harmash Oleh, Hubarieva Iryna, Harmash Tetiana, Trushkina Nataliia.** *"Relationship between the concepts of "Digital transformation" and "Industry 5.0": bibliometric analysis". At the current stage of transformational transformations, the problems of transformation of the national economy are extremely relevant. And these questions are especially relevant in the conditions of rapid development of the digital economy. According to estimates by Forbes experts, 67% of the leaders of companies from the Global 2000 list chose digital transformation as a priority goal of their corporate strategy in 2018. According to a study by analysts International Data Corporation, the total global spending on digital technologies will grow by 16.8% annually and amounted to 2.1 trillion dollars in 2019. Research by Huawei and Oxford Economics has shown that intelligent network interaction will trigger the growth of the digital economy, which will reach 23 trillion dollars by 2025. This increase will be 78.3% compared to 2017 (12.9 trillion dollars). By 2025, the share of the*

digital economy is planned to increase by 7.2 percentage points, or from 17.1 to 24.3% of global GDP. According to the calculations of The Boston Consulting Group experts, the volume of the digital economy by 2035 will amount to 16 trillion dollars USA.

In view of this, the purpose of this study is to determine the trends and key directions of digital transformation research in the era of Industry 5.0 based on bibliometric analysis using the VOSviewer software. The article carries out a bibliometric analysis of the relationship between the terms "digital transformation", "digitalization", "Industry 4.0", "Industry 5.0". It has been established that currently the problems of the digital transformation of the economy in the context of the implementation of the digital strategy of the European Union are gaining special relevance. Digital transformation is a key component of the overall strategy to transform the global economy. Correctly selected digital technologies combined with employee competencies, processes and operations will allow companies to quickly adapt to crisis situations, use promising opportunities to modernize work processes, meet new and constantly changing customer needs, stimulate growth and implement innovative and management solutions.

The concept of digital transformation of the national economy in the context of Industry 5.0 should involve the use of digital tools and platforms to transform traditional business processes, improve interaction with customers, introduce innovative technologies and form a digital ecosystem. The main components of the digital transformation of critical infrastructure include: digital technologies (cloud computing, artificial intelligence, big data analytics and the Internet of Things (IoT); organizational changes (restructuring of processes to increase their flexibility, introduction of new methodologies (DevOps, Agile), formation of a digital culture); customer orientation and integration of digital channels.

For effective digital transformation of the economy on a practical level, it is advisable to pay attention to such main aspects as: having a clear vision and strategy that meets business goals; involving different groups of stakeholders and ensuring the interest of the entire organization; constant monitoring and evaluation of the implementation of digital transformation initiatives; an adaptive and iterative approach that allows you to navigate the changing digital landscape. It has been proven that the priority direction of research in the future should be the substantiation of the theoretical and methodological provisions of the formation of the digital ecosystem.

**Keywords:** Industry 4.0, Industry 5.0, digital economy, digital transformation, digitization, digital ecosystem, digital innovation, digital technologies, information systems, digital space, artificial intelligence, sustainable development, efficiency, sustainability

**Гармаш Олег, Губарева Ірина, Гармаш Тетяна, Трушкіна Наталія. "Взаємозв'язок понять «Цифрова трансформація» та «Промисловість 5.0»: бібліометричний аналіз".** На сучасному етапі трансформаційних перетворень проблеми трансформації національної економіки є надзвичайно актуальними. Ці питання особливо актуальні в умовах швидкого розвитку цифрової економіки. За оцінками експертів Forbes, у 2018 році 67% лідерів компаній зі списку Global 2000 обрали цифрову трансформацію як пріоритетну мету своєї корпоративної стратегії. Згідно з дослідженням аналітиків International Data Corporation, загальні глобальні витрати на цифрові технології у 2019 році зросли на 16,8% і становили 2,1 трільйона доларів. Дослідження Huawei і Oxford Economics показали, що інтелектуальна мережева взаємодія сприятиме росту цифрової економіки, яка досягне 23 трільйонів доларів до 2025 року. Це зростання складе 78,3% у порівнянні з 2017 роком (12,9 трільйона доларів). До 2025 року планується збільшення частки цифрової економіки на 7,2 відсоткових пункти, або від 17,1 до 24,3% від загального ВВП світу. За розрахунками експертів компанії The Boston Consulting Group, обсяг цифрової економіки до 2035 року складатиме 16 трільйонів доларів США.



З огляду на це, мета дослідження полягає у визначенні тенденцій та ключових напрямів досліджень цифрової трансформації в епоху Промисловості 5.0 на основі бібліометричного аналізу з використанням програмного забезпечення VOSviewer. У статті проводиться бібліометричний аналіз взаємозв'язку термінів «цифрова трансформація», «цифровизація», «Промисловість 4.0», «Промисловість 5.0». Встановлено, що наразі проблеми цифрової трансформації економіки в контексті реалізації цифрової стратегії Європейського Союзу набувають особливої актуальності. Цифрова трансформація є ключовою складовою загальної стратегії трансформації глобальної економіки. Правильно підібрані цифрові технології, поєднані з компетенціями співробітників, процесами та операціями, дозволять компаніям швидко адаптуватися до кризових ситуацій, використовувати перспективні можливості для модернізації робочих процесів, відповідати новим потребам клієнтів, які постійно змінюються, стимулювати зростання та реалізовувати інноваційні й управлінські рішення.

Концепція цифрової трансформації національної економіки в контексті Промисловості 5.0 повинна передбачати використання цифрових інструментів та платформ для трансформації традиційних бізнес-процесів, покращення взаємодії з клієнтами, впровадження інноваційних технологій та формування цифрової екосистеми. Основні складові цифрової трансформації критичної інфраструктури включають: цифрові технології (хмарні обчислення, штучний інтелект, аналітика великих даних та Інтернет речей); організаційні зміни (перебудова процесів для підвищення їх гнучкості, впровадження нових методологій (DevOps, Agile), формування цифрової культури); спрямованість на клієнта та інтеграція цифрових каналів.

Для ефективної цифрової трансформації економіки на практичному рівні доцільно звернути увагу на такі основні аспекти, як: наявність чіткої візії та стратегії, яка відповідає бізнес-цілям; залучення різних груп зацікавлених сторін та забезпечення інтересу всієї організації; постійний моніторинг та оцінка реалізації ініціатив цифрової трансформації; адаптивний та ітеративний підхід, що дозволяє орієнтуватися в змінному цифровому ландшафті. Доведено, що пріоритетним напрямком досліджень у майбутньому повинно бути обґрунтування теоретичних та методологічних положень формування цифрової екосистеми.

**Ключові слова:** Промисловість 4.0, Промисловість 5.0, цифрова економіка, цифрова трансформація, цифровизація, цифрова екосистема, цифрові інновації, цифрові технології, інформаційні системи, цифровий простір, штучний інтелект, сталий розвиток, ефективність, стійкість.

**Introduction.** During the first of the four industrial revolutions, steam power became the technology that changed the world. During the second it was a conveyor, and during the third – a computer. Today, the global world is witnessing a rapid transition to information and communication technologies. This, in turn, will contribute to the acceleration of the processes of digitalization of the development of ecosystems in the era of the fourth industrial revolution, the engine of which is digital technologies [1-2]. Artificial intelligence, machine learning, Internet of Things networks, advanced analytics, and robotics

allow us to rethink the way we work and do business, as well as the way companies interact with their customers and the world.

Digital transformation is recognized as a key component of the overall business transformation strategy. Correctly selected technologies in combination with the competencies of employees, processes and operations allow organizations to quickly adapt to complex situations, use promising opportunities, meet new customer needs [3-4] that are changing, stimulate growth and introduce innovations. Digital transformation involves the integration of digital technologies and solutions in all spheres of

economic activity. This is a cultural and technological change that requires organizations to fundamentally transform their work methods, as well as customer experience and benefits. Digital solutions help to expand the staff numbers and can lead to the transformation of business processes and business models [5].

It should be noted that companies need to evolve and transform their digital landscape, starting with raw materials and early levels of the supply chain, to meet rapidly changing customer needs for more personalized service and order fulfilment, as well as to modernize and innovate traditional business models. By 2018, more than 89% of executives have implemented business policies in their companies that are primarily focused on digital technologies. By 2021, this figure has grown even more. However, during the implementation of many digital transformation projects, there were difficulties and problems in communication and planning.

According to the results of a survey conducted by the consulting company McKinsey in 2021, it was established that after COVID-19, top managers feel an urgent need to digitize and modernize work processes and outdated systems. Many respondents admitted that their companies' business models are outdated. Only 11% of respondents believed that current business models would remain economically viable until 2023. Another 64% stated that their companies need to form a digital business in order not to disappear.

So, fundamental innovations and radical transformations in the digital information field allow us to talk about the formation of a new economic reality of the XXI century. – Industries 5.0. The digital era is moving from the space of Industry 4.0 to the space of Industry 5.0 with qualitatively different properties. In the space of "Industry 5.0", the classic firm ceases to be a key player in economic reality, giving way to a new economic entity – the digital ecosystem. In view of this, there is currently a need to form

a qualitatively new concept of digital transformation of the national economy in the context of Industry 5.0.

**Literature and researches review.** The analysis of scientific literature shows that leading scientists (E. Brynjolfsson, B. Kahin [6]; C. Dahlman [7]; W. Drozd et al. [8]; H. Dzwigol et al. [9]; T. Elmasry et al. [10]; A. Kwilinski [11-13]; N. Lane [14]; F. Machlup [15]; R. Miśkiewicz [16]; D. Tapscott [17]; A. Tugui [18]) pay considerable attention to the study of new forms of digital transformation of the economy, to the development of digital models and strategies.

Despite the wide range of scientific research on the chosen topic, the multifacetedness and debatable nature of certain issues require further development. And especially the solution to this problem is actualized at the current stage of changing strategic thinking and the concept of transformation and modernization of the national economy in the conditions of digital transformations.

**Aim and objectives.** The purpose of this research is to identify the relationship between the terms "digital transformation" and "Industry 5.0" based on the bibliometric analysis of scientific publications.

The theoretical and methodological basis of the research is the provisions of the institutional theory; theory of systems, management, information society, network economy, digital economy; concepts of strategic management.

The following general scientific methods were used in the research process: analysis and synthesis, comparison and classification, expert survey, structural and logical generalization.

**Results, analysis and discussion.** The fourth industrial revolution – the concept of Industry 4.0 – is based on intelligent technologies. It consists of the following most important elements: additional production; augmented reality; autonomous robots; big data and analytics; cloud connection; cybersecurity; horizontal and vertical

integration of systems; Internet of things; simulations and digital doppelgangers.

At the same time, it should be emphasized that Industry 5.0 is not considered another industrial revolution, but rather as a complement to the technologies of Industry 4.0 due to the strengthening of cooperation between people and robots. In Industry 5.0, the nine core components of the Industry 4.0 concept have been expanded by making creativity and human well-being the focus of the industry. This made it possible to combine the speed and efficiency of machine technology with the ingenuity and talents of personnel.

Key components of Industry 5.0 include:

- human-oriented industry puts human needs and interests at the centre of the production process. Instead of asking what workers can do with new technologies, Industry 5.0 asks what technology can do for workers. While robots are tireless and precise, they are literal and lack the critical and creative thinking of their human counterparts;

- sustainable industry helps companies reduce their impact on the environment by developing circular economy processes. Other shifts in the field of sustainable development [19-20] include reducing

energy consumption, greenhouse gas emissions, and waste, as well as preventing depletion and degradation of natural resources;

- industrial production in a stable industry has a high level of reliability. It is well armed against disruptions and is able to support critical infrastructure [21] in crisis conditions. The pandemic has exposed the vulnerability of industry and the importance of increasing the flexibility and resilience of supply chains and other manufacturing components.

Based on the bibliometric analysis of scientific publications on digital transformation, which are indexed in the international scientometric database Scopus, it was established that scientists paid special attention to this issue. 61,688 documents for the years 1953-2024 were found by article title, abstracts, and keywords (Fig. 1). As a rule, these articles use such keywords as digital transformation, digital storage, algorithms, Artificial Intelligence, Industry 4.0, digital technologies, digitalization, decision making, Big Data, Internet of Things, information management, sustainable development, innovation, machine learning, information systems, optimization, sustainability, blockchain, digital economy.

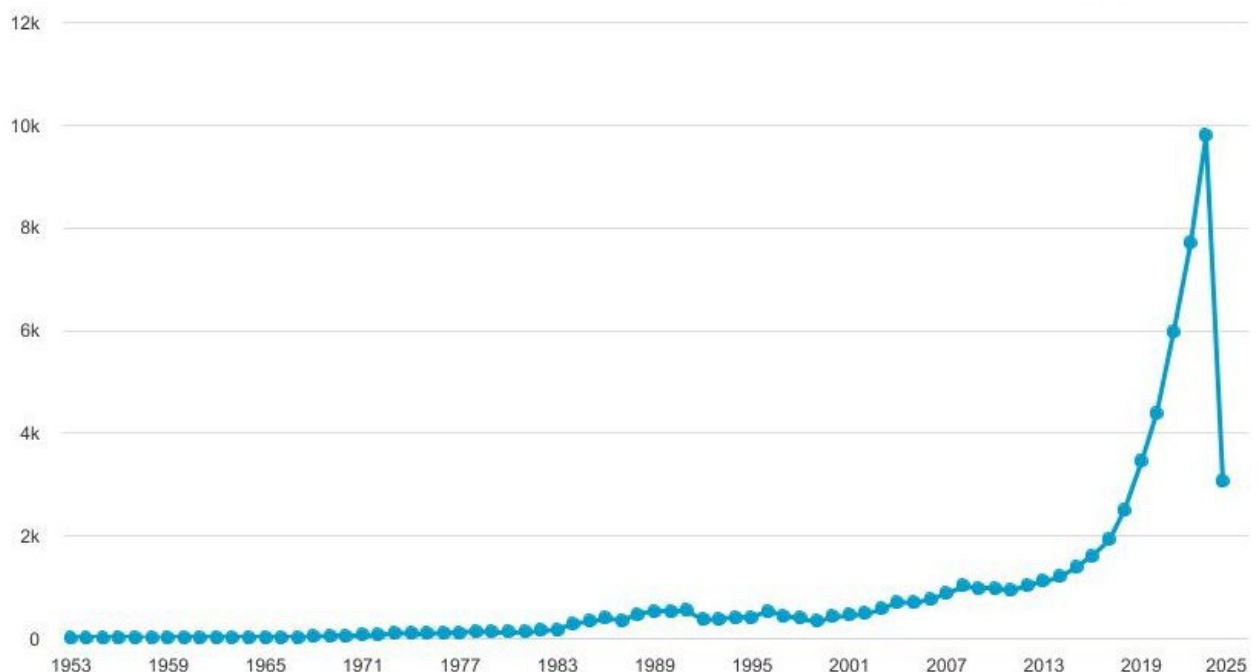


Figure 1 – Dynamics of the number of scientific publications in the scientometric database Scopus, which highlight various aspects of digital transformation

*Source: built on the basis of data from the Scopus scientometric database.*

As the analysis shows, scientists have been studying the problems of Industry 4.0 since 1928. Based on the title of the articles, abstracts and keywords, 5,640 documents

were found for the years 1928-2024, in which the principles and tools of the formation and development of the concepts of Industry 4.0 and 5.0 were considered (Fig. 2).

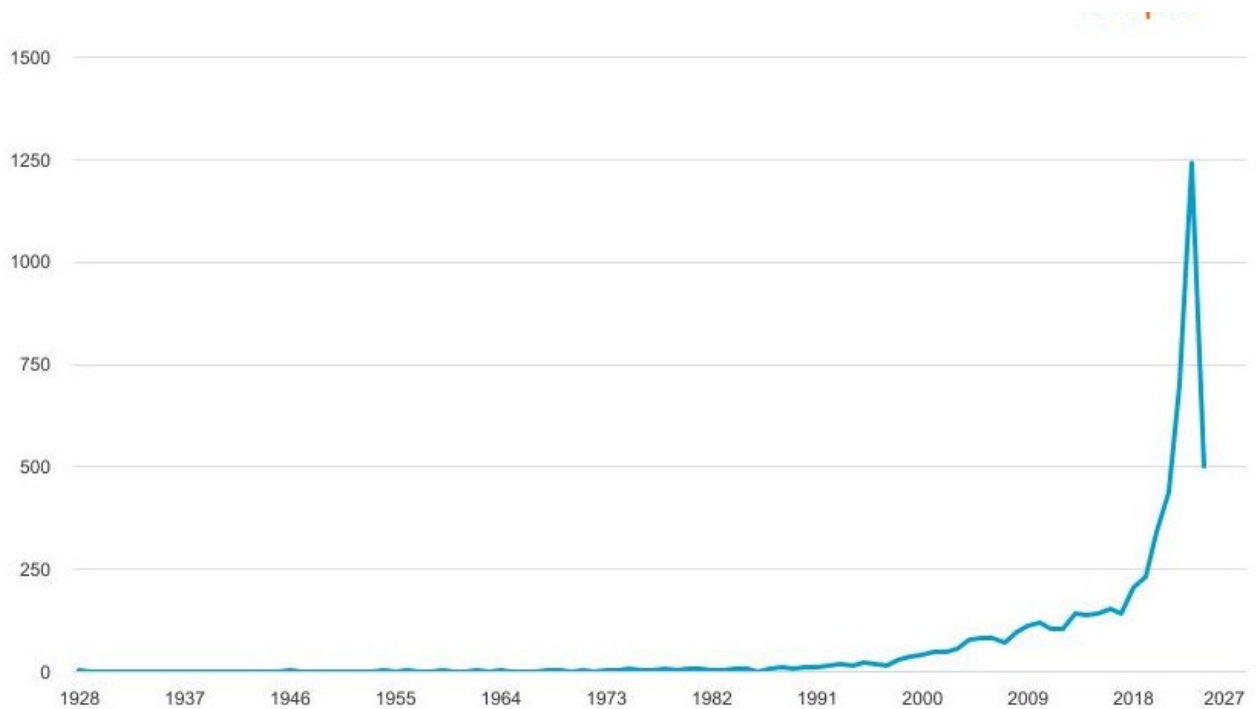


Figure 2 – Dynamics of the number of scientific publications in the scientometric database Scopus, which highlight aspects of the formation and development of Industry 4.0 and 5.0

*Source: built on the basis of data from the Scopus scientometric database.*

Based on bibliometric analysis, scientific publications on issues of digital transformation in the conditions of Industry 5.0 were studied. According to the title of the

articles, abstracts and keywords, 227 documents were found in the international scientometric database Scopus (Fig. 3).

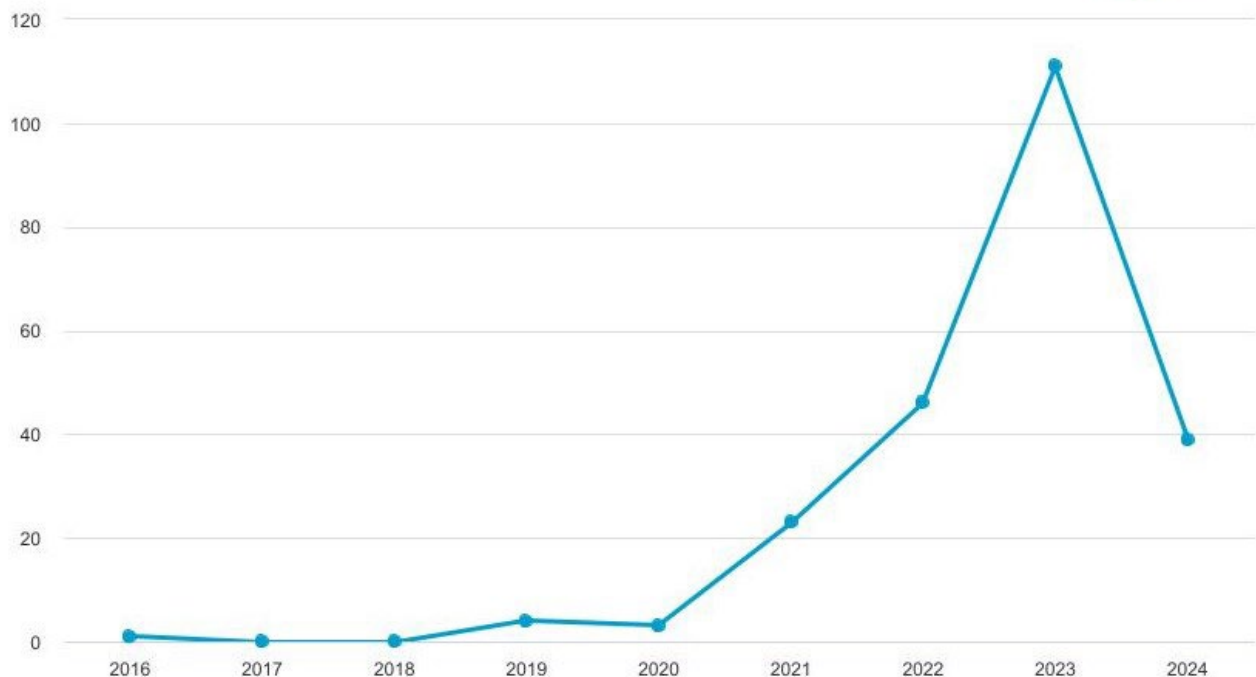


Figure 3 – Dynamics of the number of scientific publications in the scientometric database Scopus, which highlight aspects of digital transformation in the era of Industry 5.0

*Source: built on the basis of data from the Scopus scientometric database.*

As can be seen from fig. 3, this issue became especially relevant in the period from 2021 to 2023. The number of works increased from 23 to 111, or 4.8 times. The first publication on the selected topic appeared in the international scientometric database Scopus in 2016 [22]. The analysis shows that until 2019 there was an insignificant level of publication activity on digital transformation in the context of Industry 4.0 or 5.0. After that, the works of scientists, including L. Mihardjo et al., appeared in scientometric databases. [23], S. Nahavandi [24], L. Świątek [25], V. Roblek et al. [26], A. Lewandowska et al. [27], L. Anantharaman, M. Sridharan [28], E. Øvrelid, B. Bygstad [29], B. Hinings et al. [30] and others, in which attention is focused on the key features and problems that may arise for each manufacturer in the era of Industry 5.0; evaluating the concept of an innovative model of experience and flexibility to support modernization in the context of digital transformation aimed at Industry 5.0; considering the transition from Industry 4.0 to Nature 4.0 as a long-term evolution focused

on the capacity to restore members of Society 5.0.

It is worth noting that Industry 5.0 provides a shared and automated environment, thus creating a new paradigm for companies in doing business. The way of organizing the management of resources and opportunities, especially in relations with people, the culture and the process of creating new business models have changed.

The terms artificial intelligence, cyber-physical systems, big data, industry 4.0, industry 5.0, open innovation, society 5.0, super-intelligent society have been widely used in research in recent years. The transition from Society 4.0 to Society 5.0 can be achieved by implementing knowledge and technology in IoT, robotics and big data to transform society into a smart society (Society 5.0). In particular, the concept will allow adapting services and industrial activities to the real needs of people. In addition, these technologies enable the creation of advanced platforms of digital services, which will later be integrated into all spheres of life.

In the Table 1 shows the most cited publications that were published in scientific publications indexed by the Scopus scientometric database.

Table 1. The most cited articles on digital transformation in the context of Industry 5.0 in the scientometric database Scopus

| Author(s), title of work                                                                                                                            | Year | Name of the publication                                                        | Number of Scopus citations | Number of views |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------------------------------|----------------------------|-----------------|
| Nahavandi S. Industry 5.0-a human-centric solution [24]                                                                                             | 2019 | Sustainability (Switzerland)                                                   | 613                        | 606             |
| Carayannis E. G., Morawska-Jancelewicz J. The Futures of Europe: Society 5.0 and Industry 5.0 as Driving Forces of Future Universities [31]         | 2022 | Journal of the Knowledge Economy                                               | 154                        | 186             |
| Akundi A. et al. State of Industry 5.0 – Analysis and Identification of Current Research Trends [32]                                                | 2022 | Applied System Innovation                                                      | 121                        | 269             |
| Gürdür Broo D. Kaynak O., Sait S. M. Rethinking engineering education at the age of industry 5.0 [33]                                               | 2022 | Journal of Industrial Information Integration                                  | 115                        | 328             |
| Nair M. M., Tyagi A. K., Sreenath N. The Future with Industry 4.0 at the Core of Society 5.0: Open Issues, Future Opportunities and Challenges [34] | 2021 | International Conference on Computer Communication and Informatics, ICCCI 2021 | 94                         | 68              |

Source: built on the basis of data from the Scopus scientometric database.

Among the key publications that published works on the chosen topic, the following can be mentioned: Sustainability Switzerland (13 documents); IFIP Advances In Information And Communication Technology (11); Lecture Notes in Mechanical Engineering (7); Communications In Computer And Information Science (5); Journal Of The Knowledge Economy, Procedia Computer Science, Sensors (4 documents each).

In the Scopus database there are 6 documents of scientist E. Carayannis; 4 documents each – R. Makhachashvili, J. Pontes, I. Semenist; 3 documents each – H. Alimam, M. Bevilacqua, D. F. J. Campbell, M.

Ghobakhloo, M. Iranmanesh, G. Mazzuto (Fig. 4).

The key organizations involved in solving the problems of digital transformation in the context of Industry 5.0 are The George Washington University (6 documents); Universidade do Porto, Borys Grinchenko Kyiv Metropolitan University (5 documents each); University for Continuing Education Krems, Höögskolan Väst, Universidade do Minho, Universidade de Aveiro, Universidad de Sevilla, GW School of Business (4 documents each) (Fig. 5).

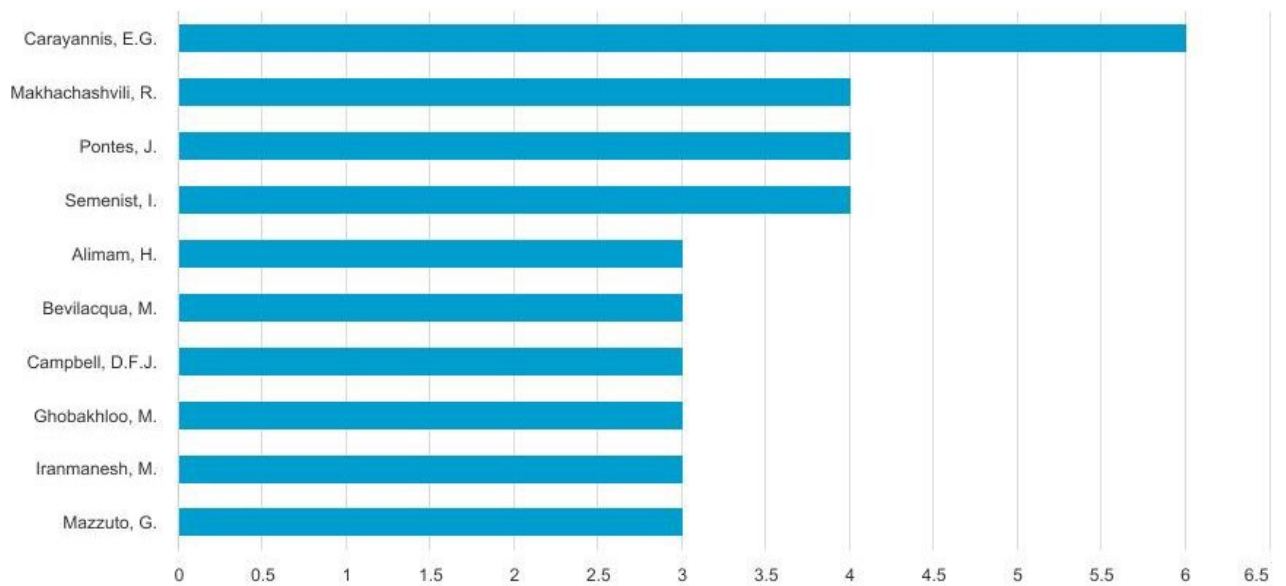


Figure 4 – Dynamics of the number of scientific publications by authors  
*Source: built on the basis of data from the Scopus scientometric database.*

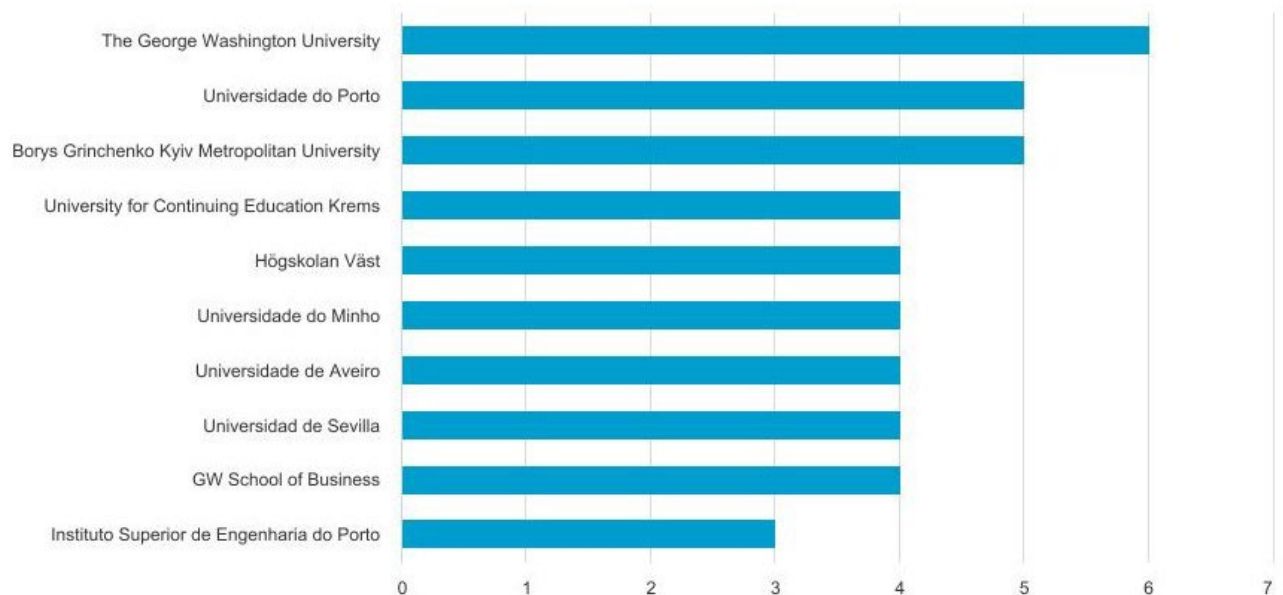


Figure 5 – Number of scientific publications by organization  
*Source: built on the basis of data from the Scopus scientometric database.*

The results of the analysis show that most of the works on the researched issues were published by scientists from India (25 documents); Germany, Portugal (20 documents each); Turkey (17); United States

(16); Italy (15); Spain (13). In Ukraine, 11 documents were found based on the established search criteria (Fig. 6).

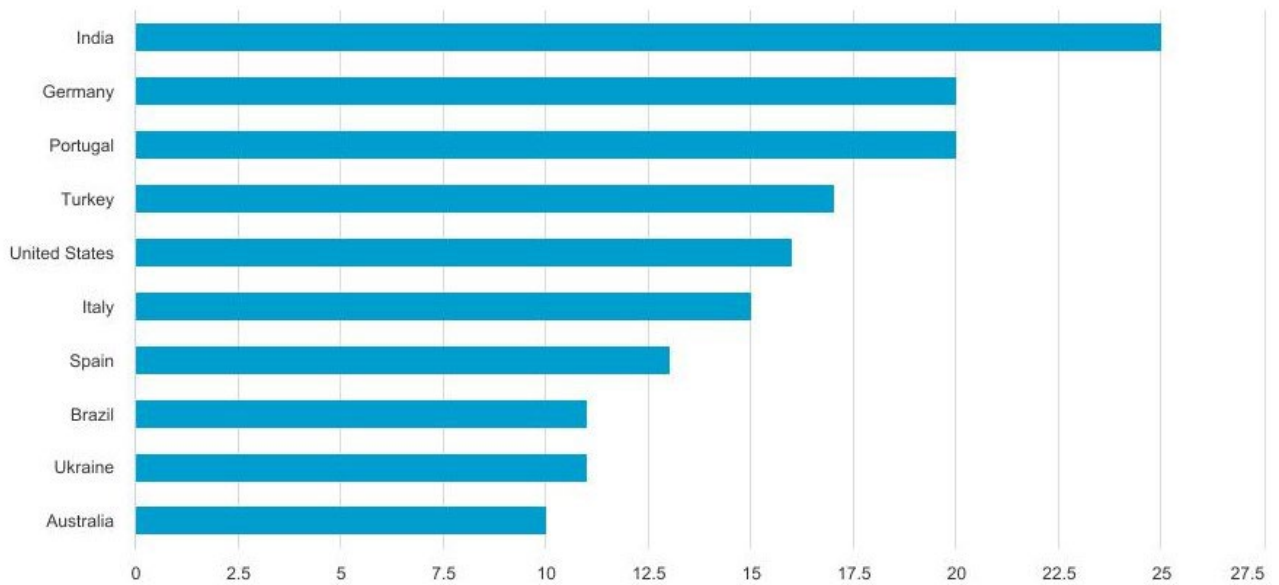


Figure 6 – Number of publications on selected issues by country  
Source: built on the basis of data from the Scopus scientometric database.

According to the types of documents, scientific works can be ranked as follows: scientific articles (86), conference materials

(66), sections of books or monographic publications (39), review articles (18), books (5) (Fig. 7).

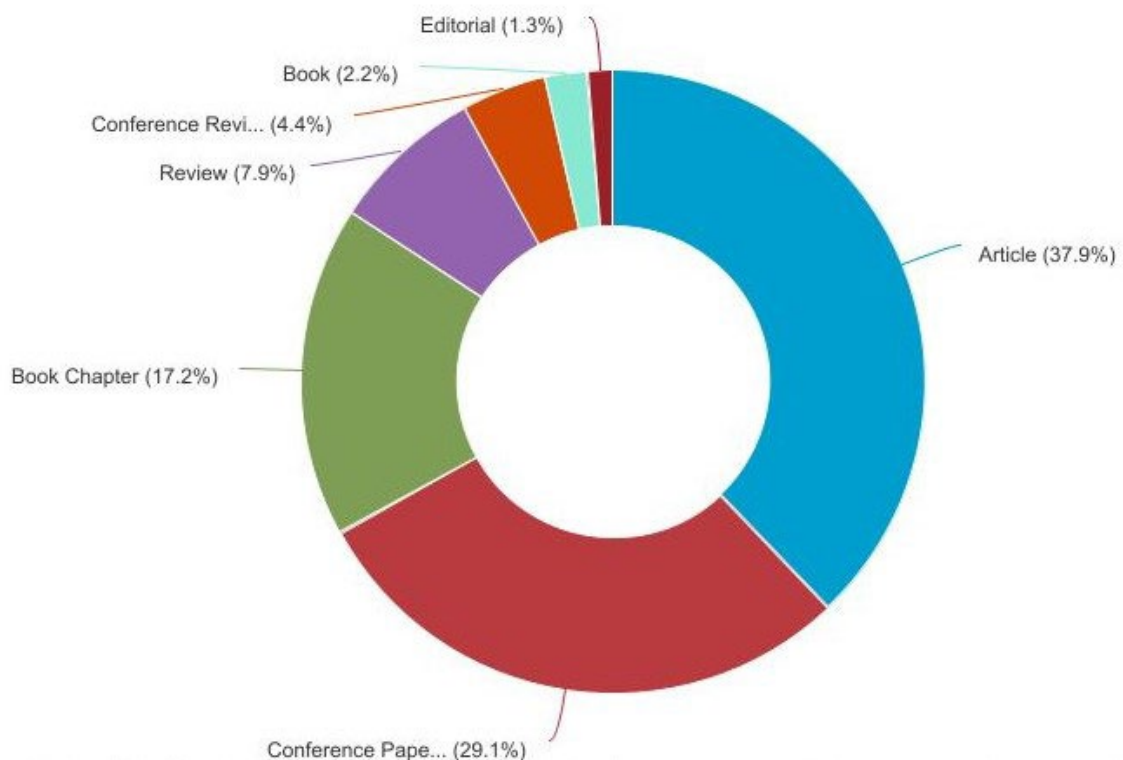


Figure 7. Specific weight of scientific publications by types of documents  
Source: built on the basis of data from the Scopus scientometric database.



For the most part, scientific works on the problems of digital transformation in the conditions of Industry 5.0 are published in the following fields of knowledge: computer science (113 documents); engineering (84);

business, management, accounting (64); decision-making sciences (40); social sciences (40); economics, econometrics and finance (38 documents) (Table 2).

Table 2. Number and share of scientific publications by field of knowledge

| Branch of knowledge                 | Number of scientific publications | Share of scientific publications, % |
|-------------------------------------|-----------------------------------|-------------------------------------|
| Computer Science                    | 113                               | 22.1                                |
| Engineering                         | 84                                | 16.4                                |
| Business, Management and Accounting | 64                                | 12.5                                |
| Decision Sciences                   | 40                                | 7.8                                 |
| Social Sciences                     | 40                                | 7.8                                 |
| Economics, Econometrics and Finance | 38                                | 7.4                                 |
| Mathematics                         | 25                                | 4.9                                 |
| Energy                              | 24                                | 4.7                                 |
| Environmental Science               | 22                                | 4.3                                 |
| Materials Science                   | 12                                | 2.3                                 |
| Other                               |                                   | 9.6                                 |

Source: built on the basis of data from the Scopus scientometric database.

The main sponsors that finance scientific publications on the problems of digital transformation in the era of industrial revolutions include the following: Fundação para a Ciência e a Tecnologia (14 documents); European Regional Development Fund, Horizon 2020 Framework Program, Ministério

da Ciência, Tecnologia e Ensino Superior (5 documents each); Bundesministerium für Bildung und Forschung, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior, European Commission, Horizon 2020 (3 documents each) (Fig. 8).

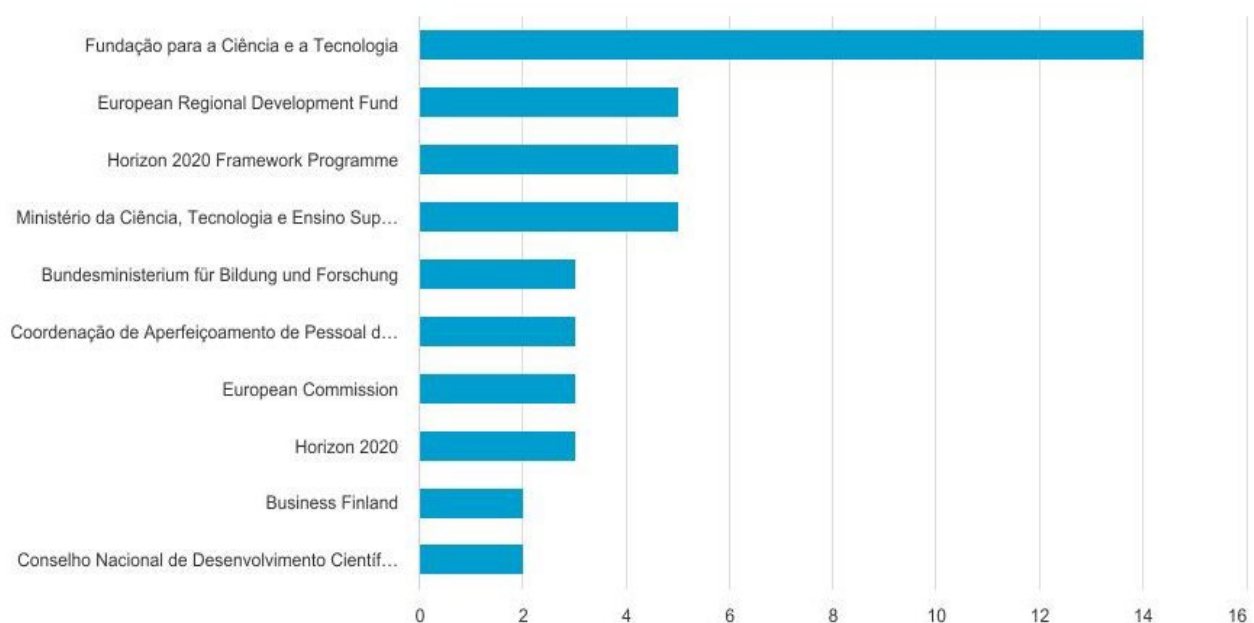


Figure 8 – Number of publications on selected issues by sponsoring organizations that finance scientific research and development

Source: built on the basis of data from the Scopus scientometric database.

In the article, using bibliometric analysis, the main clusters of thematic areas of publications devoted to digital

transformation in the context of the concept of Industry 5.0 were identified (Fig. 9).

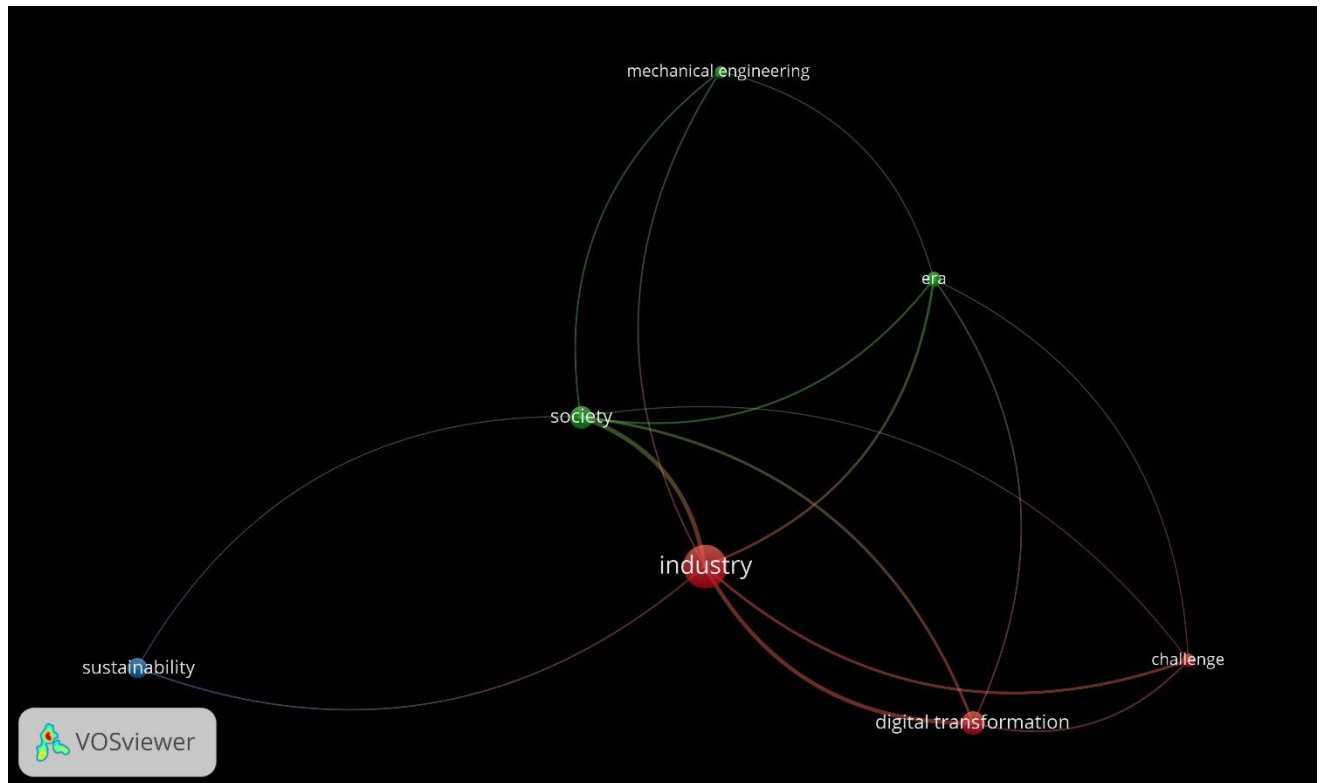


Figure 9 – Network visualization of citations of articles on issues of digital transformation in the context of the implementation of the Industry 5.0 concept using the VOSviewer toolkit  
*Source: built on the basis of data from the Scopus scientometric database using the VOSviewer program [35].*

As can be seen from Fig. 9, each of the clusters symbolizes the direction of scientific research in the field of digital transformation and Industry 4.0 or 5.0. Let's analyze them.

The first cluster (red) contains 3 keywords. Grouped keywords in this cluster indicate that scholars consider digital transformations in the context of the industrial revolution.

The second cluster (green) consists of 2 keywords and focuses on engineering technologies and innovations.

The next cluster (blue) outlines research on digital transformation from the perspective of sustainable development or ecosystem resilience.

If the search is expanded to include, in addition to citation information, bibliographic information, a brief description and keywords, information on funding, etc., 278 keywords can be identified, which are organized into 20 clusters (Fig. 10).



within their digital ecosystem. The partnership of humans and intelligent machines combines the precision and speed of industrial automation with the creativity, innovation and critical thinking skills of humans.

The long-term benefits of implementing Industry 5.0 are consistent with its core values. For example, increasing the attraction and retention of talent, saving energy and increasing overall sustainability. The above advantages help to increase competitiveness and relevance through successful adaptation to a changing world and new markets. These include:

1) Attracting and retaining talented employees. Every year, it becomes more difficult for companies to attract and retain the skilled and talented personnel they need to compete. When workers are mere machine operators, they are denied the tasks and creative inputs that drive human achievement. The principles and technologies of Industry 5.0 provide a more progressive and interesting work environment, which can contribute to increased employee satisfaction and loyalty.

2) Sustainable development and competitiveness. In the business world, sustainable practices are not an option, but an expectation of stakeholders. This especially applies to resource- and energy-intensive industries. A forward-looking business with sustainable development in mind will be more attractive to potential investors, employees and consumers. The implementation of Industry 5.0 practices will contribute to the economic performance of industries while simultaneously ensuring environmental sustainability.

3) Stability. The ability to respond to revolutionary changes such as trade wars, pandemics and climate impacts has become a critical component of business management. Industry 5.0 technologies play an important role in the development of flexibility and resilience within industry through data collection, automated risk analysis and increased security.

It should be noted that companies planning digital transformation should start the transformation process with four steps:

– determination of the starting point – performing an audit of existing systems and assets. For a successful launch of the project, first of all, it is necessary to determine those processes of the company that have a high operational priority and which are the easiest to transform;

– determination of priorities – the advantage of digital transformation is that it does not have to be implemented all at once. Intelligent technologies are built to evolve, scale and integrate;

– preparation of the route card – the most important advantages of intelligent technologies are their high scalability and ability to quickly adapt and change the configuration. An effective transformation roadmap should allow for flexibility and growth, but start the project with a roadmap that includes several important and achievable goals. The plan should include robust change management and migration strategies. Digital transformation involves not only the updating of technologies, but also the development of people. These first steps are very important. You should seek help from experienced specialists who understand the unique needs of the company and are able to help in choosing the optimal course for the business;

– preparation of divisions – intelligent technologies help to reduce the number of repetitive tasks, increase the involvement of employees and ensure effective cooperation. But these benefits can only be realized when these technologies are used by all staff. You should listen to the suggestions and ideas of employees, openly answer their concerns, and give them time to adjust to the changes.

It's equally important to look to your software vendor for help in developing a transformation strategy and roadmap, and to learn which solutions best meet your unique business needs.

The concept of digital transformation in the context of Industry 5.0 should involve the

use of digital tools and platforms to transform traditional business processes, improve interaction with customers, introduce innovative technologies and form a digital ecosystem. The main components of digital transformation of a critical infrastructure include:

- digital technologies (cloud computing, artificial intelligence, big data analytics and the Internet of Things (IoT), which allow collecting, analyzing and using huge amounts of data to make informed decisions, automate processes and provide a personalized experience);
- organizational changes (restructuring of processes to increase their flexibility, introduction of new methodologies (DevOps, Agile), formation of a digital culture);
- customer orientation and integration of digital channels (the use of websites, mobile applications and social network platforms will improve the quality of customer service, provide personalized content, and ensure seamless interaction at various contact points).

For effective digital transformation on a practical level, it is advisable to pay attention to such main aspects as: having a clear vision and strategy that meets business goals; involving different groups of stakeholders and ensuring the interest of the entire organization; constant monitoring and evaluation of the implementation of digital transformation initiatives; an adaptive and iterative approach that allows you to navigate the changing digital landscape.

Thus, digital transformation integrates all levels and functional areas of the company. Intelligent technologies provide the most important tools companies need to survive and thrive. Among the main advantages of digital transformation in the conditions of Industry 5.0, the following can be named:

1) In-depth data analysis for real-time decision-making. In many companies, the assessment of work efficiency and return on investment is based on data from past periods. However, the processes of manual data collection, processing and analysis are

slow and not conducive to the quick use of the opportunities that open up. A modern ERP system and advanced analytics tools allow companies to see data in real time and configure powerful analysis algorithms, ensuring the best decisions are made at exactly the right moment.

2) Increasing efficiency and productivity. Networked devices and IoT devices continuously transmit data, hardware logs, and performance reports. With the help of advanced analytics tools, this data can become the basis for diagnostic maintenance, reduce downtime and provide the information you need, increasing the productivity and efficiency of workflows.

3) Optimizing the customer experience. Clients appreciate the convenience and quality of the process of interaction with the company. Personalization, omnichannel engagement, customized service plans and access to real-time data will help you exceed their ever-changing expectations, increase your leads and retain existing customers by increasing their loyalty.

4) Implementation of innovations in the business model. Consumer and market requirements are changing. The focus of attention is gradually shifting to the modernization of business models as a tool for value creation. However, reshaping fundamental business models and customer experiences is not possible without real-time data collection and analysis, as well as automated intelligent processes to drive new business, payment and service models.

5) Support of a reliable and competitive corporate development strategy. Digitization of operations and optimization of services with the help of network technologies creates new ways of interaction and cooperation, as well as optimizing the business development strategy in the areas of: development of new products and services; increase in profitability and strengthening of revenue generation channels; attraction and retention of potential and real customers.

6) Increasing flexibility and resilience to crises. Today's business is eager for digital

transformation because it offers tools for rapid development of products and services, as well as predictive analytics capabilities to prepare for future crises, market changes and new perspectives. Companies need scalability and a full suite of cloud solutions to innovate.

Prospects for further research consist in substantiating the theoretical and methodological provisions of the formation of the digital ecosystem and the digital transformation of the logistics services market under the conditions of Industry 5.0.

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