







# “Higher education for sustainable development in the digital era: Mapping the bibliometric analysis”

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# HIGHER EDUCATION FOR SUSTAINABLE DEVELOPMENT IN THE DIGITAL ERA: MAPPING THE BIBLIOMETRIC ANALYSIS

## Abstract

Modern higher education institutions in developed countries are becoming active agents of permanent societal changes. The aim of the study is to map the scientific landscape on the topic of higher education for sustainable development in the context of digitalization. In the research process, bibliometric analysis, an in-built Scopus instrument, and VOSviewer were used. The findings proved that the severe restrictions faced by universities during the COVID-19 pandemic became a powerful impulse to intensify the attention of scientists to the mentioned topic. Visualization maps of keywords and scientific publications showed the existing interdisciplinary nature and the main thematic directions of research on higher education for sustainable development in the digital era. They demonstrated a direct connection between the basic principles of the sustainable development concept, sustainable development goals, higher education, universities, digitization, and digital technologies. The largest number of works on the specified subject belong to scientists from China, Spain, the Czech Republic, Germany, and Ukraine. The study concluded that future publications in the analyzed field would cover the effectiveness of digital technologies in higher education, the development of competencies for the digital economy, inclusiveness, cybersecurity, as well as ethical aspects of the use of technologies to achieve the global sustainable development goals.

## Keywords

higher education, university, sustainable development concept, sustainable development goals, digitization, digital technologies, bibliometric analysis

## JEL Classification

I20, I23, O15, O33

## INTRODUCTION

Ensuring sustainable development is one of the strategic goals of developed countries. In accordance with the basic postulates of the sustainable development concept, in September 2015, at the 70th session of the UN General Assembly in New York, 17 sustainable development goals were approved, and a number of countries decided to commit to their implementation (United Nations, 2015).

The concretization of these goals and the approval of 169 targets allowed governments and stakeholders to more clearly coordinate their actions to ensure sustainable development of the state and regions. The sustainable development goals aims to overcome poverty, hunger, and inequality, strengthen health and well-being, ensure quality education, gender equality, access to clean water, sanitation, clean energy, decent work, and economic growth, as well as the development of industry, innovation, infrastructure, cities, and communities, promote responsible consumption and production, mitigate the effects of climate change, preserve marine resources, land ecosystems, and support peace, justice, and partnership for sustainable development. All the goals are interconnected and interdependent; their achievement is possible only based on establishing strategic partnerships between governments and a wide range of stakeholders.

When it comes to ensuring the country's sustainable development, education is considered in two contexts. First, it is one of the most significant sustainable development goals, namely goal 4, "Quality education," – providing comprehensive and fair quality education and promoting lifelong learning opportunities for all. In addition to guaranteeing unlimited access to primary and secondary education, activities within the framework of goal 4 ensure free access to quality higher education. To achieve this goal, leading countries are taking measures to minimize gender inequality, religious prejudices, and material differences when admitting and training citizens in higher education institutions. In addition, education acts as a beneficiary. Secondly, education is an active actor in ensuring the country's sustainable development. Educational institutions integrate the basic principles and values of sustainability into the educational process and educate a new generation of citizens capable of building a sustainable society. It is in the system of formal and informal education that a set of views and ways of behavior is formed, leading to the achievement of the sustainable development goals.

The influence of universities on the sustainable development of the country involves the implementation of educational (training courses or modules on sustainability, integration of a sustainable component into the educational process) and research activities (scientific projects on the topic of promoting the sustainable development of the country of the region, development of green technologies). Another crucial aspect is green campuses (greening territories, organization of sustainable transport, ensuring energy efficiency of premises, rational handling of water resources, waste, etc).

Along with sustainability, digitalization is one of the defining trends in the development of the world's leading countries in the 21st century. Modern information and communication technologies provide additional opportunities to ensure the sustainable development of the country and its regions. Digital technologies allowed higher education institutions to conduct their educational and research activities even in the strict conditions of social distancing caused by the spread of COVID-19. The latest means of communication, educational online platforms, and tools allowed universities to work, teachers to transfer new permanent knowledge to students, and scientists to implement research projects in a distance (remote) or hybrid (mixed) format. In other words, digital technologies enabled countries to move toward achieving the sustainable development goals, even in extremely difficult exogenous conditions.

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## 1. LITERATURE REVIEW

In recent years, rapid digitization of almost all spheres of society has been observed; this trend did not escape the sphere of higher education and sustainable development. The COVID-19 pandemic and the full-scale war of Russia against Ukraine have confirmed the decisive role of modern digital technologies in supporting the functioning of enterprises and state, educational institutions, and public institutions during extremely powerful external challenges (exogenous shocks). The above actualizes the need to analyze various aspects of strengthening the influence of higher education in ensuring the sustainable development of the country/region in the conditions of their digitalization.

With the announcement of the sustainable development goals (SDGs) by the United Nations, among which SDG 4 – quality education – was

singled out, scientific interest in the impact of different levels of education on sustainability has grown significantly. Higher education plays a key role in achieving sustainable development, as it provides the knowledge, skills, and values necessary to build an ecologically, economically, and socially balanced future (Artyukhov et al., 2022; Djakona et al., 2021; Kraus et al., 2021; Viknianska et al., 2020). Higher education plays a vital role in educating conscious citizens and specialists capable of developing and implementing solutions that meet the principles of sustainable development (Antoniuk et al., 2021; Liao et al., 2019; Shaposhnykova & Shaposhnykov, 2018; Vorontsova et al., 2020). In recent years, publications devoted to the impact of higher education on ensuring sustainability have appeared in the scientific environment (Abeydeera et al., 2016; Altbach et al., 2015; Zhu et al., 2022). In particular, the research aspirations of Cottafava et al.

(2022) and Serafini et al. (2022) are devoted to the integration of the principles of sustainable development in higher education. Lim et al. (2022) and Crawford and Cifuentes-Faura (2022) prove that higher education can potentially drive sustainable development by educating a conscious generation and promoting scientific innovation. Rothe et al. (2023), Dumay (2019) and Kryvda et al. (2022) showed the connection between digital and sustainable development. Lima et al. (2023) analyzed the publications of the last decade on issues of sustainable development in Latin America. The analysis of existing studies (Britchenko et al., 2022; Tulchynska et al., 2021) demonstrates that reviews of the sustainability literature are often limited to a specific industry or field, a specific country, a specific journal, or a specific topic. Such a transition to the formation of a sample is quite logical since it allows scientists to concentrate on the main features of sustainable development, abstracting from secondary factors.

Wright and Pullen (2007) presented the results of a qualitative, comprehensive, systematic study of publications devoted to the impact of education on sustainable development. The study reviewed the publications of 1990–2005, noting a gradual increase in their number, but not a linear one; some increase in the number of journals in which articles on the topic of education appear for sustainable development; an increase in the number of such publications in interdisciplinary journals; and an increasing number of researchers of the outlined subject.

Kryshtanovych et al. (2023) and Shalimova et al. (2022) developed a methodical approach to digitalizing the education management system to ensure the sustainable development of a unified socio-economic system. The authors proposed new models of effective digitalization of the education management system to ensure its sustainable development and justified a new methodological approach to improving the integration of all aspects of digitalization into the education management system in the sustainable development context. Ahel and Lingenau (2020) and Lugovy et al. (2022) have studied the opportunities and challenges of digital transformation to improve the achievement of the SDGs in higher education. The findings provide an overview of the main po-

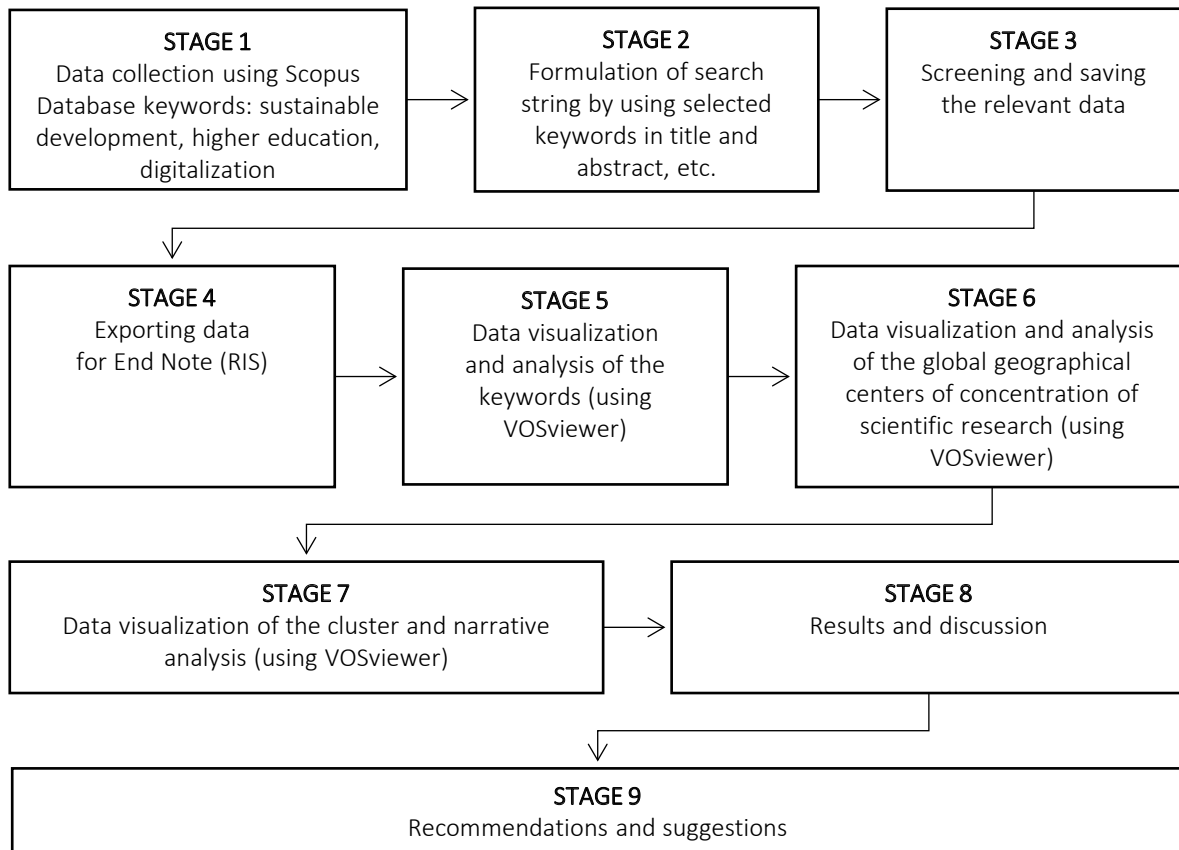
litical programs supporting digitalization and the spread of the Central and Eastern European Social Sciences in higher education.

Yang and Xiu (2023) proved that scientists from developed countries are preparing the prevailing majority of publications from specified topics; magazines in which they have published such articles are being adjusted for long-term cooperation with them; higher education for sustainable development is usually considered interdisciplinary research. Machado and Davim (2022) also emphasize the fast growth of the number of publications on the roles of higher education in permanent development in the last 30 years and also highlight leading countries, higher education institutions, and researchers. Today, the ways of the subject impact of higher education on sustainable development are properly way worked out and opened in the scientific literature that is confirmed by numerous articles with review publications in this sphere.

The aim of this particular study is to map the scientific landscape on the topic of higher education for sustainable development in the context of digitalization through a bibliometric analysis.

## 2. METHODS

The key bibliometric tools used in the study are in-built Scopus (SciVal) instruments and VOSviewer. Analytical tools of SciVal were used to analyze articles on higher education, sustainable development, and digitalization, in particular by their content, publication period, authors, and countries of origin. Articles indexed in Scopus databases were accepted for analysis. The sample covered relevant articles published during the last 50 years. Filtering of the entire array of publications indexed in the mentioned databases was carried out according to the parameters of the type of publications, period, and subject areas. The obtained results were then imported into VOSviewer, a bibliographic data visualization tool. VOSviewer was chosen as the primary analysis tool due to its convenience and intuitive user interface. Based on the data of a number of databases, VOSviewer allows one to build co-authorship maps, term maps, citation maps, and other bibliographic maps.



**Figure 1.** Research methodology

VOSviewer was used for clustering based on bibliometric maps. The proposed methodology of this study is summarized in Figure 1.

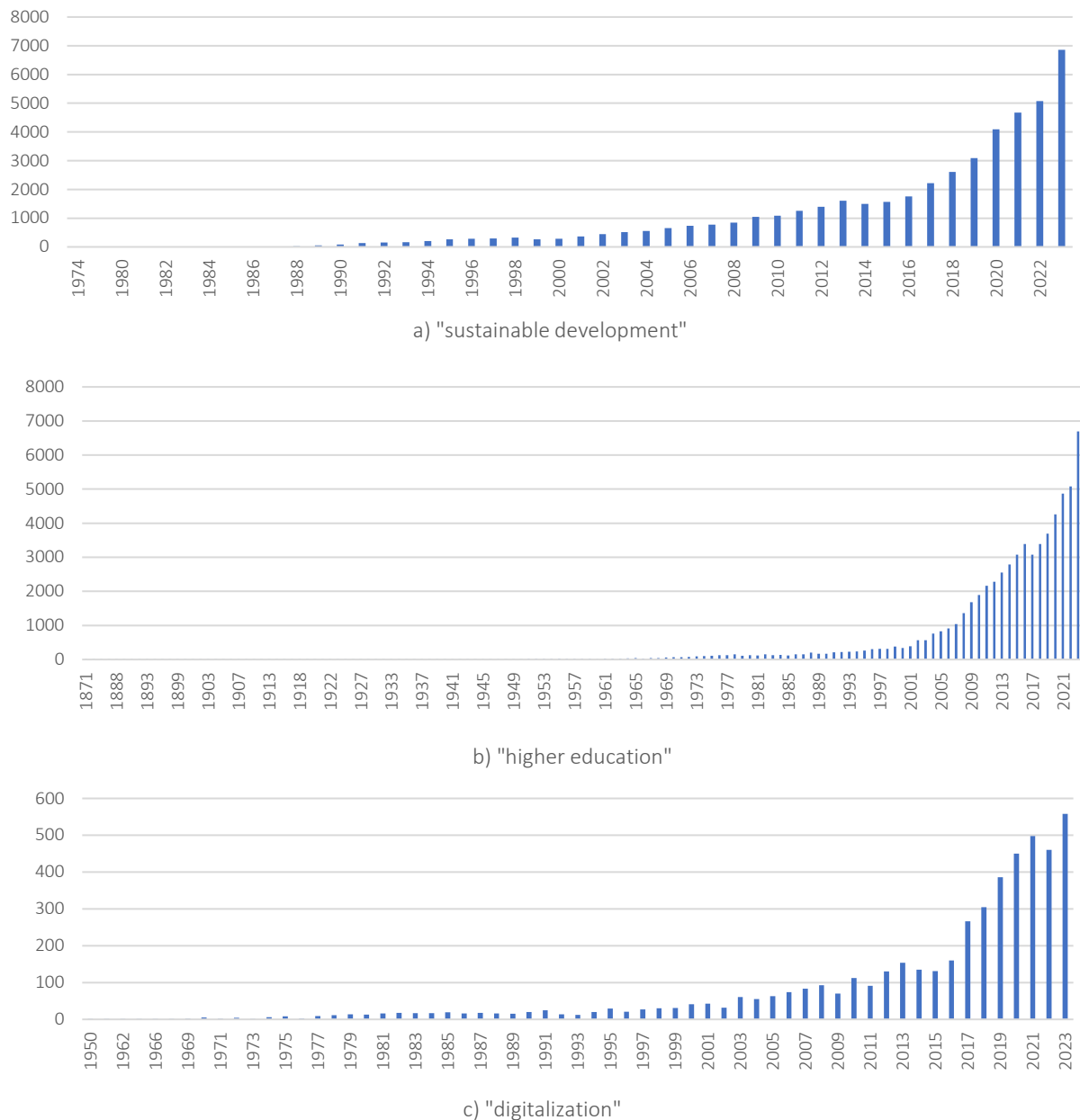
### 3. RESULTS AND DISCUSSION

Figure 2a shows the dynamics of publications, which are indexed in the Scopus database and devoted to the topic of sustainable development. The results single out the main trends in the dynamics of these publications, starting with one article every year from 1974 to 1981 – up to 6,860 publications in 2023.

Figure 2a demonstrates a gradual increase in the number of publications on the topic of sustainable development. There are three remarkable stages:

1. 1974–1990 (birth) – individual publications, in the title of which there is the term “sustainable development”;
2. 1991–2014 (revitalization) – stable growth in the number of articles on this topic, which is caused by the increase in the interest of society and the expert environment in promoting the sustainable development of the country/region/economy;
3. 2015–2023 (activation) – active annual increase in the number of articles on sustainable development in Scopus. The UN proclamation of 17 global sustainable development goals marked the transition to this stage.

The bibliometric analysis determined the geographical structure of the authors of publications on sustainable development. In particular, the leading countries are China, the United States of America, the United Kingdom, India, Germany, Australia, Canada, Italy, and Spain. These are mainly countries with a high level of economic development, high social standards, and the standards of living. These countries own significant natural areas and rare ecosystems and pay great attention to their preservation, investing significant funds in maintaining their condition. Accordingly, the topic of sustainable development is highly relevant for these countries.



**Figure 2.** Dynamic analysis of the number of titles of scientific publications separate on sustainable development, higher education, and digitalization

Most of all articles in the sustainable development sphere are presented in social sciences, environmental science, engineering, energy, business, management and accounting, economics, econometrics and finance, Earth and planetary sciences, computer science, agricultural and biological sciences, and medicine journals. The profile of specified magazines gives grounds to speak about the available publications that cover different aspects of sustainable development (environmental, social, managerial, technical, and economic).

In the course of the bibliographic analysis (Figure 2), a decision was made to separate the block of higher education for several reasons. First, to determine the share of articles on the topic of higher education for sustainable development in the total number of articles devoted to the issues of higher education in general (and this can be traced in the dynamics). Second, to demonstrate the crucial role of higher education in ensuring the sustainable development of the country/region, which is manifested in the implementation by universities of educational (knowledge and life skills and



conducting professional activities in conditions of sustainable development), behavioral (sustainable youth lifestyle, sustainable thinking), and research (sustainable innovations, green technologies, scientific projects on sustainability) activities. Third, to emphasize that higher education, which consolidates the country's powerful intellectual capital in universities, lays the foundation for making sustainable management decisions, balancing the economic, ecological, and social subsystems of society in new conditions of its functioning.

As the analysis shows, from the mid-80s of the 20th century, a slight increase in the interest of scientists in the problems of higher education was arranged. From the 90s of the 20th century, there has been a stable trend toward a gradual increase in the number of publications on this topic. At the beginning of the 20th century, the number of articles on higher education began to grow rapidly. If at the end of 1979, there were 107 specified publications in the Scopus database, then in 2007 – 1,038 articles (an increase of 931 units), in 2011 – 2,165 publications (an increase of 1,127 units), and in 2023 year – 6,692 units of articles (an increase of 4,527 units). Most of the articles indexed by the Scopus database on the subject of higher education in the period before the 2000s were devoted to pedagogical issues. In the last two decades, there has been a more inherent tendency to expand the subject matter of publications on higher education, the exit of their topics beyond the boundaries of pedagogy and didactics. Modern scientific publications with the term “higher education” in their titles cover the issues of financing the university's activities, development of their research and innovation infrastructure, internationalization and globalization of activities, development of sustainable campuses, functioning in pandemic conditions, digital transformation, etc. (Figure 2b). The quality of higher education is an actual research topic that scientists in different countries of the world actively study. This thesis is confirmed by the findings of Brika et al. (2021), who conducted a comprehensive bibliometric analysis of 500 scientific works on the quality of higher education in the Web of Science. These findings are particularly important for this study, supplementing it with the results of the analysis of articles in the Web of Science (while this study is based on the analysis of publications indexed by the Scopus database).

The issue of digitization has been raised in the scientific literature since the first attempts to implement information technologies in enterprises, institutions, or organizations (Figure 2c). However, only from the last decade of the 20th century, there has been a gradual increase in the number of these publications. Over the past twenty years, the number of scientific works that reveal the topic of digitalization has increased from 31 to 558 units, that is, more than 15 times – the growth rate of the number of articles in this field is colossal. From 2017 to 2021, the largest number of articles on digitization was recorded. The outlined trends are the consequence of the rapid development of innovative digital technologies (Big Data, cloud computing, blockchain, Artificial Intelligence, Internet of Things, etc.) and active implementation of such technologies in the activities of business entities. Social distancing, remote learning mode at a number of enterprises, distance learning in educational institutions, and other restrictions, challenges, and changes caused by the COVID-19 pandemic have intensified public and scientific interest in digitization processes and the use of information technologies. The above conclusion is consistent with the research result obtained by Díaz-García et al. (2022), who used a bibliometric analysis of 469 articles published in 1900–2021 in journals included in the Web of Science. Accordingly, this current study and Díaz-García et al. (2022) are mutually complementary.

The VOSviewer information toolkit made it possible to build and visualize maps (Ostapenko et al., 2023; Pasko et al., 2021; Shome et al., 2023) of the relationship between key words in scientific publications, the titles of which contain the terms “sustainable development,” “higher education,” and “digitalization” (Figure 3), which in turn made it possible to formalize meaningful-contextual dimension of research of the higher education for sustainable development in digital era.

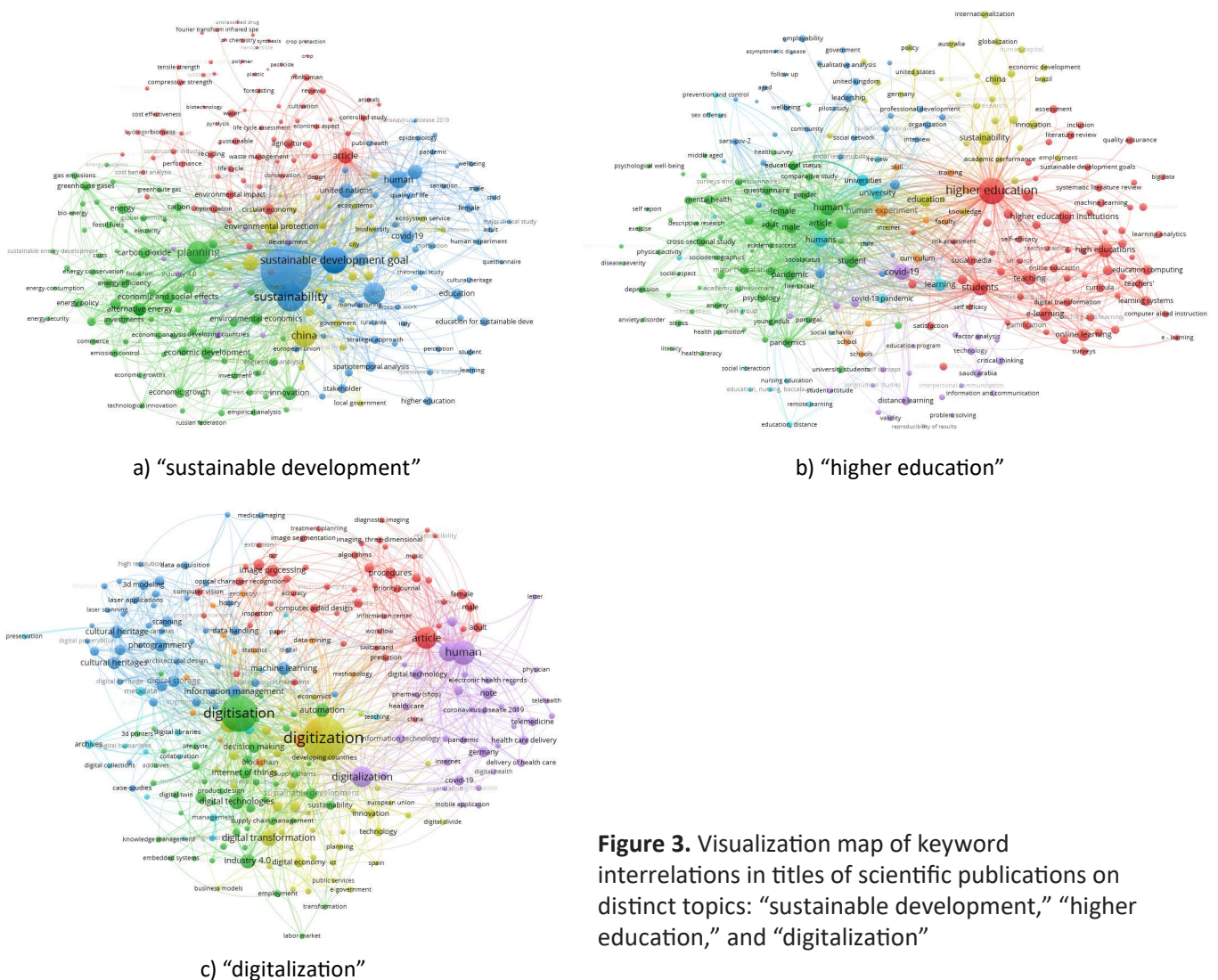
Figure 3a shows the increased interest of scientists in sustainable development explained by their desire to find effective ways and tools to ensure economic and technological development. In addition, they strive to activate and support the development of social, economic, and ecological subsystems, strengthen the role of information factors in managing the processes of transition to sustain-

able development, and form mechanisms for the implementation of management decisions to ensure the sustainability of socio-economic systems. Over the past five years, there has been an increase in the number of publications devoted to the role of higher education (universities) in ensuring the sustainable development of a country/region.

In 2020–2023, several publications were devoted to adapting higher education institutions to the restrictions caused by COVID-19. In particular, considerable attention was paid to various aspects of the forced transition of universities to a distance learning, investment in the implementation of the latest digital technologies, modifications of educational programs, changes in the organization of the educational process, strengthening of self-discipline and responsibility of students in online learning. As can be seen from Figure 3b,

despite the high relevance of the topic of higher education in the conditions of COVID-19, many articles were devoted to the topic of sustainability of universities and their impact on the implementation of sustainable development goals.

Figure 3c presents the visualization map of the relationship between keywords in scientific publications, the titles of which contain the term “digitalization” (constructed using the VOSviewer information toolkit). Articles devoted to digitization cover not only issues related to the implementation of digital technologies (IT sphere) but also penetrate into a fairly wide range of spheres and types of activities (economy, pedagogy, medicine, pharmaceuticals, culture, history, chemical industry, management, and others). A significant number of publications on digitization is related to higher education (teaching, education, e-learning, etc.).



**Figure 3.** Visualization map of keyword interrelations in titles of scientific publications on distinct topics: “sustainable development,” “higher education,” and “digitalization”



Conducting the bibliometric analysis of publications in the higher education field for sustainable development in digitalization conditions involved monitoring the database for the articles that contain the terms “higher education,” “sustainable development,” and “digitalization” at the same time. In total, four such articles were found, and they were published in 2020 (one article), 2021 (1), and 2022 (2). The topic chosen for analysis is new, and few publications are still devoted to it. However, the high relevance and perspective of this topic will lead to a further increase in the amount of research.

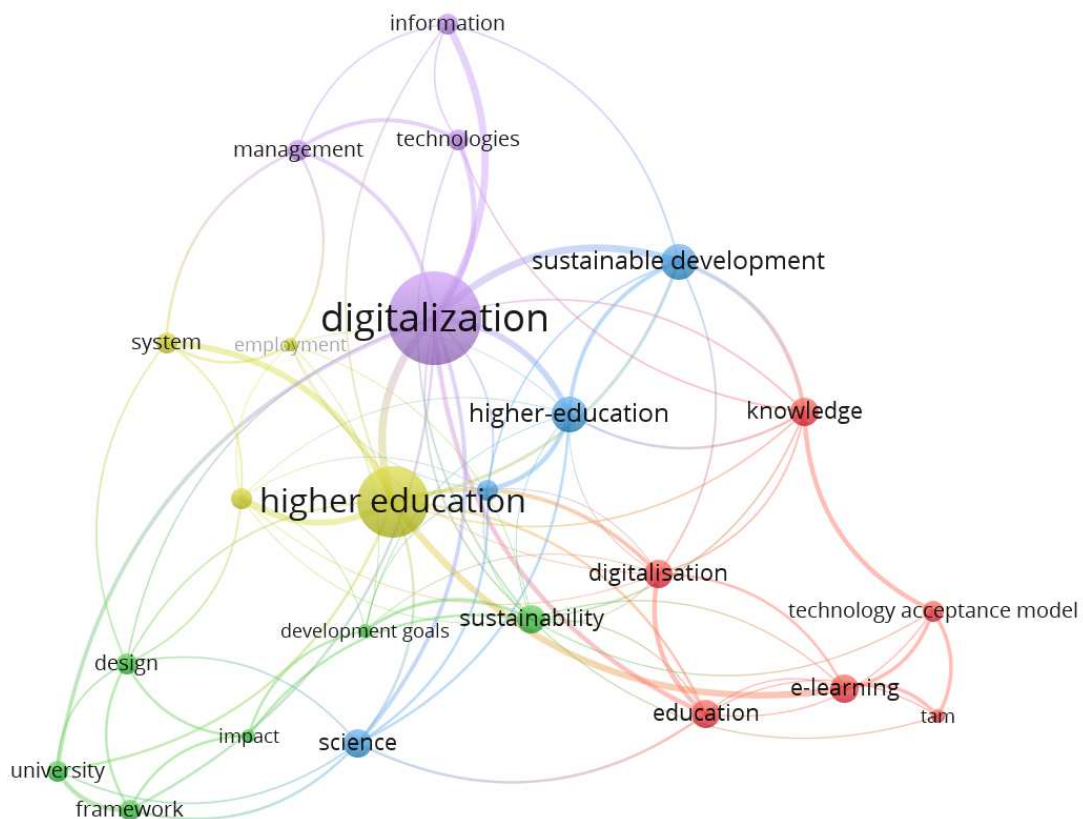
To analyze the areas of research on the subject of higher education for sustainable development in the digital era, Figure 4 demonstrates the visualization map of the relationship between sustainable development, higher education, and digitalization built using the VOSviewer software toolkit.

Despite the very small number of publications in the Scopus database on the subject under study,

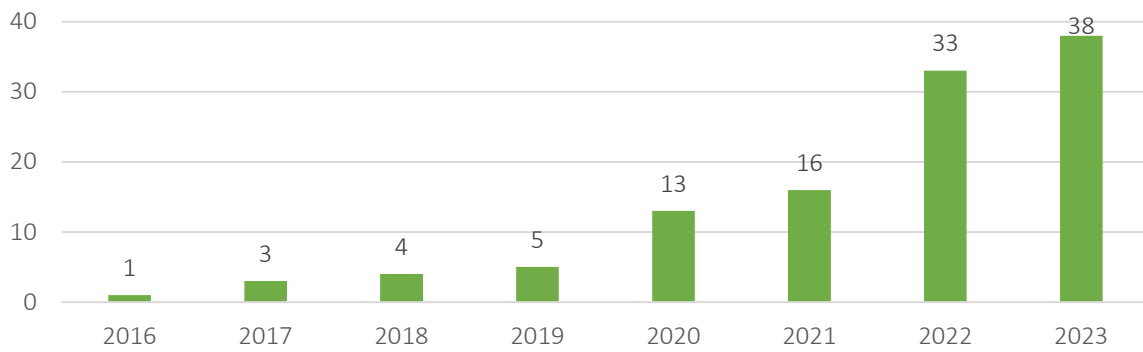
they are interdisciplinary in nature and require the use of research tools of various sciences (IT, pedagogy, management, economics, or ecology). The analyzed publications aimed to determine the most effective and efficient digital tools for the amplification of the contribution of higher education institutions in achieving the sustainable development goals.

Within the Scopus database, the study decided to expand the research sample devoted to the topics of sustainable development, digitalization, and higher education. In particular, the sample included articles with specified keywords (Figure 5). Thus, the study significantly expanded the sample for analysis – covering 120 articles.

In 2016, only one article was recorded. However, in 2020, 13 such publications were already in the Scopus database, in 2021 – 16, in 2022 – 33, and in 2023 – 38. This confirms the growing relevance of the research topic and the active increase in the



**Figure 4.** Visualization of global research trends of keyword interrelations in titles of comprehensive studies on sustainable development, higher education, and digitalization



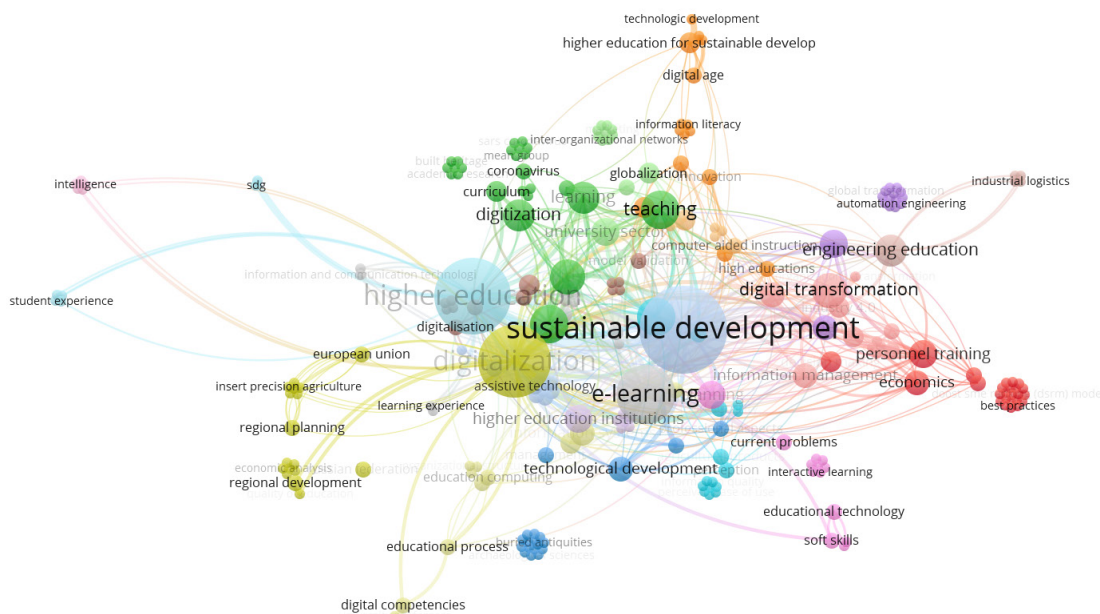
**Figure 5.** The number of scientific articles where the keywords sustainable development, higher education, and digitalization are simultaneously indicated

interest of scientists and experts in it. The complexity of research on a similar topic is explained by its interdisciplinary nature, which usually requires the formation of a team of scientists and the testing of tools and methods from several scientific areas.

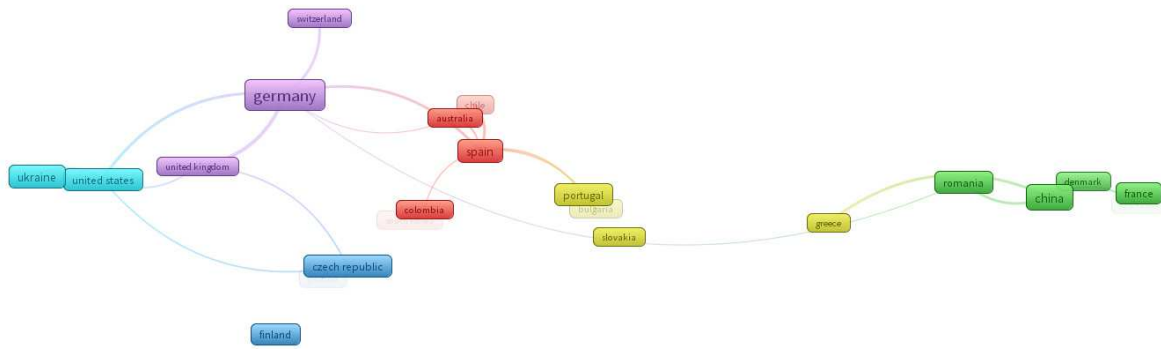
The content-contextual block of the bibliometric analysis proves that the publications outlined above reveal the relationship between sustainable development (dark blue circle in Figure 6) and higher education (blue circle in Figure 6) in the inextricable connection with digitization trends (yellow circle in Figure 6).

Figure 6 visualizes a number of intersections and connections; the intensity of sustainable development largely depends on higher education, and vice versa, sustainability trends affect the development of higher education. Diameter circles on the map demonstrate the frequency of mentions of the terms teaching, e-learning, technological development, digital transformation, educational process, information management, and university sector in analyzed articles.

By annual growth in the volume of scientific publications on the subject of higher education, the matter of sustainable development in the digital



**Figure 6.** Visualization map depicting the relationships between the concepts of sustainable development, higher education and digitalization, based on their co-occurrence in the titles, abstracts, and keywords of scientific publications



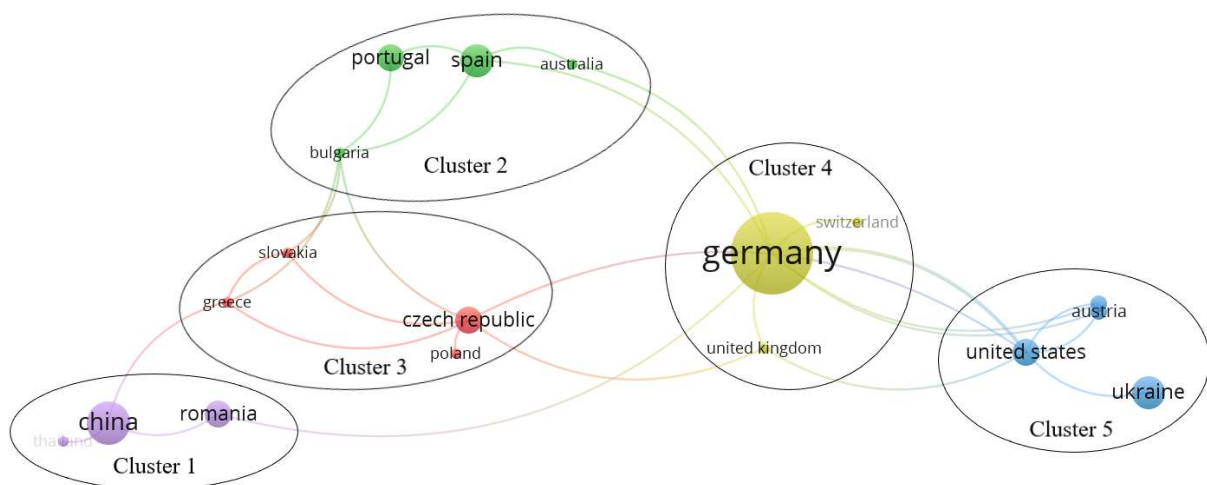
**Figure 7.** Spatial component of the bibliometric analysis of the higher education concept for sustainable development in the digital era

era is observed. In a number of such publications, the authors focus on finding innovative digital tools for improving the educational and research activities of higher education institutions in order to intensify the processes of sustainable development of the country/region. The highest growth rates in the number of articles devoted to the digitization of higher education (including in the context of ensuring movement directed to sustainable development) were observed starting from 2019–2020 due to the limitations of the COVID-19 pandemic.

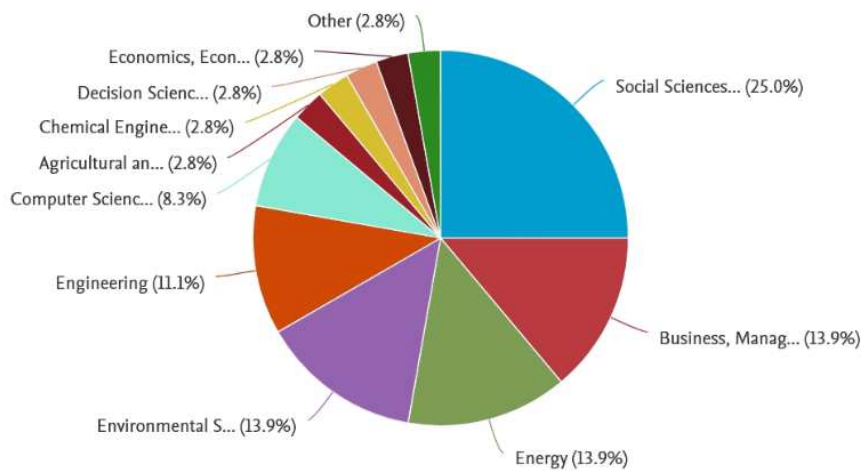
Figure 7 shows the spatial composition of the array of publications on the subject of higher education for sustainable development in the digital era changed over time.

The bibliometric analysis of the spatial dimension asserted the intensification of research in all countries of the world during the years 2017–2023 in

the relevant time ranges, each of which has its own global geographical centers of scientific research concentration. A general pattern can be noted: earlier studies of 2017–2019: Germany, Spain, the United States, Austria, and Canada; 2020–2021: Germany, Romania, Portugal, Spain; 2022–2023: China, Romania, the Czech Republic, and Germany. As for Ukraine, the analysis showed that the publication activity started in 2019. During 2023, the domestic scientific community showed a certain scientific interest in this issue. The example of Ukraine proves that modern digital technologies provide real opportunities for the functioning of educational institutions even during strict quarantine restrictions and full-scale war. Digital technologies currently mediate the formation of sustainable knowledge, sustainable thinking and lifestyle among university students, allowing successful implementation of bachelor and master programs on sustainability in various fields, ensuring comfortable international scientific com-



**Figure 8.** Visualization map of the co-authorship



**Figure 9.** Structural analysis of higher education for sustainable development in the digital era

munication, implementation of joint projects on sustainability, and development of green technologies, sustainable methods of economic activity, etc. Higher education institutions use digital technologies to widely inform society about their sustainable initiatives, popularize European values of sustainability, and involve the public in measures to achieve the sustainable development goals.

According to the spatial clustering of countries using the VOSviewer toolkit (Figure 8), five groups of countries were identified, researchers from which have the most publications on higher education for sustainable development in the digital era. In the total volume of scientific publications, the largest number of works for the analyzed period belongs to scientists from China, Spain, the Czech Republic, Germany, and Ukraine.

Figure 9 demonstrates the predominance of social sciences and business, management, and accounting, which confirms the interdisciplinary nature of the study of the higher education concept for sustainable development in the digital era. At the same time, the branch affiliation of the analyzed scientific works is quite well-known and wide. However, the majority of research have a socio-humanitarian character. This way, research of the higher education concept for sustainable development in the digital era generally takes a key place in social sciences, business, management, accounting, energy, and environmental science.

In the next five years, the topic of higher education for sustainable development in the digital era can gain more and more popularity in scientific circles. This thesis is justified by the following considerations. First, rapid technological changes necessitate the introduction of innovative digital technologies into the activities of higher education institutions to ensure their competitiveness both on the national and international market of educational services. Moreover, modern digital solutions are capable of accelerating the pace of achieving the sustainable development goals, their promotion and informing a wider target audience about the university's sustainability initiatives. To ensure compliance with modern requirements, universities update approaches to the organization of the educational process and educational programs and integrate sustainability and digital components in their development strategies.

Second, the global nature of digitization and sustainable development actualizes the expediency of researching synergies from their combination in the practice of modern higher education institutions. Third, the interdisciplinary nature of the topic attracts specialists from different sciences to its research, which causes the opening of new areas and niches for study. Fourth, the topicality of the topic, the increased interest of society, various stakeholders, and international organizations in issues of promoting sustainable development stimulates the inflow of investments (grants) for the implementation of research projects on the

sustainability of universities in the era of digitalization. The education for sustainable development will deepen and become narrowly specialized. It can refer to the study of the role of certain types of digital technologies (Artificial Intelligence, Internet of Things, etc.) in strengthening the influence of higher education on ensuring the sustainable development of the country/region. Vital issues also include assessment of the effectiveness of digital technologies in higher education for sustainable development, development of sustainable competencies for the digital economy, increasing the inclusiveness level, and simplifying the access of students from different groups of society to participation in sustainable projects and initiatives. In addition, it is worth noting ensuring cybersecurity, protection against digital threats in higher education in the context of sustainability; introduction of the remote form of learning educational programs on sustainable development of various sectors and branches of the economy; ethical aspects of the use of digital technologies in higher education in the implementation of the global Sustainable Development Goals, etc.

Supporting the majority of scientific research on the mentioned subject, it is advisable to pay attention to the analysis of modern challenges of higher education on the way to the implementation of the sustainable development goals in the conditions of digitalization. The findings show the need to improve digital teaching and the quality of education

through innovation, technological development, and the use of resources, as well as create a digital platform and an appropriate environment for the promotion of SDGs.

This study supports the relevant research of Keller et al. (2023). According to Kaszalik et al. (2023), education, science, technology, research, and innovation are supporting tools of the European Union's Sustainable Development 2030 program. Scientists say that these elements are valuable because their priority is not in doubt, and they act as catalysts.

The findings also support Li et al. (2022), who conducted a meta-analysis consisting of a systematic review of the available literature on the topic of digitization and higher education for sustainable development. This study lacks mathematical models and empirical tools.

Paying attention to the research results of Toader et al. (2021), it is appropriate to note the positive impact of digitalization on higher education, as well as the positive impact of the latter on sustainable development, as a basis for future stimulation of public policy. The study used quantitative and qualitative approaches based on questionnaires. It was concluded that thanks to digitalization, most participants in the educational process were able to continue their studies during the pandemic. Scientists also proved the feasibility of introducing sustainable initiatives into the higher education system.

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## CONCLUSION

The aim of the study was to map the scientific landscape on the topic of higher education for sustainable development in the context of digitalization through bibliometric analysis. To achieve the aim of the paper, bibliometric analysis, an in-built Scopus instrument, and VOSviewer were used. The analysis demonstrated the direct connection between the basic principles of the sustainable development concept, sustainable development goals, higher education, universities, digitization, and digital technologies. The paper gradually revealed the answers to the research issues on the relationship between categories, the degree of study of the topic, the structure of relevant scientific publications, their keywords, as well as promising ways of scientific research.

The rapid spread of COVID-19 and Russia's war against Ukraine proved that digital technologies are a sufficiently effective tool for continuing the activities of higher education institutions (including their movement toward the achievement of SDGs) even in conditions of extremely powerful exogenous challenges. Modern digital technologies make it possible to more effectively implement educational programs on sustainability, develop sustainable skills and lifestyles among students, and contribute to the expansion of international scientific communication while implementing joint sustainable projects.



They are also used to popularize and involve the public in activities to achieve the SDGs. The positive influence of higher education institutions is manifested through their educational (eco-oriented training personnel for the national economy; new generation of entrepreneurs able that do business in an environmentally friendly way), social (development of young people's ecological way of thinking and green lifestyle), and research (creation of economically profitable environmentally safe technologies; creation and transfer of new sustainable knowledge) activities. It is difficult to overestimate the role of universities in ensuring sustainability since their activities indirectly lead to the formation of a sustainable society and a sustainable economy. At the same time, the higher education system itself is changing, transforming into an inclusive system with free access to high-quality knowledge, as well as a system that provides equal opportunities for all and creates the basis for lifelong learning. Today, the highest indicators in global competitiveness ratings are increasingly occupied by established universities.

The significance of the digitization of the economy and society in this context is determined. Innovative digital solutions, tools, and technologies enabled universities to conduct high-quality educational and research activities under the challenges of the COVID-19 pandemic and Russia's war in Ukraine. Thanks to the digitization of activities, higher education institutions managed to continue the movement toward the achievement of the sustainable development goals.

The analysis of scientific publications within the scope of higher education for sustainable development showed that the role of digital technologies and innovations remains incompletely resolved. Future publications in this field should become more highly specialized, focusing on the role of certain digital technologies (Artificial Intelligence, Internet of Things, etc.) in promoting sustainable development. Topics may include the effectiveness of digital technologies in higher education, the development of competencies for the digital economy, inclusiveness, cyber security, as well as ethical aspects of using technologies to achieve SDGs.

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