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MAPPING RESEARCH ON DIGITALISATION AND ECONOMIC DEVELOPMENT: A COMPARATIVE BIBLIOMETRIC NETWORK ANALYSIS OF SCOPUS AND OPENALEX

The article explores digitalisation as a factor in economic development in the context of global transformations. The relevance of the research is determined by the growing impact of digital technologies on economic systems and the increasing need to conceptualise scientific approaches. The aim of the article is to identify major research directions and structural patterns in the academic discourse and to compare the results of mapping the research landscapes of the Scopus and OpenAlex databases. The methodology is based on bibliometric analysis using network analysis tools, including co-authorship and keyword co-occurrence analysis. The results reveal the interdisciplinary nature of research and highlight emerging thematic clusters. The practical value of the article lies in its potential application for shaping research agendas and supporting digital development strategies.

Keywords: digitalisation, economic development, academic discourse, bibliometric analysis, digital development, Scopus, OpenAlex.

JEL classification: O10, O33, F63.

КАРТУВАННЯ ДОСЛІДЖЕНЬ З ЦИФРОВІЗАЦІЇ ТА ЕКОНОМІЧНОГО РОЗВИТКУ: ПОРІВНЯЛЬНИЙ БІБЛІОМЕТРИЧНИЙ МЕРЕЖЕВИЙ АНАЛІЗ НАУКОМЕТРИЧНИХ БАЗ ДАНИХ SCOPUS ТА OPENALEX

У статті досліджується цифровізація як чинник економічного розвитку в умовах глобальних трансформацій. Актуальність дослідження зумовлена зростанням ролі інноваційних цифрових технологій у формуванні конкурентоспроможності національних економік та необхідністю системного осмислення наукових підходів до аналізу цифрових процесів. Метою даного дослідження є виявлення та систематизація ключових та перспективних наукових напрямів, концептуальних ядер та структурних зв'язків у сучасному науковому дискурсі з тематики цифровізації та економічного розвитку. Методологічну основу становить аналіз наукових публікацій, які відповідали заданим критеріям, із використанням методів бібліометричного аналізу за допомогою програмного забезпечення VOSviewer. Зокрема, автором було проведено аналіз співавторства, спільної появи ключових слів та хронологічний аналіз (за показником середнього року публікації). Застосування кількісних методів дозволило проаналізувати масив даних двох наукометричних баз (Scopus та OpenAlex) та простежити еволюцію дослідницьких пріоритетів. За результатами дослідження підтверджено міждисциплінарний характер цифровізації, сформовано уявлення про домінантні тематичні кластери та виявлено зсув дослідницького фокуса у бік інституційних, соціальних та екологічних аспектів цифровізації. Отримані результати дослідження свідчать про формування нових наукових напрямів, які пов'язані з цифровим управлінням, сталим розвитком та глобальними економічними взаємозв'язками. Серед перспективних напрямів досліджень з тематики автором виділено такі: потенціал цифровізації для просторового розвитку територій, гендерні та екологічні аспекти цифрової трансформації, специфіка функціонування фінансового та банківського сектору в умовах ісламського економічного підходу. Практична цінність дослідження полягає у можливості використання його результатів для обґрунтування наукових стратегій, визначення перспективних напрямів подальших досліджень з тематики цифровізації та економічного розвитку та підтримки процесу прийняття рішень у сфері цифрового розвитку економічних систем.

Ключові слова: цифровізація, економічний розвиток, академічний дискурс, бібліометричний аналіз, цифровий розвиток, Scopus, OpenAlex.

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Statement of the problem. Digitalisation is a significant factor in modern structural changes in economic systems, which affects labour productivity, management models, innovation activity, market functioning, and spatial organisation of economic activity. The scale of its socio-economic consequences has led to the emergence of a vast array of interdisciplinary studies, where digital transformation is considered in conjunction with institutional, social, environmental, and technological processes. The rapid expansion of publication output complicates the systematisation of accumulated research findings, the identification of the conceptual structure of the research field, and the detection of emerging thematic areas.

Bibliometric network analysis makes it possible to determine the nature of connections among authors and thematic components of the scientific discourse, identify key conceptual and empirical directions, and trace changes in research priorities. Despite the growing number of bibliometric studies, a significant number of works are based on data from a single database (predominantly Scopus or Web of Science), while the potential of open bibliometric systems, such as OpenAlex, remains under-examined. Differences in language and geographical representation, as well as thematic classification and completeness of metadata, can influence structural disparities in the global research environment.

In addition, widely known citation databases (Scopus and Web of Science) face growing criticism due to their high cost, limited accessibility of data, and structural asymmetries. Moreover, it is noted that Scopus is characterised by insufficient geographical diversity of authors, particularly from the Middle East and the African continent. It was revealed that millions of records with author affiliation information collected in Scopus are unexpectedly labelled as «country-undefined» [1]. To support the open-access policy, leading universities and research institutions prefer open-access scientific databases, opting out of subscriptions to Scopus [2-5] and prioritizing open bibliometric databases, primarily OpenAlex.

The scientific problem of the article is to identify how the use of different citation databases alters the representation of the field structure in digitalisation and economic development, its thematic trends, and temporal shifts. To address the problem, the author applies a comparative bibliometric network analysis of documents from the Scopus and OpenAlex databases.

Analysis of recent research and publications.

R. N. A. Shihab et al. conducted a bibliometric analysis with the keyword co-occurrence analysis in Scopus literature from 2008 to 2014 to map the intellectual contours and evolution of research within various subject domains [6]. When examining economic development in the context of the digital economy, W. Al-Zoubi analysed English-language publications in Web of Science from 2000 to 2023 [7]. Z. Dai and Y. Jiang focused on international digital economy-related literature in the Web of Science, comparing it with scientific discourse formed within the China National Knowledge Infrastructure. The authors underscored the differences between the two discourses: while Chinese

research built on a practical approach, international studies centred on the intersection of technology and society [8]. The collective work led by Manuel J. Cobo explored the current research trends and conceptual structure of Web of Science literature on the digital economy, using a bibliometric and science mapping approach [9]. L.-S. Mihai et al. captured the presence of notable conceptual fragmentation in Web of Science literature on digitalisation and sustainability-oriented innovations and pointed to the necessity for a more integrated theoretical framework in performance measurement and corporate social responsibility [10].

A synthesis of the reviewed studies demonstrates that digitalisation has emerged as an interdisciplinary field of research where technological changes are analysed in conjunction with economic, social, institutional, and environmental processes. However, the vast array of existing bibliometric studies still relies on data from a single citation database, which limits the possibilities for comparing the structure of the research field and identifying differences related to indexing, publication coverage, and thematic classification. This necessity justifies conducting a comparative bibliometric mapping of scientific publications indexed in Scopus and OpenAlex.

The aim of the article is to identify structural, thematic, and temporal patterns in the academic discourse on digitalisation and economic development and to outline promising directions for its further development through comparative bibliometric network analysis of scientific publications from the Scopus and OpenAlex databases.

Methods. The methodological foundation of the study is comparative bibliometric network analysis of scientific publications on digitalisation and economic development indexed in Scopus and OpenAlex. To identify the structure of the research field, the co-authorship network analysis and the keyword co-occurrence analysis were applied. A chronological mapping based on the average publication year was used to reveal temporal shifts in the thematic focus of publications. The visualisation of bibliometric networks was carried out using VOSviewer software (version 1.6.2), applying fractional counting for co-authorship analysis and full counting for keyword co-occurrence analysis. Clustering of network components was performed based on a modularity algorithm, accounting for link strength between authors and keywords. The dataset was formed from publications covering the period 2020–2025, retrieved from the Scopus and OpenAlex databases as of 3 January 2026.

Presentation of the main research material. Table 1 illustrates filtering criteria that were applied to select relevant publications from the Scopus citation database, based on the search query «article title, abstract, keywords» («digitalization AND economic development»). The object of analysis comprised peer-reviewed journal articles published exclusively in English during 2020–2025 (Table 1), excluding documents with author affiliations in the Russian Federation and Belarus due to restricted access to official full-text web resources.

Table 1

The search strategy for bibliometric network analysis on digitalisation and economic development

	Scopus	OpenAlex
Authors identified from the database	n = 6,533	n = 45,461
Filter: minimum number of publications	4	5
Authors included	n = 182	n = 300
Keywords identified from the database	n = 10,146	n = 6,249
Filter: minimum number of co-occurrences	15	30
Keywords that meet the threshold	n = 237	n = 599
Keywords included after manual revising	n = 210	n = 438
Search strategy: Search string: TITLE-ABS-KEY (“digitalization” AND “economic development”) Time period: 2020-2025 Document and source type: article, journal Language: English (S); English and Ukrainian (O) Subject area: limited to Economics, Econometrics and Finance; Business, Management and Accounting; Social Sciences; Environmental Science; Energy; Computer Science; Engineering; Decision Science; Agricultural and Biological Science (only for OpenAlex)		

Source: systematized by the author on the basis of [11], [12].

The data collection and filtering phase yielded a final sample of 2,367 papers as of 3 January 2026. During the period under consideration, the growth of publication activity was non-linear, and the geographical distribution of authors was disproportionate. The highest publication volume on the relevant topic was produced by authors affiliated with China (764 articles) and Ukraine (344 articles) [11]. European countries in the top 10 accounted for 509 documents (Italy, the United Kingdom, Germany, Poland, Romania, and Spain), while Kazakhstan led the Asian region with 91 articles [11]. By subject area, selected documents were distributed as follows: social sciences (1,012 articles), environmental science (733), economics, econometrics, and finance (678), business, management, and accounting (647), computer science (502), energy (455), and engineering (349) [11]. The above quantitative indicators should be interpreted with caution and used predominantly for comparison, given that interdisciplinary articles may be assigned to several subject areas simultaneously.

RQ1. What are the major structural and temporal features of the co-authorship network within the field of digitalisation and economic development research?

After applying the selection criteria illustrated in Figure 1, the total sample of authors comprised 6,533 individuals. Filters and subsequent selection significantly reduced the number of authors to 182. The threshold values were established to maintain focus on the most productive authors and high-frequency keywords, thereby ensuring a balance between network interpretability and representativeness. To construct a visual representation of the co-authorship map, a method of fractional counting was applied.

Clustering performed via VOSviewer algorithms grouped the authors into 27 clusters, 8 of which were single-node clusters (29.6%). To uncover structural patterns and collaboration dynamics, the analysis focused on multi-node clusters that had higher indicators of internal connectivity. Within the network, 155 out of 182 clusters were located most compactly and predominantly affiliated with China, ranging from 2 to 19 authors in multi-node clusters.

Given the average publication year, 9.9% of the authors had a value higher than 2024.5. The emergence of new authors reflects a plurality of perspectives or the existence of insufficiently researched areas of knowledge. The keyword co-occurrence analysis allowed answering the following research questions:

RQ2. Which conceptual and empirical research streams have shaped the knowledge base on digitalisation and economic development?

RQ3. What topics have attracted the primary attention of researchers over time, and what are the core topics in the relevant literature?

A primary review of the network (Figure 1) made it possible to distinguish the most frequently occurring concepts, which comprise a technological core on the field studied, namely, *digitalization*, *digitization*, *digital economy*, *digital transformation*, *innovation*, and *digital technologies*. High frequency of occurrences and value of total link strength (TLS) for the above keywords suggest a mature and conceptually cohesive body of literature focused on technological shifts as a driving force behind economic and societal processes.

Some keywords were subjects of closer attention due to their thematic specificity. The presence of “carbon emission” (keyword) with concepts related to sustainable development indicated a strong integration of digitalisation research with a requirement for its application in an environmentally sustainable way. Essentially, some authors emphasize the importance of sticking to the principle of “twin transition” (which is digital and green transition). Similarly, “human” (keyword) underscores growing attention to humanitarian aspects of globalisation, including labour, skills, and social cohesion.

To build network visualisation, a full counting for the keyword co-occurrence analysis was applied. The method was chosen to balance the weight of each keyword regardless of its total occurrence in a document and to prevent the dilution of prevalent themes.



Scopus

Rank	Keyword	Occurrences	TLS	Rank	Keyword	Occurrences	TLS
1	Digitalization	745	4,167	8	Innovation	239	1,801
2	Sustainable development	426	3,184	9	Digital transformation	223	1,126
3	China	363	3,297	10	Economic growth	195	1,567
4	Digitization	337	2,789	11	Economic and social effects	167	1,450
5	Economic development	280	2,591	12	Human	125	1,444
6	Sustainability	276	1,990	13	Digital technologies	124	656
7	Digital economy	240	1,340	14	Carbon emission	113	1,412

Fig. 1. The most co-occurring keywords in Scopus-indexed literature on digitalisation and economic development (2020-2025)
Source: systematized by the author on the basis of [11].

The keyword co-occurrence map (Figure 2) demonstrates a high-density, multi-node semantic research structure, where a central conceptual core clearly stands out

(digitalization, digitization, innovation and economic development, sustainability).

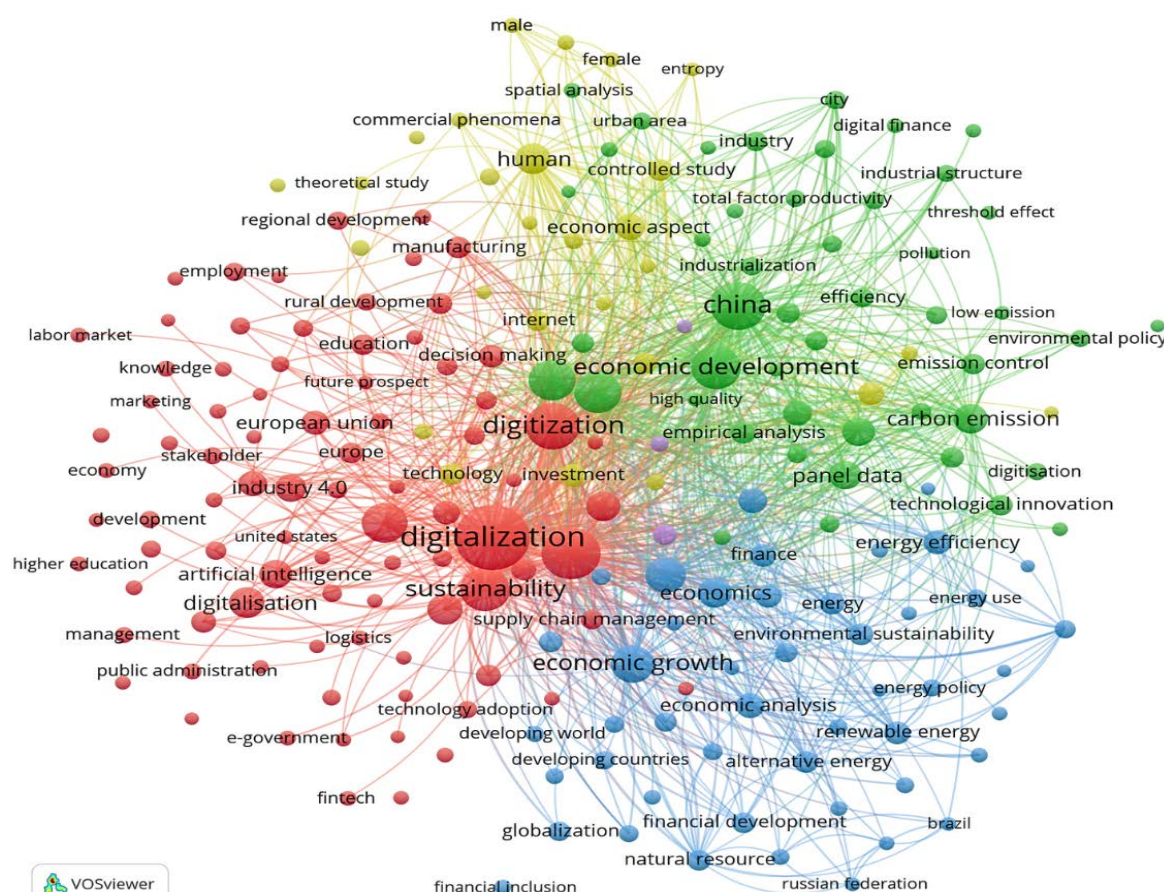


Fig. 2. Keyword co-occurrence network visualisation in Scopus-indexed literature on digitalisation and economic development
Source: created by the author on the basis of [11].

The network map is characterized by a cluster nature and interdisciplinarity. The subject area spans economics, public administration, energy, ecology, finance, regional development, etc. The list of countries and regions

mentioned (*China, Brazil, India, the European Union, Ukraine, the United States*) indicates the prevalence of the case-study approach. Analysing keyword sets within the clusters made it possible to map the communication

structure around the themes of the groups.

Cluster 1 (red): Managerial aspects of digitalisation

The cluster represents a technology-oriented research stream, within which digitalisation acts as a transformative tool for business processes (*business development, corporate social responsibility*), governance (*management, governance, policy making*), and industry (*manufacturing, performance, life cycle*).

Cluster 2 (green): Ecological aspects of digitalisation

The cluster captures increasing scientific interest in the environmental impacts of digitalisation and its role in achieving the Sustainable Development Goals (SDGs) and energy security (*energy efficiency, energy transition, energy utilization, renewable energy, renewable energy consumption*).

Cluster 3 (blue): Empirical research on digitalisation

The cluster is closely linked to empirical studies (*empirical analysis, panel data, spatial analysis, spatiotemporal analysis*) and economic development, with a focus on environmental sustainability and decarbonisation.

Cluster 4 (yellow) comprises keywords from social-oriented studies (*adult, male, female, human, digital divide, urban planning, urban development*) with a profound methodological background (*cluster analysis, controlled study, factor analysis, theoretical study*).

Cluster 5 (purple) is represented by only 3 keywords (*environment, environmental impact, resource allocation*), which hinders a clear identification of the cluster's nature. According to the average publication year, perspectives of

the twin transition (i.e., digital and green) seem to be the most advanced field of scientific research.

The sample of scientific publications from the OpenAlex citation database encompasses documents in both English and Ukrainian. As of 3 January 2026, the total number of documents that met the specified requirements was equal to 20,790 works [12]. Similarly to dynamics in Scopus, an increase of OpenAlex-indexed publications was non-linear and varied from 1,248 to 6,216 works. On a geographic basis, the distribution of affiliated authors was the following: China (2,676 authors), Ukraine (1,915), Indonesia (1,401), the USA (566), and the United Kingdom (426) [12].

After applying selection criteria and filters, the total sample of authors from the OpenAlex citation database on the relevant topic included 45,461 individuals. The threshold (Figure 1) reduced the number of authors to 300 scientists, providing a sufficient sample size for further analysis.

Following the clustering analysis, 67% of all groups (166) are single-node clusters. The results demonstrate that there are no visible linkages, which may indicate collective works. In this regard, single-node clusters are more likely to be structurally isolated than scientifically marginal. This suggests that single authorship may reflect, on the one hand, the emergence of a new thematic stream and, on the other, limited scholarly background. This latter hypothesis is confirmed by nodes with an average publication year close to 2024.0 (Figure 3).

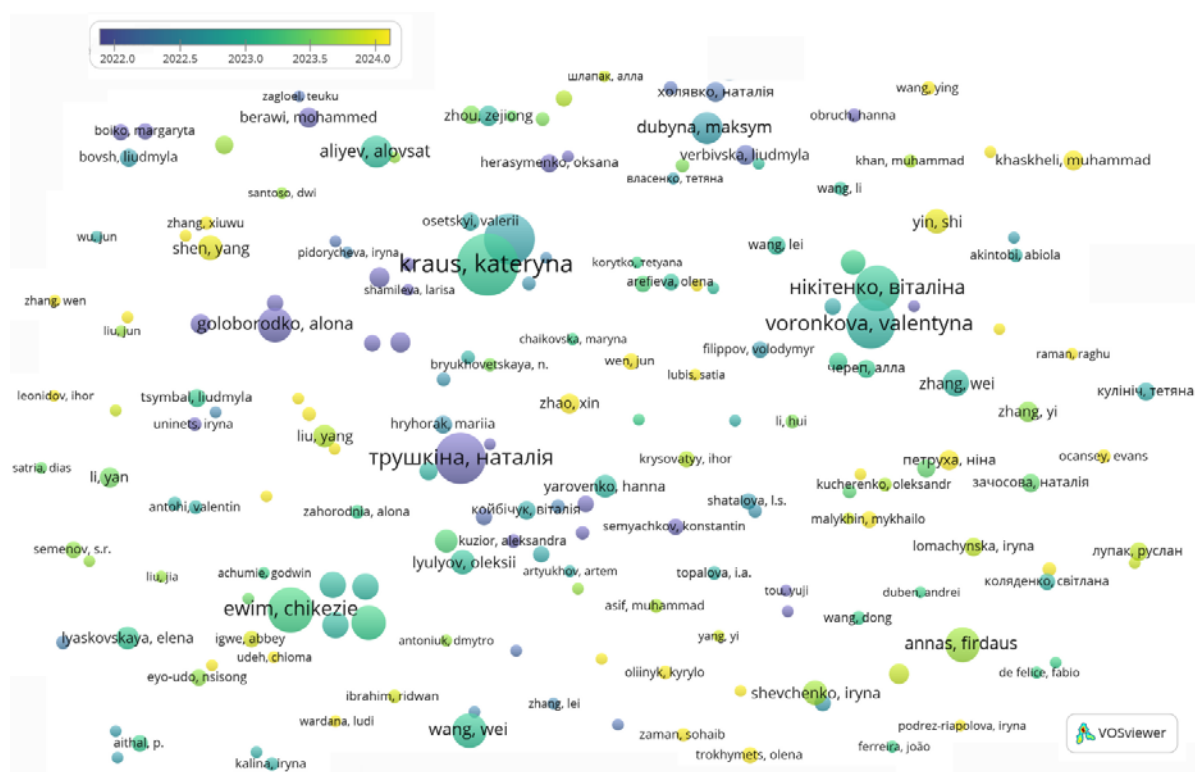


Fig. 3. Fragment of the OpenAlex co-authorship network on digitalisation and economic development
Source: systematized by the author on the basis of [12].

By setting a minimum limit of 8 nodes in a formation, 6 clusters were identified where the majority of authors were affiliated with Ukraine. Figure 4 presents the

scientists indexed in OpenAlex with the highest individual metrics of network interaction.

Author	Links	TLS	Documents	H-Index
Kraus K.	5	24.0	31	6
Kraus N.	5	25.0	25	6
Trushkina N.	6	14.0	25	3
Voronkova V.	6	22.0	24	15
Chikezie P.E.	9	21.0	22	8
Nikitenko V.	6	18.0	22	1
Popelo O.	8	12.0	20	1
Kubatko O.	4	12.0	17	19
Lyulyov O.	3	10.0	11	44

Fig. 4. Leading authors indexed in OpenAlex (2020-2025) in terms of the highest individual metrics of network interaction
Source: systematized by the author on the basis of [12].

Given the metrics in Figure 4, it can be stated that certain authors (Kraus K., Kraus N., Trushkina N., Voronkova V., and Nikitenko V.) demonstrate an advanced level of network connectivity. High scores in total link strength (TLS) reflect active participation in collective studies.

However, they were not always accompanied by a corresponding number of links. This, in turn, may indicate the repetitive and sustained nature of research collaboration (for example, Nataliia Kraus and Kateryna Kraus) [13], [14].



Rank	Keyword	Occurrences	TLS	Rank	Keyword	Occurrences	TLS
1	Business	14,076	123,046	8	Economic growth	3,480	37,815
2	Economics	9,645	96,044	9	Sociology	3,146	31,365
3	Computer Science	9,294	87,587	10	Finance	2,831	26,107
4	Political Science	8,048	77,197	11	Industrial organization	2,558	25,879
5	Geography	4,699	44,051	12	Economic system	2,173	23,347
6	Engineering	3,754	37,495	13	Digital economy	2,060	22,986
7	Marketing	3,536	35,116	14	World wide web	1,949	19,015

Fig. 5. The most co-occurring keywords in OpenAlex-indexed literature on digitalisation and economic development (2020-2025)
Source: systematized by the author on the basis of [12].

The findings of the keyword co-occurrence analysis of OpenAlex-indexed literature repeatedly confirm the interdisciplinary structure of the network. It was established that the digital agenda is becoming integrated across economic, social, managerial, engineering, and environmental research fields. Economics and management studies continue to form the central core of the scientific discourse, focusing on the transformation of business models, financial systems, and market mechanisms (Figure 5).

As shown in Figure 5, business (14,076 occurrences), economics (9,645), and computer science (9,294) are the most commonly used terms in relevant literature. Near the central core, domain-specific keywords are concentrated, namely, *political science*, *sociology*, *psychology*, *public relations*, and *law*.

Hence, studies extended into the social and institutional domain, investigating issues related to governance, societal changes, behavioural aspects, and regulatory policy in the context of digital transformations.

In the geographical and environmental cluster (red colour), several environmental terms achieved higher representation, namely, *sustainable development*, *environmental economics*, *ecology*, *environmental science*, *environmental planning*, and *natural resource economics*. Given an average publication year, this set of keywords has a value exceeding 2023.5, confirming growing interest in the environmental impacts of digitalisation. Moreover, the gradual expansion of the digitalisation discourse towards human capital, education, and social inclusion was identified. It is worth mentioning that research on digitalisation

is at the phase of its structural maturity, which can be evidenced by interdisciplinarity, the comprehensive nature of academic pursuits, and the expansion of the

methodological toolkit of the phenomenon (namely, digitalisation), its manifestations, and its potential for implementation.

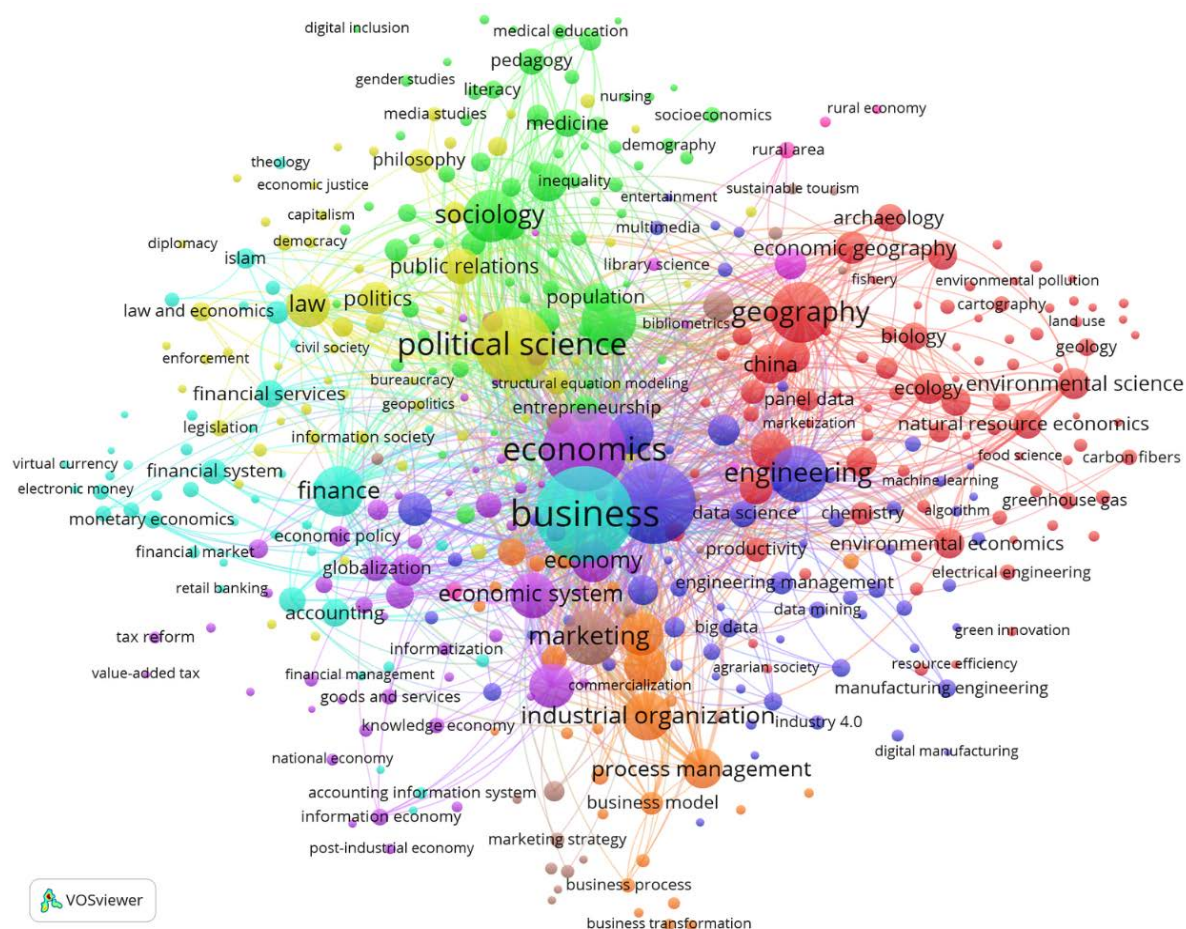


Fig. 6. Keyword co-occurrence network visualisation in OpenAlex-indexed literature on digitalisation and economic development
Source: created by the author on the basis of [12].

The average publication year is an indicator of thematic evolution. Keywords with scores varying between 2021 and 2022 represent a conceptually mature body of literature (*industrial production, informatization, information economy, postindustrial economy, quaternary sector of the economy, electronic money, information society*). The above terms are connected with classic theories of information and post-industrial development, and the early stages of digital transformation. In scientific literature, such keywords are rather undergoing deepening and clarification, which evidences that they are entering a phase of scientific maturity.

Instead, keywords with an average publication year after 2024.0 (yellow colour) reflect the emergence of new interdisciplinary streams (*green innovation, green growth, carbon fibers, archaeology, biology, physics, ancient history, socioeconomics*). Digitalisation integrates with natural, environmental, and humanities sciences. Attention is actively focused on issues related to the impact of digital initiatives on the environment and the opportunities of stable, low-carbon development in national economies. Research on digitalisation is becoming more dynamic and adapts to new global challenges, particularly the

requirements of sustainable development and technological convergence.

The findings of the comparative analysis showed that Scopus and OpenAlex create complementary rather than identical mappings of the research landscape. The Scopus citation database provides a more compact mapping of the established publication core and a more coherent co-authorship network. OpenAlex, in turn, expands linguistic, geographical, and disciplinary coverage, yet it forms a more fragmented co-authorship structure and broader thematic categories. Combining the two databases enables the identification of robust characteristics of the scientific discourse alongside results that are sensitive to indexing principles, publication coverage, and metadata structure.

Conclusions. The findings highlight that the scientific field at the intersection of digitalisation and economic development has a complex internal structure and covers technological, managerial, social, institutional, and environmental domains. The essence of digitalisation is not limited to the practical application of digital tools but is more connected with the quality of economic growth, transformation of management models, sustainability of economic systems, and social consequences of

technological shifts.

The co-authorship analysis demonstrates that the configuration of scientific collaboration is contingent on the source of bibliometric data. Scopus more distinctively illustrates separate clusters of authors with stable connections, while OpenAlex covers a wider range of authors and works. As a result, the network acquires a more dispersed character.

Thematic mapping enables the establishment of a sustainable connection between digital disruptions, innovation activity, business development, and structural modernization of the economy. Emerging publications enhance academic attention in energy transition, environmental effectiveness, decarbonisation, human capital, social inclusion, and regulatory mechanisms, which reflects the gradual transition from the analysis of separate digital technologies to the investigation of complex outcomes of digital transformation of economic systems.

A comparison of the results of two citation databases confirmed the suggestion that the choice of data source influences the configuration of the bibliometric map. Scopus more extensively reproduces terminology and established relationships within the subject field. OpenAlex extends the boundaries of the analysis due to higher linguistic, geographical, and disciplinary representation, but at the same time uses broader categories of thematic classification.

The practical significance of the obtained results lies in the possibility of using them to design research programs, clarify thematic priorities, and opt for data sources for future bibliometric studies. Prospects for further research are associated with constructing harmonized samples based on unified criteria, complementing network analysis with content analysis, and an in-depth examination of the digital transformation of territories, financial systems, urban environments, and socially vulnerable groups.

Emerging research themes (according to the average publication year) are Islamic banking and economic approaches peculiar to the Islamic economy, the unfolding of digitalisation in sociocultural and economic contexts in the Muslim-majority countries. Building on the identified research gaps, promising research topics were outlined, namely, the potential of digitalisation for regional development, and the gender and environmental aspects of digital transformation.

Nevertheless, the author argues that the current research has some limitations due to the volume of analysed data and the high level of generalization of the results. Bibliometric tools cannot capture the nuanced qualitative dimensions of scholarly literature because they focus on quantitative metrics instead. Despite the criticism of the Scopus and Web of Science citation databases, the transition to alternative bibliometric sources, such as OpenAlex, remains slow. The latter is currently under close scrutiny by bibliometricians and is not without its limitations. Furthermore, the author notes that this study is limited to the past five years, which precludes tracing the global evolution of the research field on digitalisation and economic development over a longer timeframe.

Declaration on the Use of Artificial Intelligence Tools. During the preparation of this article, certain artificial intelligence tools and auxiliary digital services were used. LanguageTool (free version) was employed to check spelling and punctuation errors. Reverso Context (free web version) was used to identify synonymous terms in order to diversify the lexical basis of specific text fragments. Gemini was used for the stylistic editing of selected sections of the manuscript. The author bears full responsibility for the scientific content, the reliability of the data, the accuracy of the bibliographic references, the research findings, and the conclusions presented in the article.

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