

# DIGITAL ECONOMY AND ECONOMIC GROWTH RESEARCH: A SCIENTOMETRIC STUDY OF CURRENT TRENDS AND FUTURE AGENDAS

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## Article history

Received date : 16-5-2026  
Revised date : 17-5-2026  
Accepted date : 2-6-2026  
Published date : 11-6-2026

## To cite this document:

Chaonan, C., & Abdul Jalil, N. (2026). Digital economy and economic growth research: A scientometric study of current trends and future agendas. *Journal of Islamic, Social, Economics and Development (JISED)*, 11 (83), 144 – 163.

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**Abstract:** *In recent years, the literature on the digital economy has experienced exponential growth, with the majority of studies focusing on a single country and limited international perspectives. This paper, utilizing the Web of Science (WoS) database and employing the visualization and analysis tool known as CiteSpace (6.2.R4(64-bit) Advanced), conducts a comprehensive overview, analyzing the research landscape in the field of digital economy and economic development over the past two decades from a national perspective. The study explores current hot topics and anticipates future trends in this research domain. The findings of the study revealed that most of the publishing organizations were universities and government departments, with the most significant contributions originating from Ukraine, Russia, and China. Most of the cooperation groups are country-based, with different groups within the country, and transnational groups are almost non-existent. The main research directions for the future include the role of digital technology in sustainable development, the catalyzing impact of digital innovation on emerging industries, the influence of the digital economy on social inequality, and digital transformation.*

**Keywords:** *Scientometric analysis; Digital economy and Economic growth; Citespace*

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## Introduction

The digital economy has become a major driver of global growth, transforming industries, business models, social interaction, and value distribution. Rooted in ICT, the Internet, and mobile technologies (Tapscott, 1995; Øverby & Audestad, 2021), it encompasses platforms, e-business, digital infrastructure, and regulation (Heath & Micallef, 2022), reflecting Carlsson's (2004) "new economy." In Asia, it promotes innovation, entrepreneurship, and integration into global production (K. Li et al., 2020).

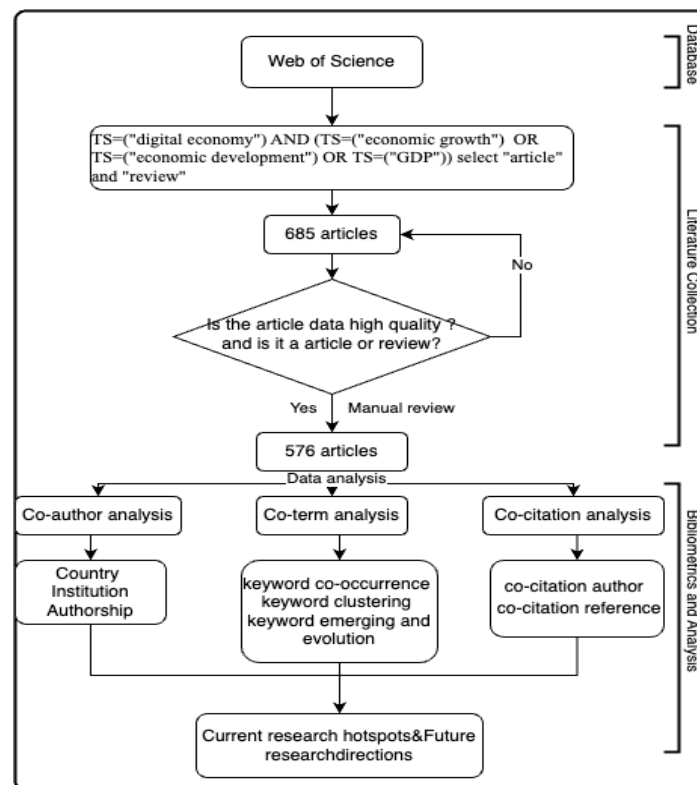
It generates billions of daily interactions (Gaziz et al., 2020), enhances resilience in crises such as COVID-19 (Nizar et al., 2021), and supports industrial upgrading, employment restructuring, and low-carbon development (Zhang, 2022; Yang et al., 2023). Its interconnected platforms accelerate service delivery and innovation (Pratt, 2017).

Yet, concerns persist: digital inequality (Yudina, 2020; Blanutsa, 2020), labor market disruption (Sadovaya, 2021), digital poverty (Konoplev, 2021), and environmental costs, including higher carbon emissions from digital infrastructure (Tang & Yang, 2023). Additional issues involve data privacy, market concentration, and ethical automation.

In sum, the digital economy is a key engine of sustainable growth but also a source of inequality and environmental stress. This study applies scientometric analysis with CiteSpace to map trends, highlight gaps, and guide future research and policy.

## Materials and Methods

Bibliometrics provides a quantitative and objective way to analyze databases, often using co-term and co-citation methods (Luo et al., 2022). This study applies bibliometrics to examine the digital economy and economic growth through co-authorship, co-term, and co-citation analyses. The co-term approach focuses on keyword co-occurrence, clustering, and evolution, while co-citation examines both authors and references. The overall picture is illustrated in figure 1.



**Figure 1: Research Flow Chart**

Web of Science (WoS), among the most extensively utilized bibliographic databases globally, offers entry to an extensive repository of scholarly research literature across diverse fields (Mongeon & Paul-Hus, 2016). It encompasses the indexing of numerous scholarly journals, conference proceedings, books, and various academic sources, thereby streamlining the literature review process (Singh et al., 2021).

CiteSpace, created by Chen Chaomei, is an information visualization and analysis tool coded in Java. It is employed for exploring co-citation networks through extensive bibliometric datasets (Chen et al., 2012). Several scholars employed CiteSpace to conduct literature reviews across diverse domains, including economy. For example, Peng et al. (2023) utilize the CiteSpace to analysis the research on the impact of the digital economy on enterprise innovation behavior, and find the current research hotspots and future research directions. The pairing of Web of Science (WoS) and CiteSpace was extensively employed in various influential review articles. Such as (Su et al., 2019).

“Digital economy” and “economy development or economic growth” are the terms used to find the articles. The type of reference is set to “articles and reviews” to ensure the high quality of the data source. Initially, 697 papers were chosen. However, the reliability of bibliometric analyses hinges on precise metadata, including author names, publication titles, abstracts, publication year, and citation details. In case of any absence, incompleteness, or formatting errors in these essential metadata within the Web of Science (WoS) data export, the bibliometric software may encounter challenges in accurate data processing. To ensure the integrity of the analysis, 121 papers with incomplete data were manually screened and excluded, resulting in a final set of 576 documents for bibliometric analysis.

## Findings

### Overview of Selected Publications

This section primarily analyzes the average annual publication of papers in this field and identifies the journals that publish the most relevant papers. This analysis provides insights into the current state of research on the correlation between digital economy and economic development.

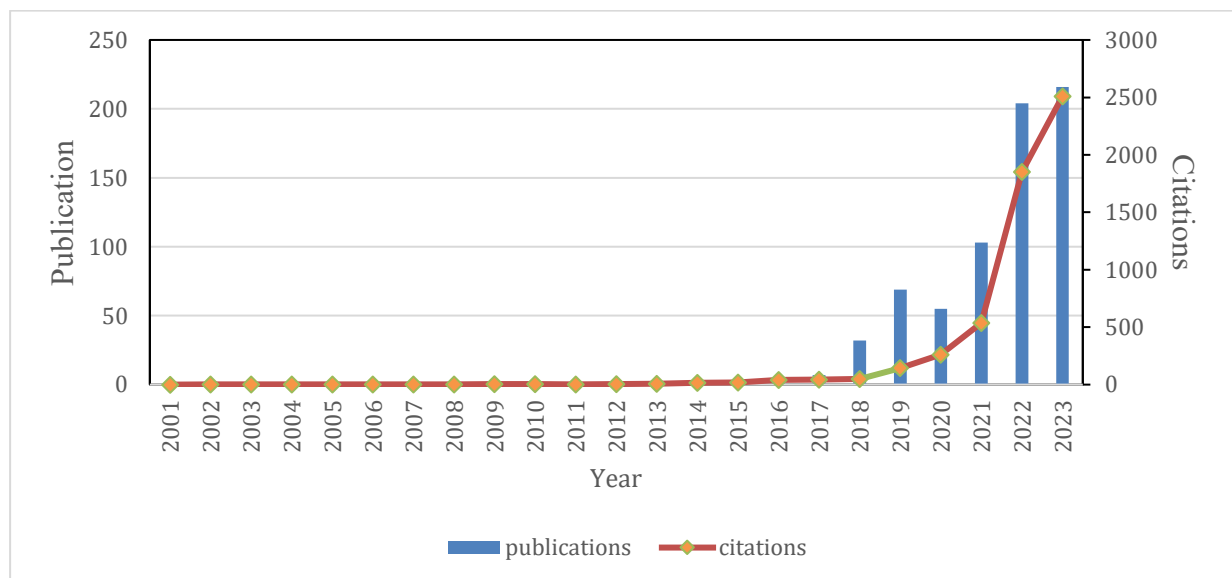
### Average Annual Publication

Tracking the annual number of publications and citations is crucial for predicting research trends (Kousha & Thelwall, 2023; Liu, 2013). Based on Web of Science data (retrieved Dec 10, 2023), research on the digital economy and economic development can be divided into three phases. From 2001 to 2017, the field was in its early stage with only 18 articles, reflecting initial scholarly efforts to explore the emerging link between digitalization and growth.

During 2018 to 2020, research entered a steady growth phase, producing 156 articles and 454 citations. Studies in this period expanded into areas such as labor market dynamics and industrial transformation. Since 2021, the field has entered a rapid expansion stage, with 523 publications and nearly 4,900 citations to date.

Recent research has focused on digital transformation, e-commerce and electronic payments, digital finance, human capital and skills, innovation and competitiveness, as well as digital inequality and social impacts.

In sum, both publications and citations have risen sharply year by year. The surge after 2021, especially following the COVID-19 pandemic, signals an explosive growth of academic interest in the digital economy's influence on economic development.



**Figure 2: Number of Cited Times and Publications Per Year Over Time In Digital Economy and Economy Growth Research.**

### Major Sources

A substantial number of studies on the digital economy and economic development are published in well-recognized international journals, reflecting the importance of this topic. Table 1 lists journals with more than five publications, with *Sustainability* (92 articles) and *Environmental Science and Pollution Research* (25 articles) leading by a wide margin. While these top journals dominate, the presence of other outlets underscores the diversity and relevance of publishing platforms contributing to this field of research.

**Table 1: Major Publication Titles**

No.	Publication Titles	Number	Percentage
1	SUSTAINABILITY	92	13.43
2	ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH	25	3.65
3	FRONTIERS IN ENVIRONMENTAL SCIENCE	16	2.34
4	TECHNOLOGY IN SOCIETY	15	2.19
5	INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH	14	2.04
6	ECONOMIC ANNALS XXI	13	1.90
7	SOCIO ECONOMIC SYSTEMS VOL 2	12	1.75
8	STUDIES IN SYSTEMS DECISION AND CONTROL	12	1.75
9	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	12	1.75
10	PLOS ONE	11	1.61

### Co-Authorship Analysis

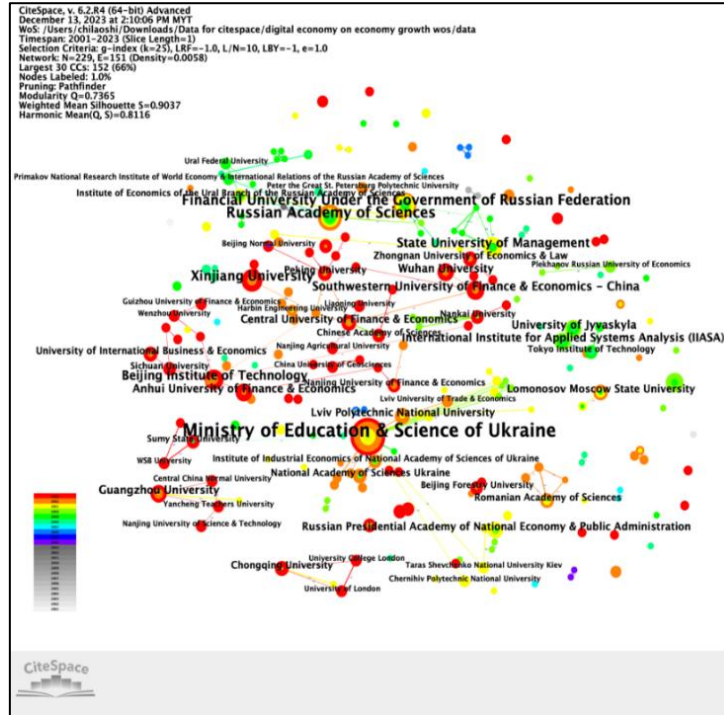
Co-authorship analysis examines collaborative relationships in academic publishing (Glänzel & Schubert, 2004). By mapping ties among authors, it reveals collaboration patterns, research networks, and emerging themes. Using CiteSpace, this study analyzes collaborations across countries, institutions, and individual authors at macro, meso, and micro levels, identifying the key contributors to research on the digital economy and economic development.

### Country Analysis

Co-country analysis is a useful tool for measuring the spatial distribution of articles (L. Pan et al., 2023). Figure 3 shows the network with the threshold set to 2 and a network of 69 nodes and 118 links. It contains the countries that make the main contributions in the field. Every node in the network represents a country. The larger the node, the greater the number of relevant publications for that country. From Figure 4, it can be observed that China has the highest publication volume, followed by Russia, Ukraine, the United States, and the United Kingdom. The purple circle around the node reflects the strength of the centrality, which indicates the significance of a network node. In terms of centrality, China exhibits the highest centrality, followed by the United States, Russia, the United Kingdom, and Poland.



country partnerships. Strengthening international cooperation and broadening channels for knowledge exchange will be essential in the future.



**Figure 4: Research Institution Cooperation Network Map**

According to Lip's Law, it is possible to identify the core research institutions in the field of digital economy and economic development. The formula is expressed as  $M \approx 0.749 \times \sqrt{N_{max}}$ , where M represents the number of published papers, and  $N_{max}$  represents the number of papers produced by the most prolific institution within the analyzed time frame. The highest publication count is 32, and the calculated value for M is approximately 4.24. In the context of rounding to the integer 5, the 23 institutions with a publication count reaching 5 papers are considered core institutions. Notably, the Ministry of Education & Science of Ukraine stands out with a significantly higher publication count compared to other core institutions. Following closely are the Russian Academy of Sciences and the Financial University Under the Government of the Russian Federation. It is noteworthy that within the top three institutions by centrality, two are from China, indicating their outstanding contributions to research in the field and warranting further attention.

**Table 3: List of Research the Top 20 Institutions by Number and Centrality**

No.	Count	Institutions	Centrality	Institutions
1	32	Ministry of Education & Science of Ukraine	0.03	Beijing Institute of Technology
2	15	Russian Academy of Sciences	0.03	Zhejiang University
3	13	Financial University Under the Government of Russian Federation	0.02	Ministry of Education & Science of Ukraine
4	11	Xinjiang University	0.02	Central University of Finance & Economics

5	9	Beijing Institute of Technology	0.01	Financial University Under the Government of Russian Federation
6	9	State University of Management	0.01	State University of Management
7	8	Southwest State University - Russia	0.01	Southwestern University of Finance & Economics - China
8	8	Southwestern University of Finance & Economics - China	0.01	Anhui University of Finance & Economics
9	7	Anhui University of Finance & Economics	0.01	Peking University
10	7	Guangzhou University	0.01	Sichuan University
11	7	International Institute for Applied Systems Analysis (IIASA)	0.01	Nankai University
12	7	University of Jyvaskyla	0.01	Renmin University of China
13	7	Wuhan University	0.01	Xi'an Jiaotong University
14	6	Central University of Finance & Economics	0.01	Shanghai University of Finance & Economics
15	6	Lomonosov Moscow State University	0.01	Dongbei University of Finance & Economics
16	6	Lviv Polytechnic National University	0.01	Moscow City University
17	6	Russian Presidential Academy of National Economy & Public Administration	0.01	Institute of Philosophy
18	5	Chongqing University	0	Russian Academy of Sciences
19	5	National Academy of Sciences Ukraine	0	Xinjiang University
20	5	Peking University	0	Southwest State University - Russia

### Authors Analysis

The purpose of co-author analysis is to identify key researchers and their collaborative relationships (Uddin et al., 2012). By tracking shared interests, it highlights research trends within the field. Figure 5 shows the co-authorship network with 210 nodes and 116 links, where node size reflects publication frequency and links represent collaborations. Several strong teams are evident, led by scholars such as Watanabe Chihiro, Wu Haitao, and Neittaanmaki Pekka, with many groups based in China and others from countries like Japan and Ukraine. Overall, while a few complex research clusters exist, many researchers remain relatively dispersed with limited collaboration across networks.

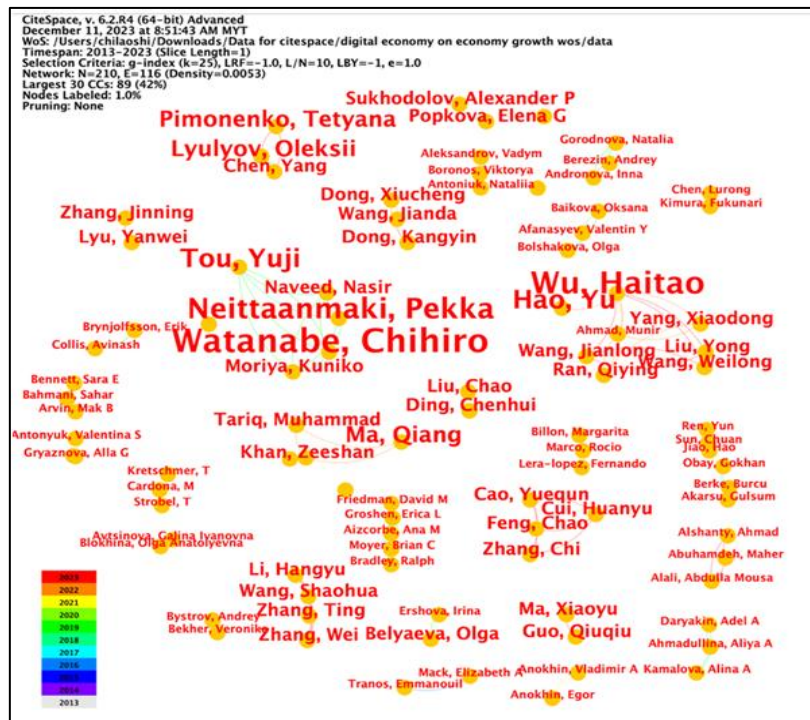


Figure 5: Co-Author Network Map

Table 4: Top 5 Authors in Frequency in Digital Economy and Economy Development

No.	Frequency	Author
1	7	Watanabe, Chihiro
2	6	Wu, Haitao
3	5	Neittaaanmaki, Pekka
4	4	Tou, Yuji
5	4	Hao, Yu

Table 4 lists the top five authors by publication frequency, with the highest count at seven. The calculated core author threshold ( $M \approx 2$ ) identifies 64 core authors. Watanabe leads the field, followed by Wu Haitao and Neittaaanmaki Pekka. Notably, three of the top five are from China, reflecting strong national engagement in digital economy research. However, while these core authors are influential, other contributors collectively account for about 95% of total publications, showing that progress in this field is widely distributed.

### Co-Term Analysis

Keywords provide a concise summary of an article’s core theme, and their frequency, relevance, and emergence can reveal research hotspots, intrinsic connections, and the relative importance of topics within a field (Donthu et al., 2021). Keyword analysis typically involves four key indicators: frequency, centrality, salience, and clustering. A higher keyword frequency suggests greater research attention; higher centrality reflects stronger importance within the research network; the degree of emergence indicates prominent research trends over specific time periods; and clustering helps identify the main thematic directions of research in the field (Li, 2019).



13	28	energy consumption	0.13	technology
14	26	information technology	0.12	model
15	26	co2 emissions	0.11	spatial distribution
16	26	efficiency	0.11	infrastructure
17	25	performance	0.11	challenges
18	23	big data	0.11	panel data
19	23	consumption	0.11	internet

### Keyword Cluster Analysis

Figure 7 presents the keyword clustering results generated by CiteSpace, comprising 361 nodes and 806 links, which collectively highlight the current research hotspots. The clustering quality is strong (Modularity  $Q = 0.7365$ ; Mean Silhouette = 0.9037), yielding 23 clusters, of which 14 are major. The largest cluster (#0, “energy poverty”) explores the relationships among energy access, economic growth, and technological innovation. Cluster #1 (“digital divide”) underscores growing disparities in digital access across regions and population groups. Clusters #2 and #6 (“digital economy” and “sharing economy”) emphasize the role of digital technologies in enhancing flexibility, connectivity, and resource utilization. Cluster #3 (“mediating effect”) investigates mechanisms such as innovation and industrial structure through which the digital economy fosters development. Other notable clusters include *economic development* (#4), *green growth* (#5), *digital platforms* (#7), *productivity* (#8), *artificial intelligence* (#9), *corporate innovation* (#10), *digital skills* (#11), *broadband provision* (#12), and *tech cities* (#13). Collectively, these clusters reflect the diverse and far-reaching influence of the digital economy on sustainability, innovation, and social transformation.

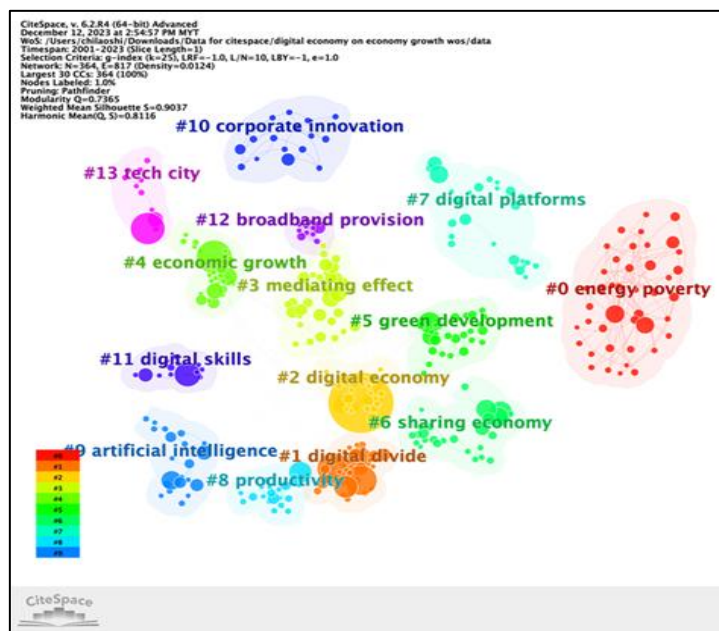


Figure 7: Keywords Clusters Map

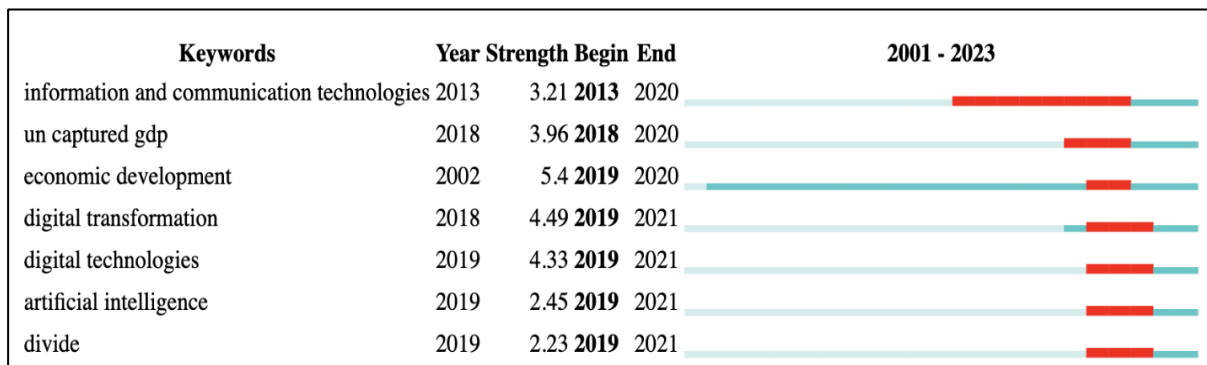
### Keyword Emerging and Evolution Analysis

Emerging keywords refer to terms that show a sharp increase in usage within a specific time period, signaling new research frontiers (Jun et al., 2018). Figure 8 highlights seven emerging keywords in digital economy research: *information and communication technologies (ICT)*, *un-*

*captured GDP, economic development, digital transformation, digital technologies, artificial intelligence, and divide.*

The earliest and longest-lasting focus was on ICT (2013–2020), reflecting the rise of mobile internet and smartphones that accelerated digital growth (Roessler, 2018). This period also reignited the debate on the “productivity paradox,” as productivity improvements lagged despite rapid digital advancement. Between 2018 and 2020, the term “un-captured GDP” gained attention, emphasizing the limitations of traditional GDP measures in capturing digital value creation (Watanabe et al., 2018). During the same period, economic development became a central theme, while new keywords such as digital transformation, digital technologies, and artificial intelligence rose to prominence particularly as the COVID-19 pandemic reshaped global economies (Asare Vitenu-Sackey & Barfi, 2021).

Finally, from 2019 to 2021, the keyword “divide” emerged, underscoring growing inequalities in digital access. Research during this phase examined its various definitions, root causes, and impacts across economic, social, and cultural dimensions (Reddick et al., 2020; Shah et al., 2022).



**Figure 8: Emerging Keywords in the Research on the Digital Economy and Economic Development**

Figure 8 shows the evolution of keyword networks from 2002 to 2023, with a threshold of 7. Node size reflects keyword frequency, while their timing marks first appearance. Research on the digital economy expanded steadily from 2002, alongside persistent growth in technology-related terms such as *information technology* and *communication technology*. The term *innovation* spiked in 2015, followed by *impact* and *digital transformation* in 2020. Since 2023, new but less frequent keywords *sustainable development*, *energy*, *carbon emission*, *consumption*, and *human capital* suggest a diversification of research directions that may shape future studies.

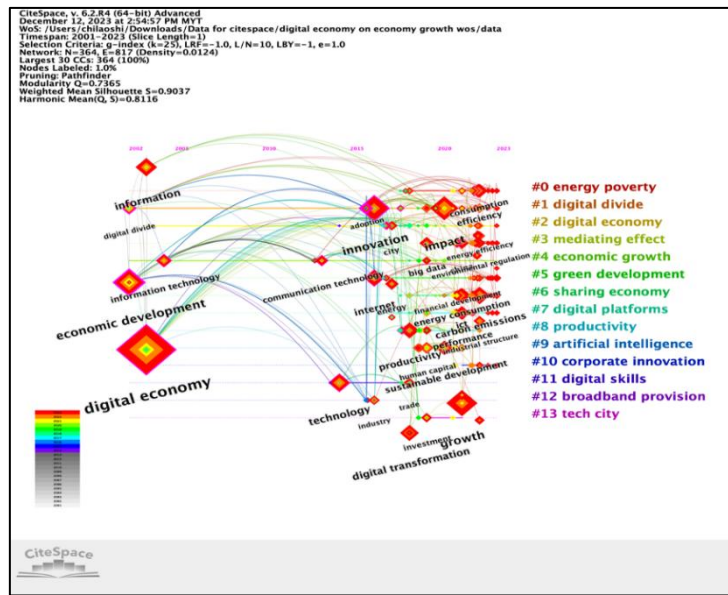


Figure 9: Timeline Of Keywords Map

### Co-Citation Analysis

CiteSpace software employs co-citation analysis to measure the knowledge base, research hotspots, and trends (Junjia et al., 2023). Co-citation refers to the occurrence of two articles about a third article appearing together (Hota et al., 2020). The following section presents a co-citation analysis of authors and references.

### Co-Cited Authors Analysis

Figure 10 illustrates the author co-citation network, where node size represents citation frequency and links indicate co-citation relationships. The network comprises 621 nodes and 9,405 links, with several highly cited authors prominently positioned.

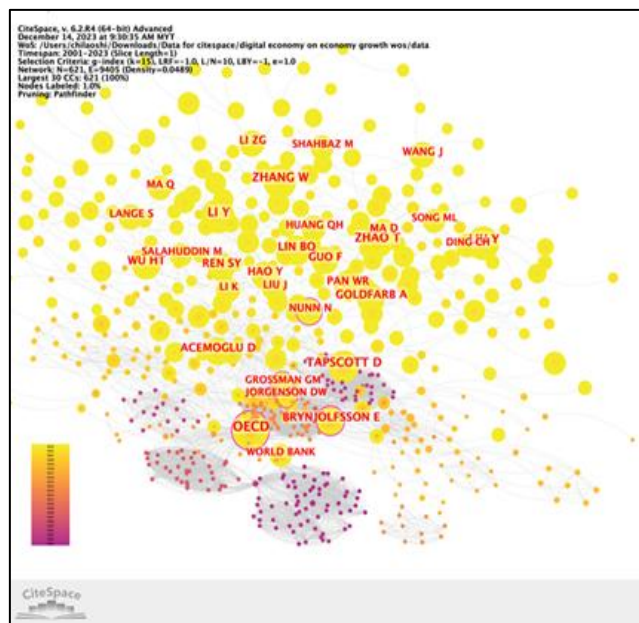


Figure 10: Authors' Co-Citation Network.

The ten most frequently cited authors include *OECD, Li Y., Zhang W., Liu Y., Zhao T., Tapscott D., Wu H.T., Lin B.Q., Brynjolfsson E., and Goldfarb & Tucker (2019)*. Authors exhibiting the highest centrality values such as *OECD, Brynjolfsson E., European Commission, Basu S., Romer P.M., Jorgenson D.W., Zhao T., Nunn N., Grossman G.M., and Elhorst J.P.* serve as key bridging figures within the intellectual network. Notably, *OECD* and *Zhao T.* rank highly in both citation frequency and centrality, underscoring their significant influence in shaping the field. Figure 11 further identifies 18 authors with pronounced citation bursts.

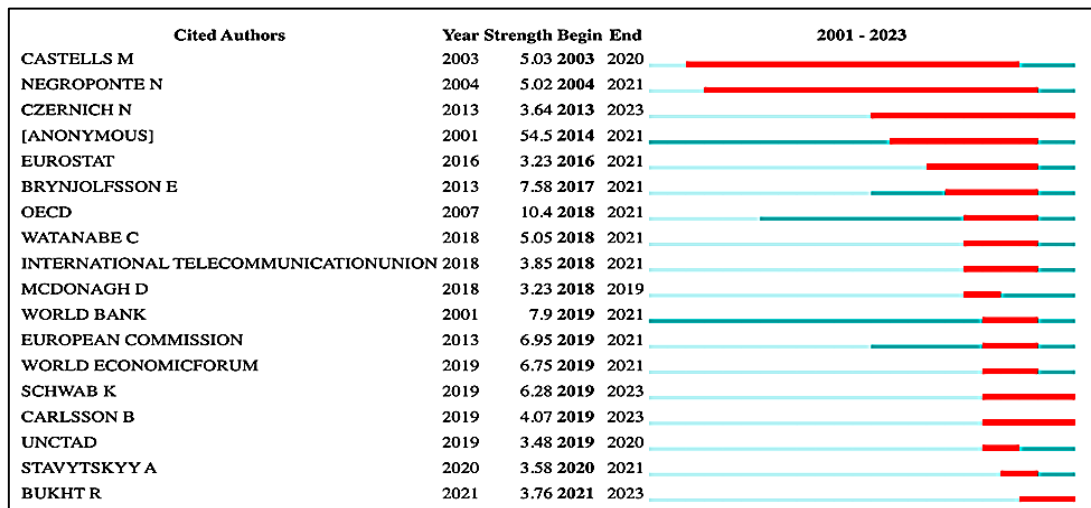


Figure 11: Top 18 Cited Authors with the Strongest Citation Bursts

Early foundational scholars such as Manuel Castells and Nicholas Negroponte laid the groundwork by conceptualizing the *network society* and exploring the transformative impact of the digital era on society, education, and media. More recently, Czernich et al. (2011) has sustained influence since 2013 through their seminal work on *Broadband Infrastructure and Economic Growth*. From 2019 onward, scholars such as Klaus Schwab and Carlsson B., among others, have emerged as key contributors to the evolving discourse on digital economy and technological transformation.

Table 6: Top 6 Co-Cited Authors by Frequency and Centrality

No.	Frequency	Cited Authors	Centrality	Cited Authors
1	83	OECD	0.21	OECD
2	64	LI Y	0.21	BRYNJOLFSSON E
3	62	ZHANG W	0.15	EUROPEAN COMMISSION
4	60	LIU Y	0.14	BASU S
5	59	ZHAO T	0.08	ROMER PM
6	55	TAPSCOTT D	0.07	JORGENSON DW
7	49	WU HT	0.06	ZHAO T
8	48	LIN BQ	0.06	NUNN N
9	47	BRYNJOLFSSON E	0.06	GROSSMAN GM
10	46	GOLDFARB A	0.06	ELHORST JP

### Co-Cited References Analysis

Table 7 lists the top 9 co-cited references by frequency and centrality. Zhao et al. (2022), which has the highest total number of citations, is mainly concerned with the measurement of the digital economy and the relationship between the digital economy and the high-quality development of the economy. The second most frequently cited document mainly argues that the digital economy reduces the cost from five aspects: search, reproduction, transportation, tracking, and verification. All these articles have played a fundamental role in the understanding and appreciation of the digital economy.

**Table 7: Top 9 Co-Cited References by Frequency and Centrality List**

No.	Frequency	Reference	Centrality	Reference
1	46	(Zhao et al., 2022)	0.18	(Jorgenson et al., 2008)
2	45	(Goldfarb & Tucker, 2019)	0.14	(Basu & Fernald, 2007)
3	42	(Pan, W. et al., 2022)	0.13	(Brynjolfsson & Hitt, 1996)
4	41	(Ren et al., 2021)	0.12	(Crandall R, 2007)
5	38	(Li. et al., 2021)	0.12	(Ahmad N, 2016)
6	35	(Lange & Santarius., 2020)	0.11	(Röller & Waverman, 2001)
7	34	(Ma & Zhu, 2022)	0.1	(Czernich et al., 2011)
8	33	(Li, Z. & Wang, 2022)	0.09	(Negroponte N, 1995)
9	33	(Nunn & Qian, 2014)	0.09	(Antonelli, 2003)

Table 8 in the following page presents the top 11 references with the strongest citation bursts, all of which emerged from 2018 onwards. This indicates a rapid surge in research on the digital economy and economic development beginning in 2018, marking it as a growing focal point of study. Between 2018 and 2020, four highly cited works by Watanabe C. three focused on *uncaptured GDP* highlight the prominence of this theme during the period and underscore his contributions to the field. Continuing through 2023, the highlighted references reflect ongoing interest in new developments of the digital economy, its relationship with social indicators, broadband infrastructure, and national competitiveness. Collectively, these trends point to emerging and diversifying research directions in the field.

**Table 8: Top 11 References with the Strongest Citation Bursts**

References	Year	Strength	Begin	End	2001 - 2023
Watanabe C, 2015, TECHNOL SOC, V41, P21, DOI 10.1016/j.techsoc.2014.10.006, <a href="#">DOI</a>	2015	4.39	2018	2020	
Watanabe C, 2004, TECHNOL FORECAST SOC, V71, P723, DOI 10.1016/S0040-1625(02)00306-2, <a href="#">DOI</a>	2004	4.39	2018	2020	
Watanabe C, 2015, TECHNOL SOC, V42, P104, DOI 10.1016/j.techsoc.2015.04.003, <a href="#">DOI</a>	2015	3.76	2018	2020	
Watanabe C, 2016, TECHNOL SOC, V46, P164, DOI 10.1016/j.techsoc.2016.06.004, <a href="#">DOI</a>	2016	3.24	2018	2019	
Schwab K, 2016, THE FOURTH INDUSTRIAL REVOLUTION, V0, P0	2016	5.61	2019	2023	
Carlsson B, 2004, STRUCTURAL CHANGE AND ECONOMIC DYNAMICS, V15, P245, DOI 10.1016/j.strueco.2004.02.001, <a href="#">DOI</a>	2004	4.48	2019	2023	
Watanabe C, 2018, TECHNOL FORECAST SOC, V137, P226, DOI 10.1016/j.techfore.2018.07.053, <a href="#">DOI</a>	2018	3.23	2019	2020	
[Anonymous], 2016, 4 IND REVOLUTION, V0, P0	2016	3.23	2019	2020	
Negroponte N, 1995, BEING DIGITAL, V0, P0	1995	3.19	2019	2020	
Starytskyy A, 2019, BALT J EUR STUD, V9, P245, DOI 10.1515/bjes-2019-0032, <a href="#">DOI</a>	2019	3.59	2020	2023	
Czernich N, 2011, ECON J, V121, P503, DOI 10.1111/j.1468-0297.2011.02420.x, <a href="#">DOI</a>	2011	3.94	2021	2023	

## Discussion: Current Trend and Future Agendas

In recent years, research on the digital economy and economic development has evolved into several emerging directions. Building on the preceding analysis, potential areas for future investigation include:

### i. Digital Technology and Sustainable Development

Future studies can explore how digital tools contribute to sustainability goals across environmental, energy, social, and economic dimensions. The integration of technologies such as Building Information Modeling (BIM) and the Internet of Things (IoT) enables real-time data collection and analysis, generating valuable insights for more effective sustainability strategies (Bibri, 2018).

### ii. Digital Innovation and Emerging Industries

Research could focus on how digital innovation stimulates the creation of new industries and supports the evolution of transformative technologies such as artificial intelligence (AI), blockchain, and IoT, which are reshaping economic structures and value creation processes.

### iii. Digital Inequality and Social Impact

Further investigation is needed to determine whether digitalization exacerbates social and economic inequalities, and to evaluate its wider impacts on various social groups, particularly in developing economies.

### iv. Digital Transformation and Economic Growth

Future work should examine how digital transformation enhances productivity and innovation, both at the national and enterprise levels, thereby driving sustainable economic growth and competitiveness.

### v. Governance, International Cooperation, and Data Privacy

Research should also assess the influence of digital technologies on governance, public administration, and e-governance systems. At the international level, attention is needed on how digitization facilitates cross-border trade and collaboration, while ensuring data privacy, cybersecurity, and a balanced approach between technological innovation and individual rights.

Overall, a multidimensional research agenda is essential to capture the dynamic role of the digital economy and its implications for sustainable growth, effective governance, and social equity in an increasingly interconnected world.

## Conclusions

The discussion of this section is divided into the following perspectives; advantages, limitations and possible applications.

### Advantages

This study demonstrates the usefulness of scientometric analysis, using CiteSpace to provide a systematic overview of 576 references on digital economy and economic development. The analysis highlights clear growth trends in the literature, especially in recent years, and identifies leading publication outlets such as *Sustainability* and *Environmental Science and Pollution Research*. Co-authorship and co-citation mapping reveal the dominant role of universities and government institutions, as well as the emerging research frontiers in areas such as energy poverty, digital divide, digital skills, and competitiveness. These insights not only capture the

current landscape of scholarship but also offer a comprehensive map of thematic clusters and collaborations, enabling researchers to better understand the evolving dynamics of the field.

### **Limitations**

Despite its contributions, the study has some important constraints. First, the analysis relies on a single data source, which may exclude relevant publications indexed in other databases such as Scopus, Web of Science Core Collection subsets, or CNKI. This could limit the comprehensiveness of the findings. Second, the parameter settings of CiteSpace inherently shape the outcomes, introducing possible variations in cluster generation and network visualization. Finally, the limited presence of transnational collaborations uncovered in the study may partly reflect database bias rather than the actual state of research networks. Future research could strengthen the evidence base through multi-database integration and by combining scientometric mapping with systematic literature review approaches.

### **Possible Applications**

The findings have several practical applications. First, the thematic clusters identified can serve as a reference framework for scholars aiming to position their work within the broader research landscape. Second, policy-makers and funding bodies can leverage the analysis to identify gaps in international collaboration and to design initiatives that encourage cross-border research partnerships. Third, the mapping of research frontiers such as digital infrastructure, social indicators, and competitiveness provides a roadmap for future inquiry, guiding both academic and applied research agendas. Lastly, this study can be used as a benchmark analysis for institutions, helping them to evaluate their relative contribution to the digital economy scholarship and to strategize future research investments.

### **Acknowledgement**

This article is from the research funded by the Ministry of Higher Education under the Fundamental Research Grant Scheme [FRGS: 2022-0071-106-02]

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