

Digital Empowerment Research: A Bibliometric Analysis

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Abstract

Digital Empowerment has emerged as a transformational concept in today's digital world. We live in it, and it is changing how we use technology to get knowledge, innovation, and take part in the economy and society. As digital technologies increasingly influence governance, education, entrepreneurship, financial, and social inclusion, due to this scholarly research on digital empowerment is increasing day by day. Though scholarly research interest is increasing in the domain of DE, this field is still lacking in a systematic review of its intellectual structure, thematic evolution, and collaboration network. For the study, data were collected from the Scopus database and analyzed through Biblioshiny (Bibliometric R package). The study included performance indicators such as the annual scientific production, citation analysis, leading authors, documents, and countries with network-based techniques such as co-citation, and keyword occurrence analysis. The findings reveal that there is steady growth in research production in the DE field, specifically in the last one and a half decades, with the dominant themes centered around digital inclusion, Digital literacy, digital divide, and e-learning. Emerging research fronts for the future, which include risk assessment, strategic approach, and vulnerability. The findings of the study have strategic significance for researchers and policymakers, and for those who are willing to seek the advantage of DE in the global digital economy, and help to create a more sustainable and better future.

Keywords: Digital Empowerment, Digital Inclusion, Bibliometric analysis, Science Mapping, ICT for Development.

Introduction

In today's fast-moving and technologically driven world, the term Digital Empowerment (DE) has emerged as a transformational concept that is not only an emerging term but also has become a fundamental aspect of modern life, influencing and deeply integrating into everyday life. These areas include education, learning, policymaking, entrepreneurship, governance, and financial and social inclusion. A person who develops and uses digital skills to improve their life is seen as digitally empowered (Akkoyulu et al., 2010). DE provides an individual with new ways and the ability to participate in society and express themselves freely (Hans, 2018). Increasing control over the skills needed to adapt information technology in society is known as DE (Mäkinen, 2006). As information and communication technologies (ICTs) become more common in everyday life, DE is widely recognized as a way to promote inclusion, reduce inequalities, and enable active citizenship (Adam & Alhassan, 2021; Ye & Yang, 2020). Over the past two decades, scholarly interest in this field has grown significantly in multiple research domains, including information systems, education, development studies, citizenship participation, and

public policy. The existing research emphasizes its multidimensional nature and includes digital inclusion, digital literacy, and the ability to participate in digital economies and governance processes (Chetty et al., 2018; Sharma et al., 2022). Studies have shown that DE helps bridge the digital divide, particularly among marginalized groups, by increasing access to information, enhancing skills, and promoting socio-economic participation (Aryal, 2024; Pawluczuk et al., 2021). Even though research on DE has increased rapidly, the field remains fragmented. Many studies concentrate on specific topics such as digital health, digital literacy, and gender based digital inclusion, while fewer studies provide a broader and unified perspective of DE (Raihan et al., 2025; Acilar & Saebo, 2023). Previous bibliometric studies in related areas like digital transformation, digital governance, and digital inclusion have demonstrated the importance of systematic analysis in understanding research growth, identifying trends, and exploring key themes (Chawla & Goyal, 2022; Hoyos Munoz et al., 2025). However, a bibliometric analysis specifically focused on DE is still limited. Bibliometric analysis offers a useful method for studying a large volume of academic literature using quantitative techniques such as citation analysis, co-authorship analysis, and keyword co-occurrence mapping. These methods help researchers understand the overall structure of a research field, identify gaps in knowledge, discover new research opportunities, and evaluate the contribution made by scholars (Donthu et al., 2021). They are also helpful in identifying emerging themes and understanding how knowledge in a field develops over time (Ravselj et al., 2022; Cobelli & Blasioli, 2023). Because of this, the bibliometric analysis is a valuable approach for addressing the research gap in DE studies. As DE research continues to expand across multiple disciplines, a bibliometric approach can help explain how different research areas are connected and where future studies are needed. Due to this reason, the present study conducts a bibliometric analysis of DE research. The study aims to examine the intellectual structure of the field, identify major contributors, and analyze key research trends and thematic developments. The following are the objectives that this study focuses on:

1. To examine publication growth and trends in DE research over a particular time duration.
2. To identify the leading authors in the DE field.
3. To analyze the most highly cited articles related to DE.
4. To identify emerging themes and future research opportunities in the field.
5. To know the most influential country in the DE research field.

By achieving these objectives, the study aims to provide a broader and more connected view of DE research. The findings may support researchers in navigating the literature and help policymakers and practitioners develop more inclusive and informed digital strategies.

Concept of Digital Empowerment

DE is the process of supporting individuals and communities in using digital tools and technologies to make daily activities easier and more effective, including learning, health care, communication, money management, and social connections. It involves providing access to internet connectivity, digital devices and services, digital literacy education, and digital resources, ultimately making society more equitable and inclusive. According to the World Bank (2016), DE means the use of digital technologies to expand opportunities, improve access to information, and promote inclusive socio-economic development. Other scholars like Sadiku, Musa & Musa (2022) said that DE refers to equipping individuals and communities with digital knowledge and tools to enhance innovation, communication, and socio-economic development. Digital technology is the core of DE. It is also known as the spiral process because it follows the changes and aligns with the progress of society and its surrounding environment. According to Batriani

et al. (2023), DE is a broad and multi-step process that includes different stages to help individuals access better opportunities and contributions that influence society by staying updated. Therefore, we can say that DE can be defined as a multidimensional process through which individuals and communities gain the ability, access, skills, and confidence to effectively utilize digital technologies for enhancing decision-making, productivity, participation, and overall socio-economic development.

Research Methodology

The present study used Bibliometric analysis, which applies statistical methods to study the qualitative and quantitative growth of a research area (DeBekker et al., 2005). This method helps in identifying current and emerging trends in the field. It also provides a broad general understanding of the existing literature, highlights research gaps, generates new research directions, and helps researchers in their understanding of their contribution to the field (Donthu et al., 2021).

Data Selection

The Bibliometric information on DE was obtained from Scopus, a globally recognized bibliographic database of peer-reviewed literature. Therefore, this research uses Scopus database as the exclusive bibliographic data source, due to its comprehensive indexing of high-impact, peer-reviewed publications and its adherence to strict citation standards that are widely acknowledged in education and interdisciplinary research. To cover all aspects of DE research, the search query utilized in the advanced online search engine involved a wide range of keywords about DE, as identified in the comprehensive literature review of current bibliometric studies in the area, where the terms "Digital Empowerment" and "Digital Inclusion" were treated interchangeably and viewed as closely associated concepts due to the ongoing lack of formal agreement among academics, practitioners, and policymakers regarding the differentiation between these terms. Thus, in this study, Digital Empowerment is viewed as an umbrella concept.

The following keywords related to DE are covered in the search query:

“Digital Empowerment,” or “Digital Inclusion,” or “Information and Communication technology,” or “Digital Technology,” these are the search terms in the study. This action gives a total of 3875 articles published. Then apply data cleaning filters, restricting the articles published in the subject area of Social Science, Computer Science, Business, Management, and Accounting, and to articles published in English. We limit the literature to the document type of articles, review papers, and from open access. Our final sample includes 617 articles based on the inclusion/exclusion criteria for this comprehensive study.

PRISMA

To ensure thorough and transparent data retrieval and organization, PRISMA guidelines were followed as integrative reviews must adopt, follow, and report a rigorous review protocol (Paul et al., 2021). PRISMA stands for Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

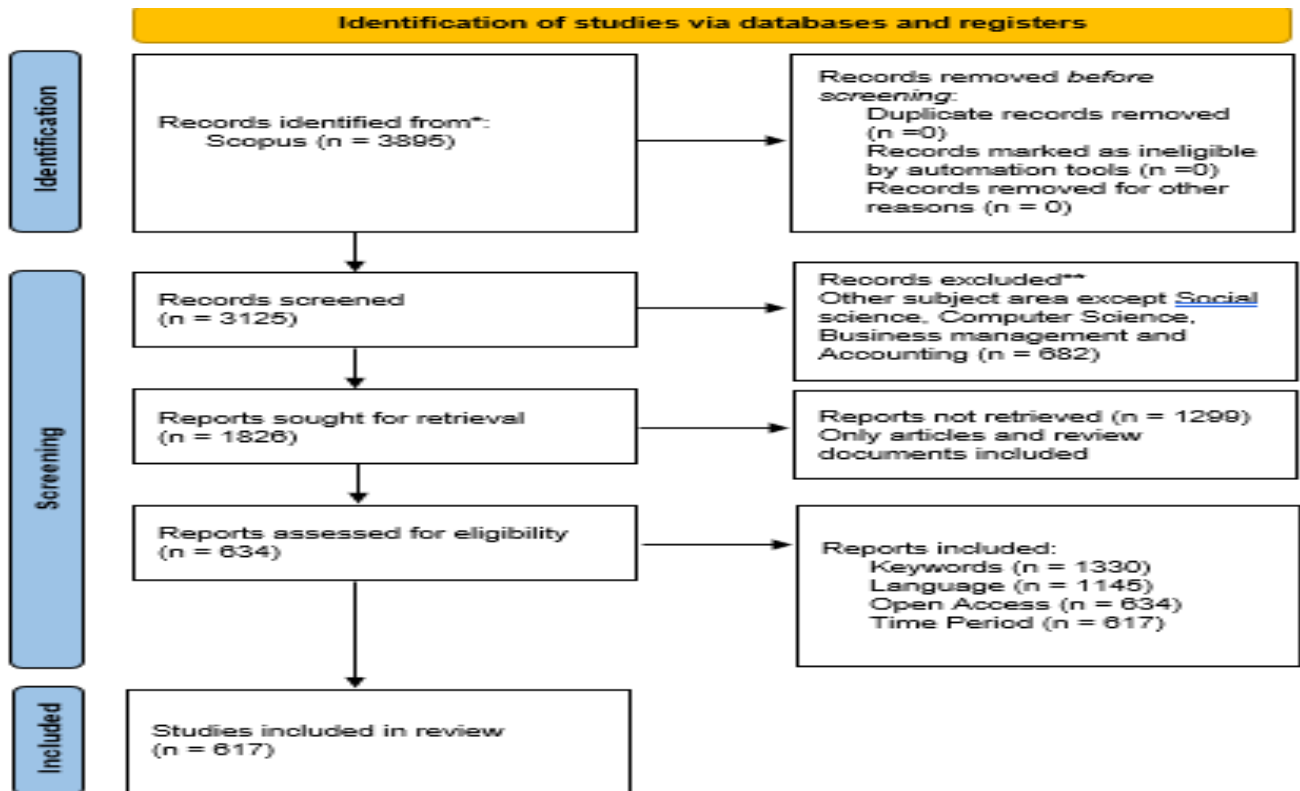


Figure 1 PRISMA Flow Diagram

It is a standardized reporting guideline used in academic research to improve. It helps researchers systematically collect, screen, select, and report research studies. Figure 1 shows the PRISMA diagram of data retrieval steps from the Scopus database. In Figure 1, the PRISMA flow diagram is shown, which systematically presents the steps of identification, screening, eligibility, and inclusion & exclusion of the studies. Shows that initially a sum of 3,895 records were identified from the Scopus database. No records were removed before screening. During the screening stage 3,125 records were examined based on their titles and abstracts, out of which 682 records were excluded due to irrelevance in subject areas, retaining only 782 studies from Social Sciences, Computer Science, and Business, Management, and Accounting. Subsequently, 1,826 reports were sought for full-text retrieval. However, 1,299 reports were excluded because they did not match the inclusion criteria, particularly with respect to document type, where only journal articles and review papers were considered. Then, 634 full-text articles were evaluated for eligibility based on predefined criteria such as keyword relevance, language, accessibility, and time period. Finally, a total of 617 studies were involved in the review for this study.

Data Analysis Method

After all of the appropriate bibliometric data on DE research had been extracted from Scopus, bibliometric approaches and software tools were applied. The diagram of bibliometric analysis, which has been used in the study, is shown in Figure 2. With respect to the descriptive overview, the descriptive statistics were extracted and examined using the Biblioshiny analytical tool, which is an open-source software that provides a range of tools for conducting quantitative bibliometrics research (Yogesh Pai et al., 2022). Biblioshiny is a web-based graphical interface built on the R package Bibliometrix, designed to make bibliometric analysis accessible to researchers without requiring programming skills. It allows users to

import bibliographic data, run analyses, and generate visualizations through a point-and-click dashboard. Aria and Cuccurullo had developed the R package, written in the R language, which has the main algorithms for conducting statistical and analysis of science mapping. The data analysis used for this study is as follows::

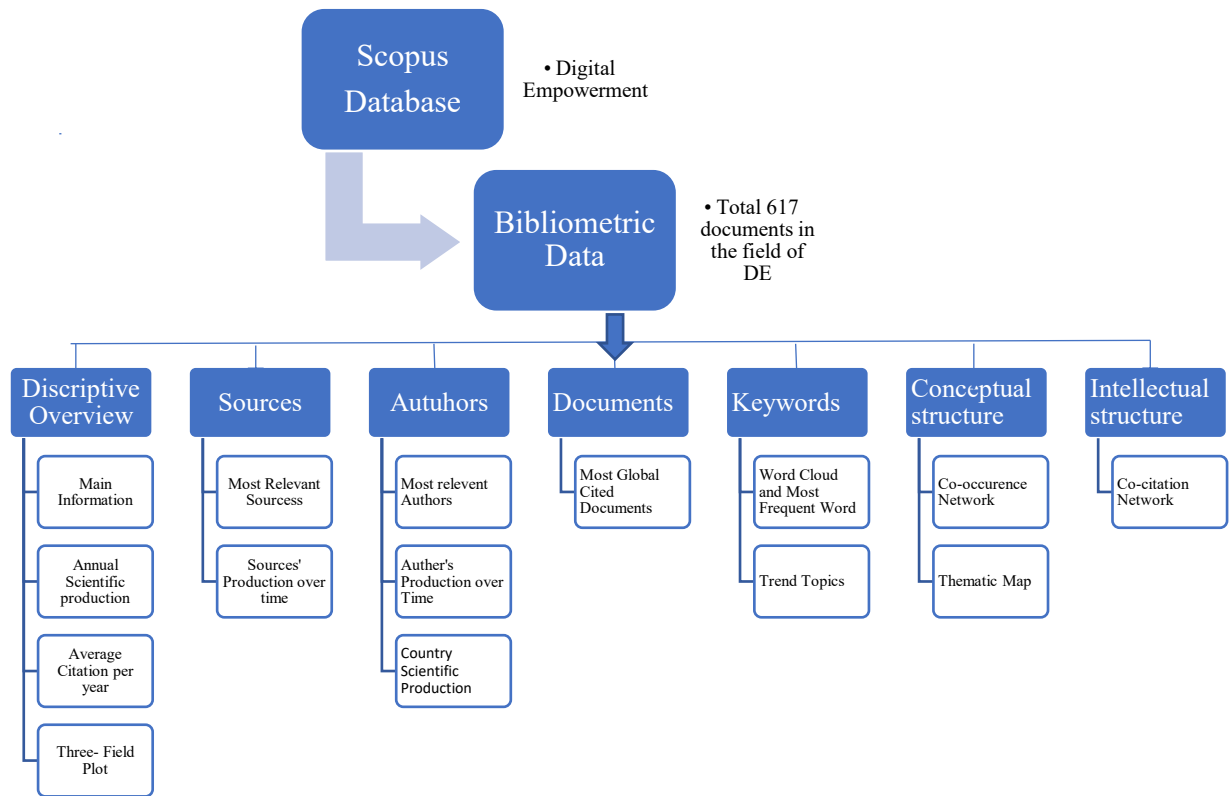


Figure 2 The Schema of Bibliometric Analysis

Figure 2 shows the analyses used in this research study. Data from DE were derived from the Scopus database. The overall number of documents included in the research study is 617 in the field of DE. To know the descriptive overview of the DE area, four analyses are included: 1. “Main Information,” 2. “Annual Scientific Production,” 3. “Average Citation Per Year,” and 4 “Three Fields Plot.” For sources, the two analyses included 1 “Most Relevant Sources” and 2 “Sources’ Production Over Time.” To know about authors and their contribution, “Most Relevant Authors,” “Authors Production Over Time,” and “Country Scientific Production.” “Most Global Cited Documents” analysis was used for documents. The analyses used for words to identify the most frequent and key themes in the DE area are “Word Cloud” and “Trend Topics.” In the conceptual structure “Co-occurrence Network,” “Thematic Map” was used. The intellectual structure included “Co-citation Network.”

Findings of the Study

The presentation and description of the findings are structured around the seven categories that guided this study. These are described below.

1. Descriptive Overview

A descriptive overview of the study is categorized into four parts. First is about the main information about the data, which describes the overall information of the selected data for the study. The second one is the annual scientific production, which tells the volume of publications in a research field per year. The third

one is the average citation per year, and the fourth is about the three-field plot, which shows a relationship between prolific scholars, countries, and prominent keywords in the research field.

1.1 Main Information About Data

The main information table tells the collection size in terms of volume of documents, volume of authors, volume of sources, volume of keywords, timespan, and average number of citations (Massimo Aria and Corrado Cuccurullo, 2017).

Description	Results
Timespan	2010-2025
Sources (journals, books, etc)	330
Documents	617
Annual Growth Rate%	43.23
Document Average age	3.49
Average citation per doc	16.96
References	64252
Keyword plus (ID)	1491
Author’s keywords (DE)	1966
Authors	1862
Authors of single-authored docs	82
Single-authored docs	85
Co-Authored per Doc	3.31
International Co-Authorships %	24.64
Articles	589
Review Papers	28

Table 1 Main Information About Bibliometric Data

An overview of the features of the scientific literature on DE research utilized in this bibliometric analysis is represented in Table 1. This study depends on a total of documents written by 1862 different authors, with 85 research papers, which are single-authored documents written by 82 single authors and published in 330 sources in the time period between 2010 and 2025. The annual growth rate of these documents are 43.23%, and the average age of the documents is 3.49. The bibliometric indicators show that the average number of references in documents is 64252, and the average number of citations per document is 16.96. Relevant literature on DE research covers 1966 different authors’ keywords, and the keywords plus are 1491. The study reveal about the authors' collaboration co-authors per doc is 3.31, and the international co-authorship percent is 24.64%. The articles are 589, and the review papers are 28 in document types, which are used in the study.

1.2 Annual Scientific Production

The Annual Scientific Production is a bibliometric indicator measuring the volume of research documents (articles, review papers) published in a specific research field per year. It reveals research growth, trend changes, acting as a crucial tool for mapping scholarly activity and identifying field hotspots (Donthu et al., 2021; Zupic & Cater, 2015). Figure 3 and Table 2 of the annual scientific production highlight a steady growth in the literature production in the field of DE research. As per Figure 3 and Table 2 in the initial year 2010, there was only one paper in the field DE, and gradually the production has been increasing. There is a clear, sharp upward trend after 2020 (due to the COVID-19 pandemic), suggesting increased

scholarly interest in the field of DE. And in 2025, the scientific production increased to 219. This analysis clearly indicates that scholarly interest has been increasing in the research field of DE.

Year	Article
2010	1
2011	4
2012	11
2013	5
2014	7
2015	10
2016	4
2017	18
2018	12
2019	16
2020	28
2021	38
2022	48
2023	92
2024	104
2025	219

Table 2 Annual Scientific Production

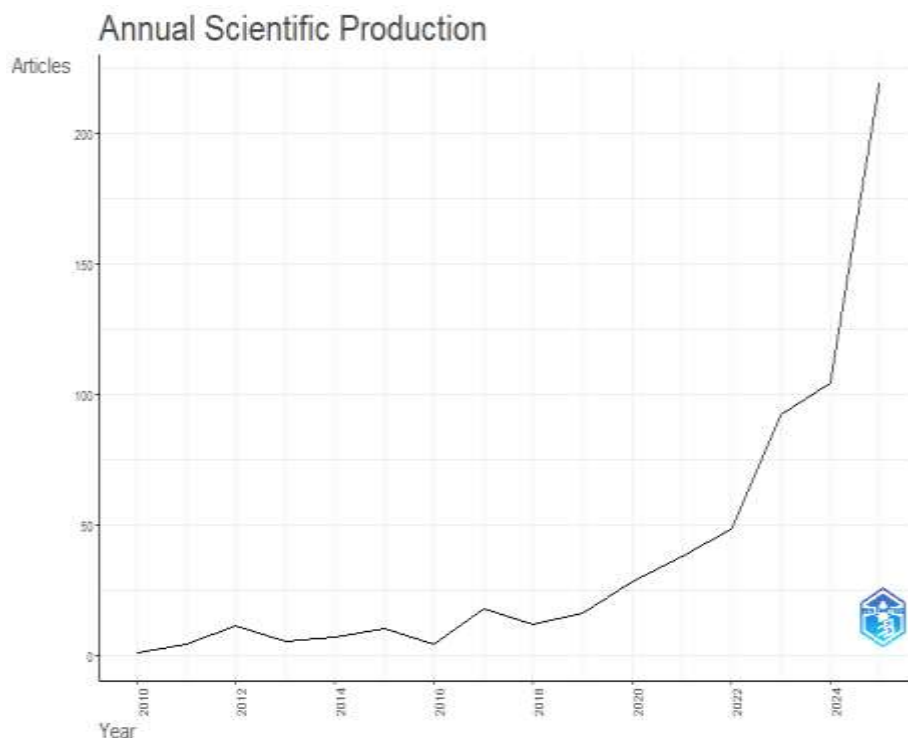


Figure 3 Annual Scientific Production (Source: Bibliometric analysis, Biblioshiny)

1.3 Average citation per year

Average citations per year analysis (often known as Mean Total Citation per Year) is a bibliometric mea-

sure used to evaluate the impact of a publication over time. This allows researchers to compare the influence of articles published in different years on a fair basis (Kumar et al., 2022). Figure 4 and Table 3 of the average citation per year show how the average number of citations per year has changed between the time period of 2010 and 2025. Overall, the trend is uneven with a clear peak in 2017 and lower values in recent years. From 2010 to 2014, the average citations per year were low, staying between 0.71 and 1.72. There is a small increase in 2015 and 2016, where the values rise to 1.90 and 4.50. In 2017, there was a sharp increase, with the highest value of 12.93. This is the peak shown in the graph.

Year	Mean TC Art	N	MeanTCper Year	Citable Year
2010	12	1	0.71	17
2011	17.25	4	1.08	16
2012	25.73	11	1.72	15
2013	21	5	1.5	14
2014	9.86	7	0.76	13
2015	22.8	10	1.9	12
2016	49.5	4	4.5	11
2017	129.28	18	12.93	10
2018	20.42	12	2.27	9
2019	30.38	16	3.8	8
2020	36.39	28	5.2	7
2021	31.92	38	5.32	6
2022	31.85	48	6.37	5
2023	14.6	92	3.65	4
2024	7.95	104	2.65	3
2025	2.34	219	1.17	2

Table 3 Average Citation Per Year

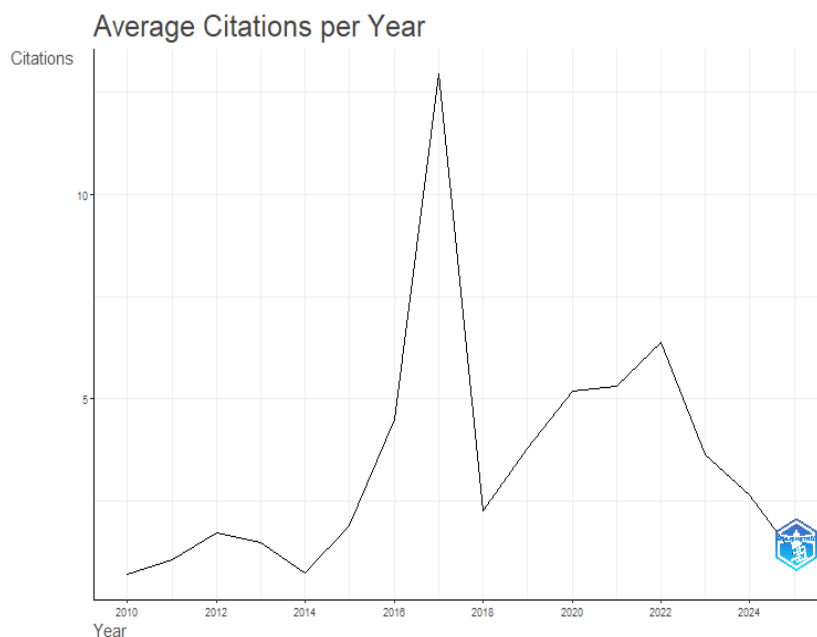


Figure 4 Average Citation Per Year (Source: Bibliometric analysis, Biblioshiny)

However, this increase is not sustained as the value drops to 2.27 in 2018. From 2019 to 2022, the values increased again, ranging from 3.80 to 6.37. This period shows more stable and moderate growth in citations. After 2022, the average citations per year start to decline, falling from 3.65 in 2023 to 1.17 in 2025.

1.4 Three Fields Plot

Figure 5 illustrates a clear depiction and accurate representation of prominent scholars, alongside their respective countries and areas of interest represented by keywords in the domain (Aria & Cuccurullo, 2017; Donthu et al., 2021) of DE. A three-field plot diagram of articles' contributions by countries, authors, and keywords within the field of DE is presented.

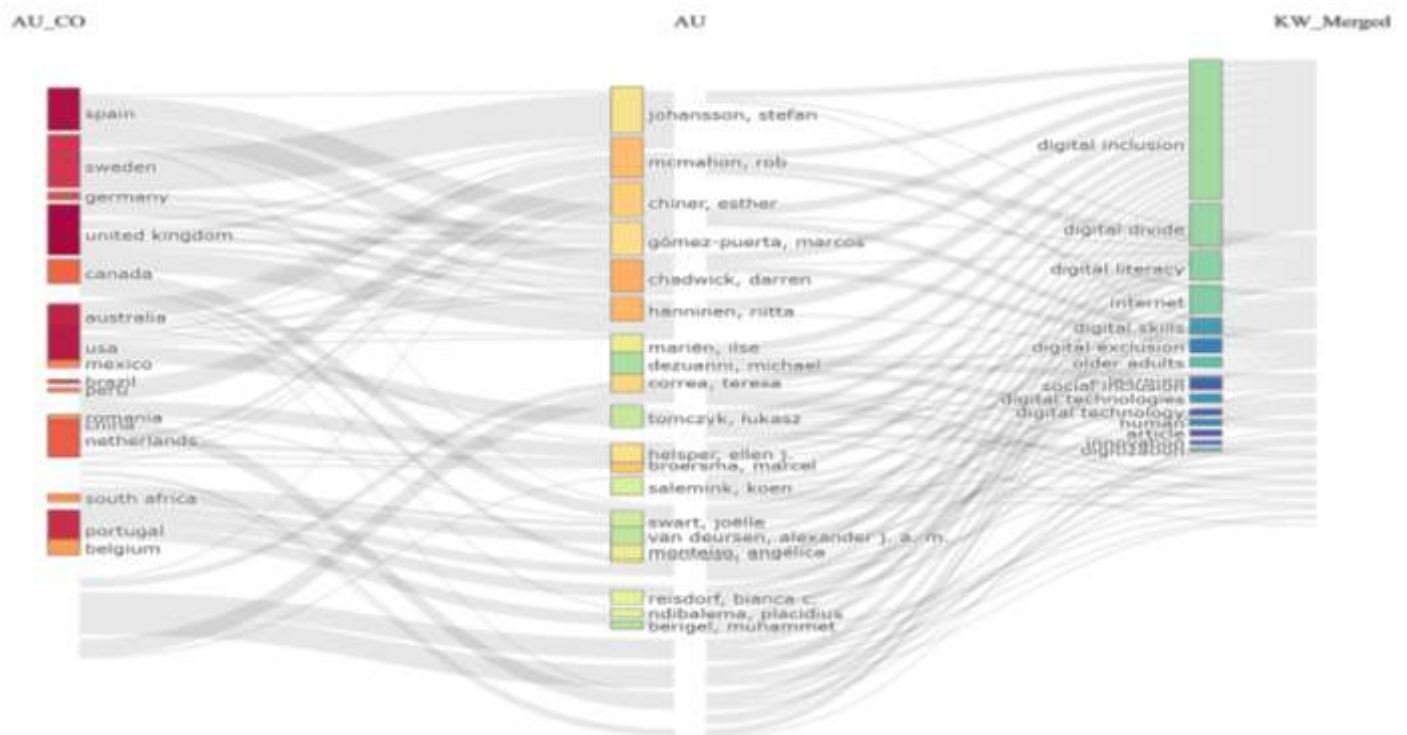


Figure 5 Three Fields Plot (Source: Bibliometric analysis, Biblioshiny)

The left column illustrates various countries, the middle column lists the names of contributing authors, and the right column shows the most frequently used keywords by these authors. The height of boxes, along with the thickness of the connecting lines, intensifies the relationship and connectivity between countries. Spain has the highest number of author affiliations, followed by Sweden, Germany, the United Kingdom, and the United States. These countries are connected to multiple authors, showing active international research involvement. Countries such as Portugal, Belgium, South Africa, and Brazil are also part of the network, but they have comparatively fewer connections. The analysis shows that authors like Johansson, Stefan, McMahon, Rob, Chiner, Ester, Gomez-Puerta, Marcos, and Chadwick are key contributors to the field. The keyword displayed on the right side represents the major themes studied in the research field. The most significant keywords are “Digital Inclusion,” “Digital Divide,” and “Digital Literacy” as they have the strongest connections with authors. This indicates that these topics are central to the research area. Other important keywords include “Internet,” “Digital Skills,” “Older Adults,” and “Social Inclusion.” Less frequent but still contribute to the discussion within the field. The connections between countries, authors, and keywords show how research collaboration and thematic focus are linked. Thicker lines in the diagram represent a stronger relationship or a higher frequency of collaboration and

topic association. Overall, the figure shows that research in this field is mainly focused on digital inclusion and related topics, with strong contributions from European and Western countries and active collaboration among authors.

2. Sources

The findings of sources from the study are described in two parts. The first one is the most relevant source, which depicts the journals that have contributed the most by their highest number of publications. And the second is the sources' production over time, which shows how many different journals were produced over a time duration.

2.1 Most relevant Sources

This analysis identifies the journals that contribute the highest number of documents. It is a common bibliometric method used to determine which journals are most influential in a particular research domain (Bradford, 1934; Donthu et al., 2021). The horizontal axis of Figure 6 shows the number of documents, and the vertical axis lists the names of the journals.

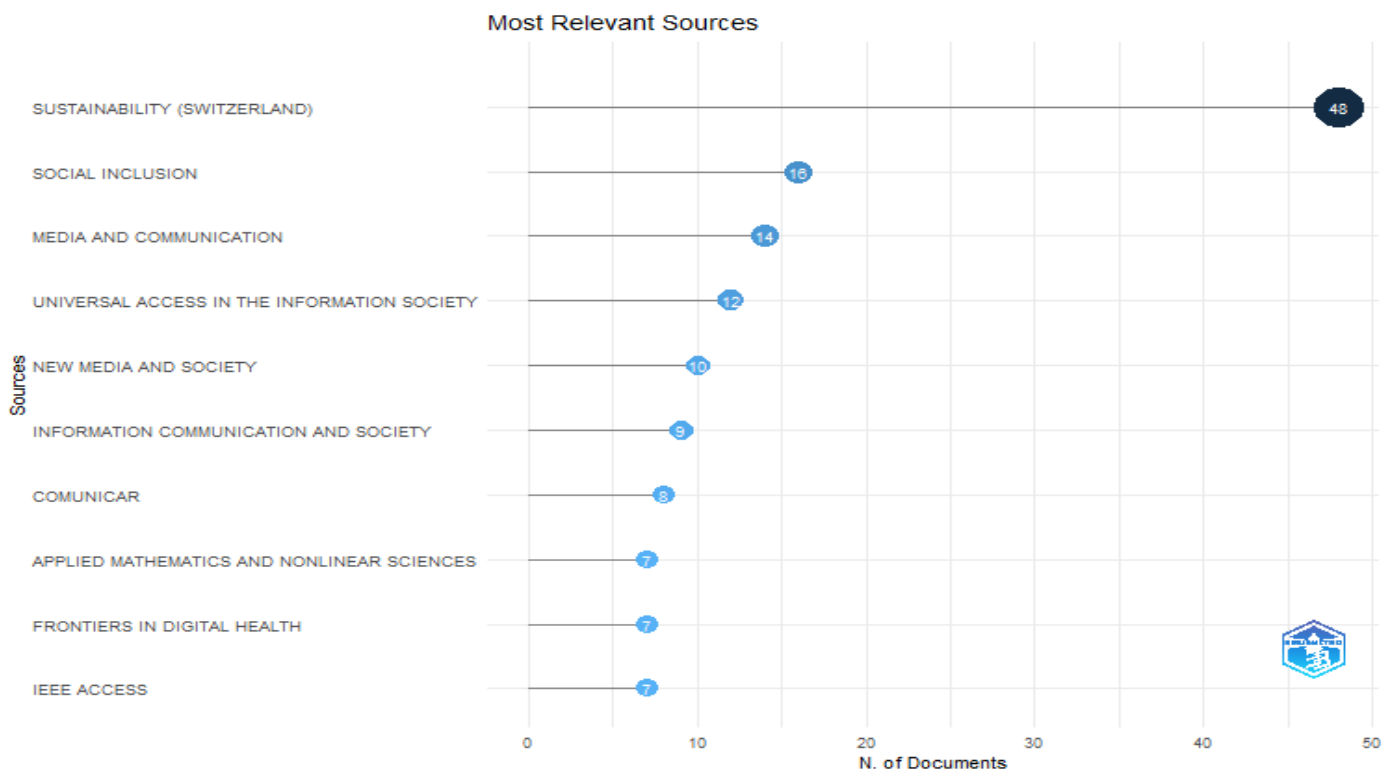


Figure 6 Most Relevant Source (Source: Bibliometric analysis, Biblioshiny)

Figure 6 shows that Sustainability Switzerland has the highest volume of publications, with 48 documents in the DE research field. This makes it the most productive and dominant source in the data set. Followed by Social Inclusion with 16 documents, and Media and Communication with 14 documents. Other sources: Universal Access in Information Society with 12 documents, New Media and Society 10 documents, Information Communication and Society 9 documents, Comunicar with 8 documents. The sources Applied Mathematics and Nonlinear Science, Frontiers in Digital Health, and IEEE Access, each with 7 documents, have fewer contributions, but they still have significant contributions in the research field, as they are among the top 10 sources of the DE research.

3. Authors

Most relevant authors are described in the authors section of the findings of the study, which reveals the number of documents they have contributed to the research domain.

3.1 Most relevant Author

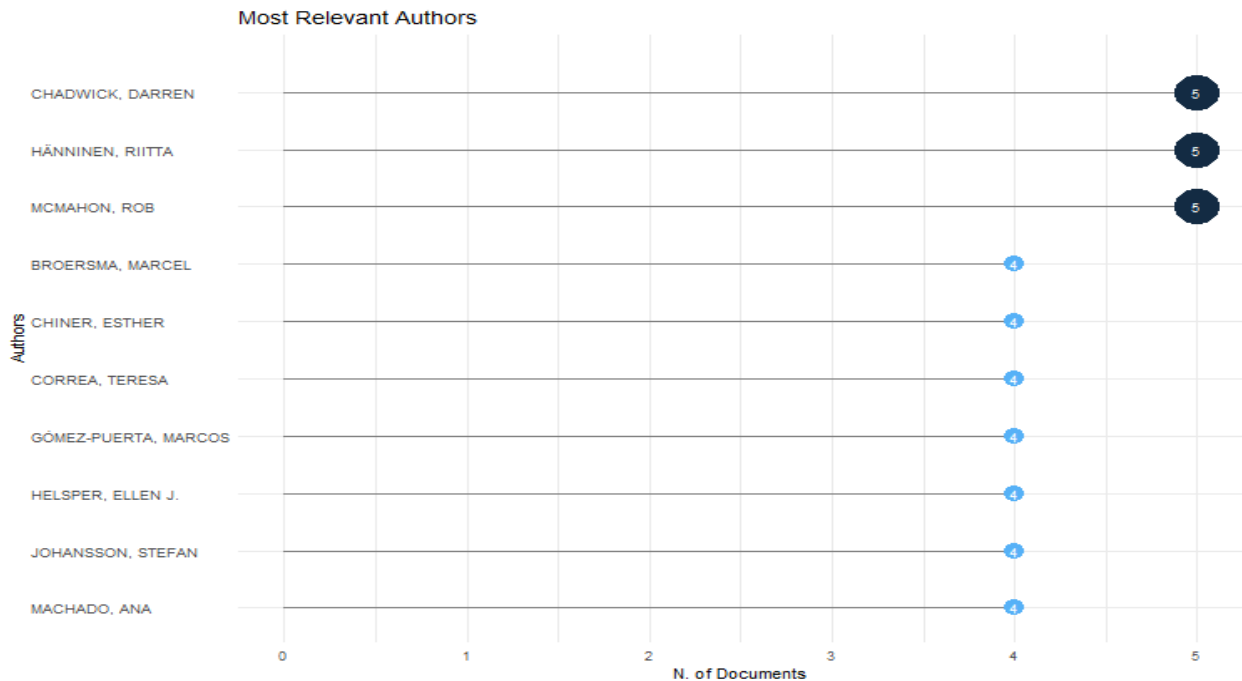


Figure 7 Most Relevant Authors (Source: Bibliometric analysis, Biblioshiny)

Figure 8 represents the most relevant authors, which is based on the number of documents they have contributed to the research domain. The horizontal axis shows the number of publications, and the vertical axis lists the authors. The result indicates in Figure 8 that Chadwick Darren, Hanninen Riita, and McMahon ROB are the most productive authors, each with five publications. These authors represent the highest level of contribution in the dataset. Followed by Broersma, Marcel; Chiner, Esther; Correa, Teresa; Gómez-Puerta, Marcos; Helsper, Ellen J.; Johansson, Stefan; and Machado, Ana, each with four publications, are showing their significant contribution in the DE research area.

3.2 Country Scientific Production

Figure 13 displays the outcome of a bibliometric analysis that depicts the scientific contributions of different countries globally based on the volume of publications output. This analysis goal is to identify the countries that are the most prolific in the quantity of scientific publications, showing their contribution to the global literature in a particular research field (Zupic & Cater, 2015; Donthu et al., 2021). China is in top place with 172 articles, while the United Kingdom is in second place with 132 articles, and Spain is in third place with 106 articles. These three nations have emerged as important research and development centers with their major contributions to the worldwide scientific literature. The USA and Australia rank fourth and sixth, with 89 and 67 articles published, respectively.

Country Scientific Production

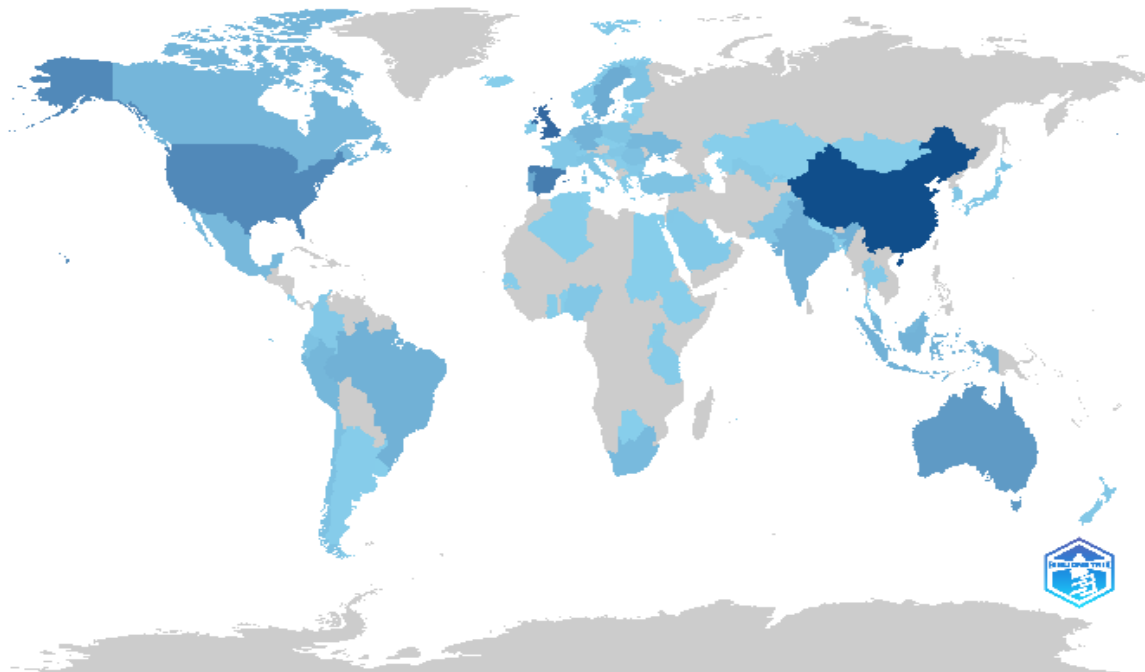


Figure 8 Country Scientific Production (Source: Bibliometric analysis, Biblioshiny)

Additionally, Portugal and Sweden also present many scientific contributions, with 49 and 45 articles, respectively. India, Brazil, and Germany have similar kinds of publications, output respectively 38, 37, and 36. These countries show important contributions, but with relatively lighter color intensity. This indicates their significant role in global scientific production, although less than countries with darker colors, like China, the UK, and Spain. China, the United Kingdom, and Spain are the top three countries that have contributed the most to scientific research in DE. This is largely due to significant government support by investing in research and development, with good research infrastructure. In addition, there is a strong academic environment, and supportive policies contribute to continued growth and innovation. All these factors make favorable conditions to producing high-quality research and contribute to the rank of these three countries as leaders in global scientific publications in the DE research field.

4. The Documents

The findings of this study about the documents are presented by the most cited documents, which reveal the documents that have the highest citation in the research world of the particular research domain.

4.1 Most Cited Document

The most-cited documents in Bibliometrix, as shown in Figure 15, provide important insights into the main areas of the research domain and the most influential themes in DE research. The horizontal axis shows the total number of worldwide citations, while the vertical axis lists the consistent documents along with their authors, publication years, and publication sources. Among the data, the work of Saleminck K, 2017, which is published in the Journal of Rural Studies, is prominent, because it has the most cited document with a total of 788 citations globally. This shows that it has a substantial impact on the DE research field. The 2017 work by Livingstone in the Journal of Communication, which has received 488 citations, shows its importance in the research field. Another important document work of Helsper (2017),

published in New Media and Society, has been cited 258 times, showing its significant contribution to the research area.

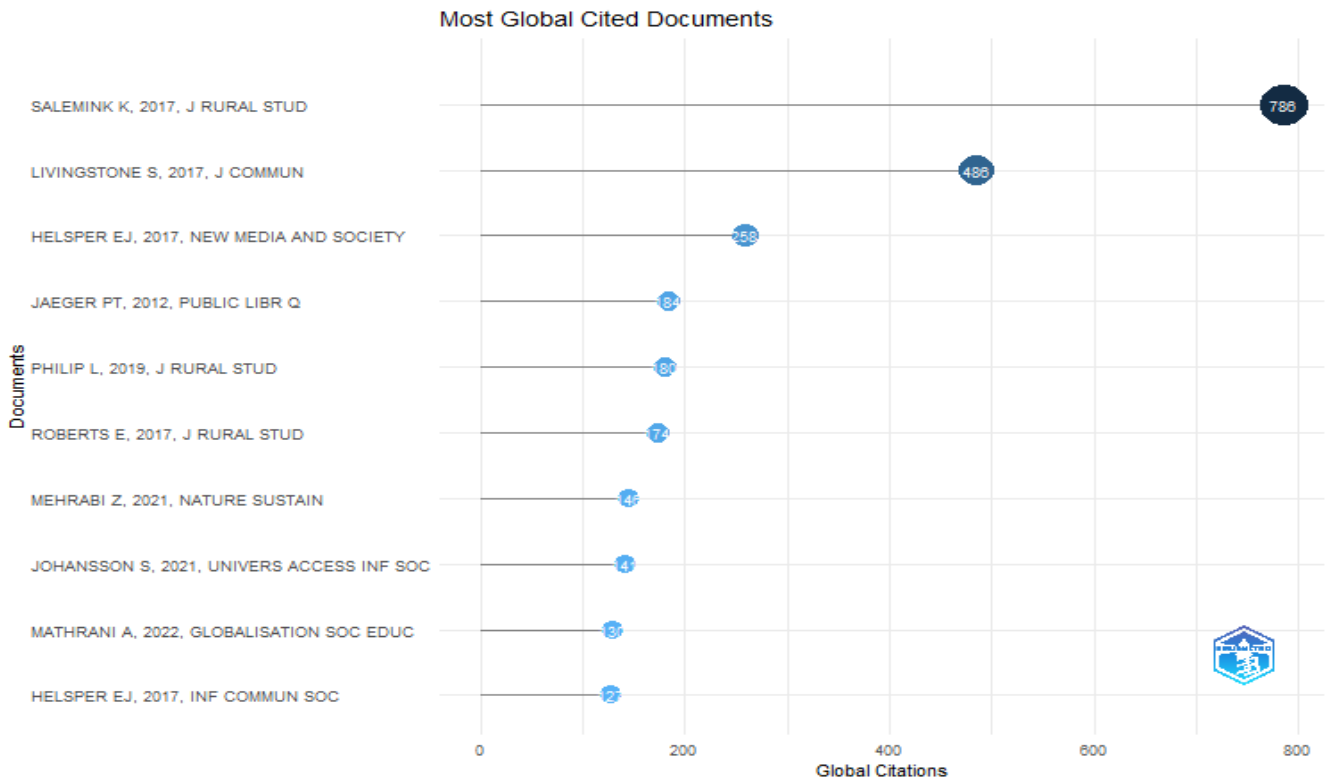


Figure 9: Most Cited Documents (Source: Bibliometric analysis, Biblioshiny)

The 2012 work by Jaeger and the 2019 work by Philip are also notable, with around 184 and 180 citations, respectively. The remaining documents, including those by Roberts (2017), Mehrabi (2021), Johansson (2021), and Mathrani (2022), get comparatively fewer citations, but their contribution is still significant within the research field. The variation in citation levels tells the differences in the reach and influence of these publications in the DE research.

5. Key Words

Word cloud, and the most frequent word, which shows the key terms that are in the research field, is described in the keywords section of the research findings.

5.1 Word Cloud and Most Frequent Word



Figure 10: Word Cloud (Source: Bibliometric analysis, Biblioshiny)

Figure 12 displays a word cloud of key terms that are in the DE research field. The purpose of using a word cloud for the papers under discussion is to identify the terms that appear most frequently, indicating the main areas where the analysis is centered. A word cloud, which is also known as a Tag Cloud, converts the text information data into visual keywords. The frequency or significance of each word is shown by differences in the size and color of words in the word cloud. As the figure shows, the most significant word is “digital inclusion,” which is at the center of the word cloud of DE research.

Terms	Frequency
Digital Inclusion	383
Digital Divide	128
Digital Literacy	53
Internet	46
Digital Empowerment	39
Digital Transformation	37
Older Adults	36
Sustainable Development	34
Empowerment	33
Digitization	31

Table 4: Most Frequent words

Along with Figure 12, Table 4 presents the frequency of the most occurring terms with their numeric frequency, as the word cloud lacks information on how many times they have occurred. As per the table, the term Digital Inclusion is the most frequently occurring word with 389 mentions, followed by “Digital Divide” with 128 mentions. This suggests that the topic of Digital Inclusion is currently a popular and relevant subject in various fields. Digital Literacy is the third most frequent word, with the number of occurrences 53, and Internet, with 48, shows a lesser but significant word in the research domain.

6. Conceptual Structure

The findings of the study for conceptual structure are presented in two categories: the co-occurrence network and the thematic map, which shows key themes and emerging research themes in the research field.

6.1 Co-occurrence Network

An important visualization technique we have used in bibliometric analysis is a co-occurrences network. This visual is grounded in a semantic network to give a conceptual structure for the study. The figure presents the co-occurrence network of keywords, which shows relationships among key research themes within the field. The network includes nodes, the individual words in the title, and edges between these nodes specify the frequency with which the words co-occur in similar titles. Figure 11 illustrates a network of interconnected nodes, which are grouped into different clusters, with each cluster represented by a distinct colour. The links between the nodes show the relationship and level of closeness between them. The nodes have been categorized into 3 distinct clusters. The network map is dominated by the red coloured cluster, in which the term Digital Inclusion appears as the dominant and highly connected term, which suggests its central role in the research domain of DE. The keyword is closely linked with terms

such as digital divide, digital literacy, internet use, and social inclusion, highlighting the strong conceptual connections between access, skills, and participation in the DE.



Figure 11 Co-occurrence Network (Source: Bibliometric analysis, Biblioshiny)

The red cluster mainly shows a network with terms that are related to inequality and access, in which keywords such as digital divide, digital inequality, internet access, older people, and COVID-19 are included. This cluster shows the social challenges and unequal opportunities associated with digital participation.

The blue cluster highlights technological and demographic dimensions of the research. Terms including human, adult, older adults, internet, and information and communication technology indicate attention, towards user groups and the role of technology in the digital interaction.

The green cluster is connected with themes related to development and innovation. Keywords including such as digital transformation, artificial intelligence, sustainability, higher education, and digital economy. These topics show a bigger viewpoint on how digital technologies and innovations contribute to economic and societal development.

In general, the network reveals that the field has a strong connection with different research, in which “Digital Inclusion” has emerged as a central connecting term that connects multiple research directions. The pattern of clustering shows that the literature integrates social, technological, and developmental viewpoints, showing the multidisciplinary nature of the DE research field.

6.2 Thematic Map

The thematic map illustrate the key topics in the area based on the author’s keywords Figure 12. The goal of creating a thematic map is to understand the current situation and evaluate the future trajectory of research advancement in the area (Garcia-Lillo et., 2023). The map illustrate the strength of their internal (density), which indicates inter-cluster development, and external (connectivity), the importance or relevance of the research in a particular area (certainly). It is categorized into four sections. The bottom left quadrant (emerging theme) signifies a theme that is not fully yet developed and exhibits low density and centrality. A network will slowly evolve themes like risk evaluation, strategic planning, and vulnerabilities. These topics hold lesser significant but offer avenues for the research in the future.

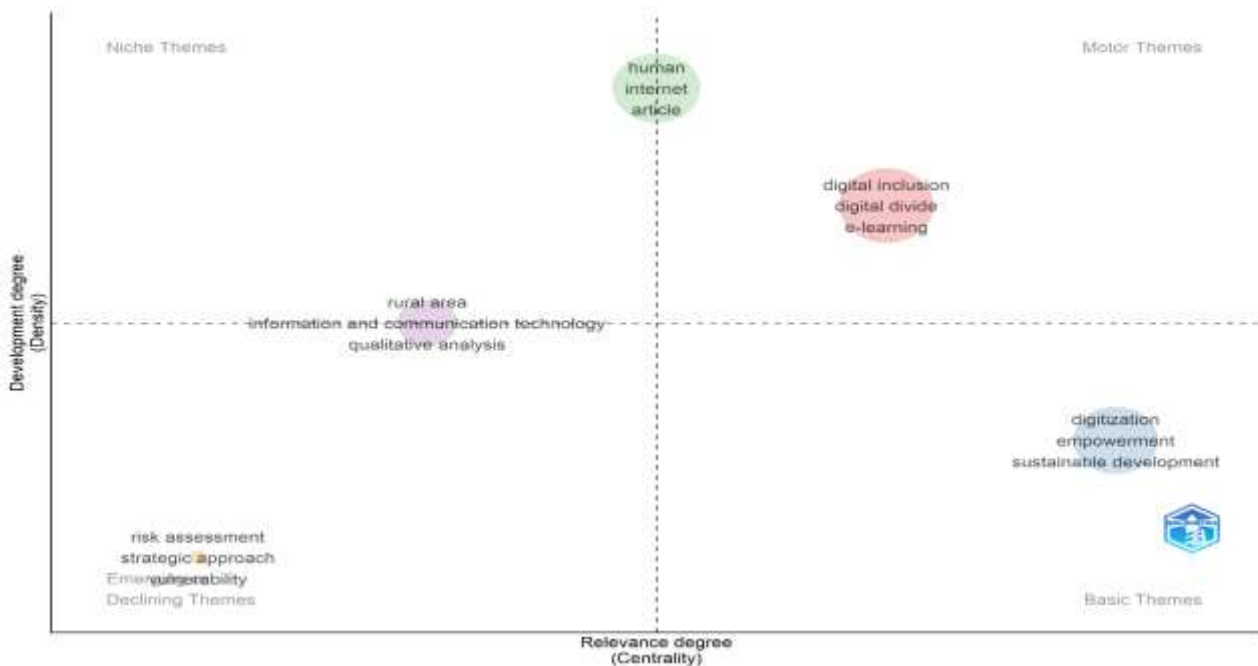


Figure 13 Thematic Map (Source: Bibliometric analysis, Biblioshiny)

The bottom right quadrant (basic theme) shows that fundamental, transversal, and underlying themes possess relevance probability with limited network development. Future research should place more emphasis on the topics related to digitization, empowerment, and sustainable development. The upper left quadrant, which represents niche themes, contains topics that are specialized, well-developed, and somewhat separate from the core research area. Subjects like rural areas, information and communication technology, and qualitative analysis need more attention in this field. The upper right quadrant represents motor themes, which are strongly developed and play an important role in the research area. Terms like digital inclusion, digital divide, and e-learning are very relevant and contribute to the progression of the research. Thematic maps aid in comprehending the research path, and these subjects offer possibilities for future exploration.

7. Intellectual structure: Co-citation Network

Being a key method in data analysis, citation-based evaluation serves as an important metric for authors' contributions, impact as citations serve as a crucial measure of the significance and relevance of a published article (Glynn et al., 2010). When a pair of articles is frequently co-cited, there is a strong likelihood that they contain similar ideas and are related to the same research domain (Benckendorff, 2009; Hiorland, 2013). Figure 14 shows the co-citation network of the most influential authors in the DE area. From the diagram, it is clear that authors like Hargittai E., Van Deursen A., J. A.M., Livingston S., Ragnedda M., and Quan-Haase A. played a significant role in marking the development of DE research. Their close interconnections indicate a strong intellectual relationship and shared research interests. The network is split into groups each one showing a different area of research. The red group has authors like Van Deursen A., Jaeger P. T. And Bertot J. C., who do research on things like inequality and access to information. The blue group is centered around Livingstone S. It seems to focus on how people use media and the internet. The green group has authors like Ragnedda M. And they look at the picture of digital society. The purple group is centered around Quan-Haase A. It is about how people communicate and interact with each other online. The orange group has authors like Johansson S., Gómez-Puerta M., and

Chadwick D. It shows another group of people working together in this field. The network shows that there are connections between these groups, and a few important authors are at the center of it all.

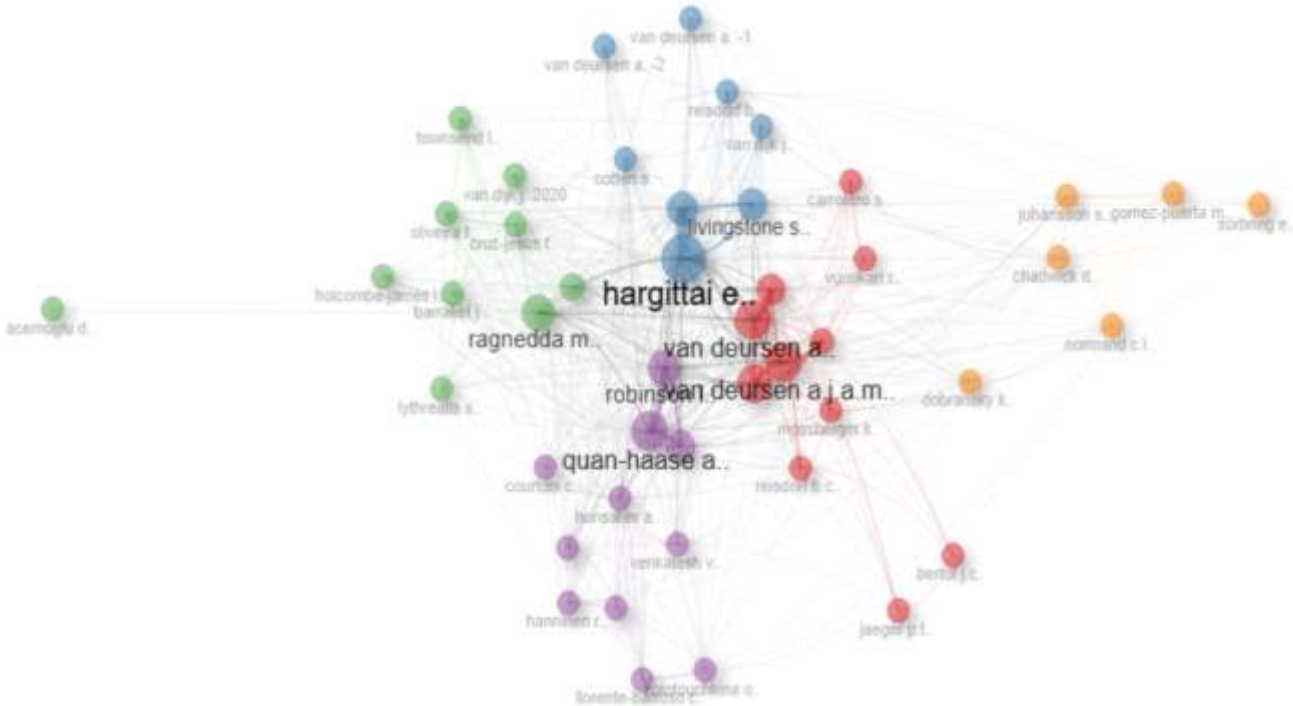


Figure 14: Co-citation Network (Source: Bibliometric analysis, Biblioshiny)

The fact that there are groups working together shows that research on digital inclusion is a mix of many areas, including communication, sociology, education, technology, and information studies.

Conclusion

This study is about the bibliometric analysis of Digital Empowerment (DE) research with data extracted from the Scopus database for the duration between 2010 and 2025. The result of the study shows that there is a significant growth in scholarly interest in digital empowerment research, particularly after 2020, due to the COVID-19 pandemic. This is because digital technologies are becoming important in contemporary social, economic, and governance systems. The study also discloses that digital inclusion, digital divide, digital literacy, ICT, and social inclusion are the dominant themes determining the intellectual structure of the research field of DE. Among these, digital inclusion comes out as the most central and commonly occurring topic, representing its strong significance within the current academic world. The co-occurrence and thematic analyses show that DE research is multidisciplinary in nature. It combines ideas and perspectives from communication studies, education, information science, sociology, and several other studies. The study also highlights key authors, institutions, countries, and journals that play a major role in the growth of DE research. Countries like China, the United Kingdom, and Spain are leading in DE research and receiving more citations because these countries have a strong research environment and academic investment. Authors such as Hargittai, Van Deursen, Livingstone, and Helsper are considered highly influential in this field. Their research work and collaboration have helped establish the core foundation of DE studies. The analysis also reveals that current research is increasingly focused on digital transformation, artificial intelligence, older adults, and digital empowerment. These areas reflect the rapid changes in digital technologies and their impact on society and economic development. At the same time

the study has a few limitations. Since only the Scopus database and English language publications were used, some relevant studies may have been left out. Future research should include database such as Web of Science and Dimensions to provide wider and more detailed coverage. Overall, the study adds valuable knowledge to DE research by explaining its intellectual structure, major contribution, thematic changes, and emerging trends. The findings will help researchers, policymakers, and practitioners better understand the field and support more inclusive and sustainable digital.

References

1. Thamri et al. (2025) The Role of Digital Empowerment in Developing Self-Efficacy Among Lectures at the Intensive Language Center at the Algerian University: Structural Equations Modeling Analysis. Zenodo. 10.5281/zenodo.18098911
2. Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285–296. <https://doi.org/10.1016/j.jbusres.2021.04.070>
3. Aryal, A. (2024). From digital divide to digital empowerment: Transforming marginalized communities. *Social Innovations Journal*. <https://socialinnovationsjournal.com/index.php/sij/article/view/8242>
4. UNDP. 2022. “Using digital banking to empower rural women entrepreneurs.” United Nations Development Programme. <https://www.undp.org/nepal/stories/using-digital-banking-empower-rural-women-entrepreneurs>.
5. Salman, D., Fawzy, N., & Zaazou, Z. (2025). The role of digitalization and education in empowering Egyptian women entrepreneurs. *Future Business Journal*, 11(199). <https://doi.org/10.1186/s43093-025-00583-x>
6. Pai, R. Y., Shetty, A., Shetty, A. D., Bhandary, R., Shetty, J., Nayak, S., Dinesh, T. K., & D’souza, K. J. (2022). Integrating artificial intelligence for knowledge management systems – synergy among people and technology: A systematic review of the evidence. *Economic Research-Ekonomska Istraživanja*, 35(1), 7043–7065. <https://doi.org/10.1080/1331677X.2022.2058976>
7. Aria, M. & Cuccurullo, C. (2017). Bibliometrix: An R-tool for comprehensive science mapping analysis, *Journal of Informetrics*, 11(4), pp 959-975, Elsevier, <https://doi.org/10.1016/j.joi.2017.08.007>
8. Zhang, Y., Li, X., Wang, J., & Chen, H. (2023). Exploring the impact of digital literacy on student empowerment: A bibliometric analysis. *Frontiers in Psychology*, 14, 1109149. <https://doi.org/10.3389/fpsyg.2023.1109149>
9. Lyu, Q., Dai, X., Zhou, B., Wang, F., Dai, L., Xiao, H., & Ni, J. (2025). Mapping competences for digital empowerment: A systematic review of smallholder farmers’ adoption of digital technologies. *Universal Access in the Information Society*, 24(3), 3347–3358. <https://doi.org/10.1007/s10209-025-01238-y>
10. Aramburuzabala, P., Culcasi, I., & Cerrillo, R. (2024). Service-learning and digital empowerment: The potential for the digital education transition in higher education. *Sustainability*, 16(6), 2448. <https://doi.org/10.3390/su16062448>
11. SLIDE European Union Erasmus+ Project (2022). The Service-Learning & Digital Empowerment Manifesto. Available online: <https://slide.reu.pub.ro>

12. Geers, I.; Meijs, L.; Somers, K. The Service-Learning & Digital Empowerment Manifesto; SLIDE Consortium: Rotterdam, The Netherlands, 2023.
13. Ravselj D., Umek, Todorovski, & Aristovnik (2022). A Review of Digital Era Governance Research in the First Two Decades: A Bibliometric Study.
14. Ding, C. J., Chen, H., Liu, Y., Hu, J., Hu, M., Chen, D., & Irfan, M. (2024). Unleashing digital empowerment: Pioneering low-carbon development through the Broadband China strategy. *Energy*, 295, 131034. <https://doi.org/10.1016/j.energy.2024.131034>
15. Shava, E., & Muringa, T. P. (2025). Digital empowerment of women in the South African public sector. *Frontiers in Sociology*, 10, 1604857. <https://doi.org/10.3389/fsoc.2025.1604857>
16. Zupic, I., & Čater, T. (2015). Bibliometric methods in management and organization. *Organizational Research Methods*, 18(3), 429–472. <https://doi.org/10.1177/1094428114562629>
17. Al-Afeef, M. A., & Alsmadi, A. A. (2025). Digital empowerment: Unraveling the impact of digital literacy on financial mastery. *Discover Sustainability*, 6(1), 311. <https://doi.org/10.1007/s43621-024-00681-4>
18. Rauf, U. A. A., Deli, M. M., & Husin, N. (2025). From exclusion to empowerment: Redesigning e-learning to mitigate risks for disabled students. *Journal of Applied Engineering and Technological Science*, 7(1). <https://doi.org/10.37385/jaets.v7i1.5432>
19. Calvo-Sotomayor, I., & Atutxa, E. (2025). Workforce aging, labour productivity, and digital empowerment in Europe. *Public Administration and Policy*, 28(1). <https://www.google.com/search?q=https://doi.org/10.1108/PAP-03-2024-0036>
20. Dong, H., & Zeng, J. (2025). Digital empowerment and sustainable tourism: Spatiotemporal coupling coordination analysis of digital technology and high-quality development in China's A-level scenic spots. *Sustainability*, 17(22), 10293. <https://doi.org/10.3390/su172210293>
21. Jimenez Cortes, R. (2025). Teacher digital empowerment scale: Study of validity and measurement invariance by gender and educational level. *Social Sciences and Humanities Open*, 12, 101968. <https://www.google.com/search?q=https://doi.org/10.1016/j.ssaho.2024.101968>
22. Li, M., Liu, Y., & Feng, R. (2025). How can China's autonomous vehicle companies use digital empowerment to improve innovation quality?—The role of digital platform capabilities and boundary-spanning search. *Systems*, 13(1), 45 <https://doi.org/10.3390/systems13010045>
23. Liu, G. L. (2025). Digital empowerment for rural migrant students in China: Identity, investment, and digital literacies beyond the classroom. *ReCALL*, 37(2). <https://doi.org/10.1017/S095834402400007X>
24. Liu, Q., Liu, S., Guan, T., Wen, Y., & Lv, K. (2025). Digital empowerment, novel productive forces, and regional green innovation efficiency: Causal inference based on spatial difference-in-differences and double machine learning approaches. *Information*, 16(7), 578. <https://doi.org/10.3390/info16070578>
25. Lyu, J., Xu, Q., Hu, C., & Chen M. (2025). Digital empowerment: The sustainable development of Chengdu lacquerware's colors and decorations. *Applied Sciences*, 15(9), 5065. <https://doi.org/10.3390/app15095065>
26. Ma, Y., Wang, S., Guo, K., & Wang, L. (2025). Multi-dimensional pathways of digitally-empowered new-quality productive forces in enterprises: A configurational analysis based on resource orchestration theory. *Systems*, 13(8), 623. <https://doi.org/10.3390/systems13080623>

27. Ma, Y., Wang, S., Guo, K., & Wang, L. (2025). Multi-dimensional pathways of digitally-empowered new-quality productive forces in enterprises: A configurational analysis based on resource orchestration theory. *Systems*, 13(8), 623. <https://doi.org/10.3390/systems13080623>
28. Munawaroh, N. A., Sudarmiati, Djatmika, E. T., Hermawan, A., & Munir, M. (2025). Digital empowerment and e-commerce adoption among handicraft SMEs: A contemporary Islamic economic law study using the TOE framework. *Milrev Metro Islamic Law Review*, 4(2). <https://www.google.com/search?q=https://doi.org/10.32332/milrev.v4i2.9515>
29. Pan, R., Li, B., Sun, Y., & Zhou, Q. (2025). A discourse-historical analysis of research on digital empowerment in English language teaching in China. *Social Sciences and Humanities Open*, 12, 101920. <https://www.google.com/search?q=https://doi.org/10.1016/j.ssaho.2024.101920>
30. Zhang, T., & Zhang, K. (2025). Establishment and application of modern ecological governance systems from the perspective of digital empowerment. *Sustainability*, 17(3), 1176. <https://doi.org/10.3390/su17031176>
31. Al-Ali, A., Alsmairat, M. A. K., Qawasmeh, R., Mahrakani, N. J., & Alhazzani, N. S. (2024). Exploring the role of digital citizenship and digital empowerment to enhance academic performance of business students. *International Journal of Data and Network Science*, 8(2), 1181–1192. <https://www.google.com/search?q=https://doi.org/10.5267/j.ijdns.2023.12.008>
32. Aramburuzabala, P., Culcasi, I., & Cerrillo, R. (2024). Service-learning and digital empowerment: The potential for the digital education transition in higher education. *Sustainability*, 16(6), 2448. <https://www.google.com/search?q=https://doi.org/10.3390/su16062448>
33. Jia, Y., & Yundendorj, K. (2024). Research on the high-quality development of cross-border e-commerce for agricultural products in China and Mongolia under the perspective of digital empowerment. *Pakistan Journal of Life and Social Sciences*, 22(2). <https://doi.org/10.3380/pjlss.2024.22.2.145>
34. Jia, Y., & Yundendorj, K. (2024). Research on the high-quality development of cross-border e-commerce for agricultural products in China and Mongolia under the perspective of digital empowerment. *Pakistan Journal of Life and Social Sciences*, 22(2). <https://doi.org/10.3380/pjlss.2024.22.2.145>
35. Saa, J. W. A., Sukker, A. M., & Samra, M. A. (2024). Digital empowerment for high school principals in Tulkarm Governorate – Palestine. *Pakistan Journal of Life and Social Sciences*, 22(2). <https://www.google.com/search?q=https://doi.org/10.3380/pjlss.2024.22.2.146>
36. Senos, S., Pedro, N., & Dorotea, N. (2024). Digital inclusion for parents: Preliminary results of the digital academy project. *Educational Media International*, 61(1-2), 45–62. <https://doi.org/10.1080/09523987.2024.2346781>
37. Wiyono, D., Parwitasari, N., Ambiapuri, E., Setiadi, H., & Khusna, K. (2024). Digital empowerment for administrative staff in private higher education institutions. *WSEAS Transactions on Computer Research*,
38. Yang, S., Luo, Y., Liu, J., Hua, Z., & Liu, C. (2024). Development of financial instruments in the green energy sector from the perspective of digital empowerment. *Applied Mathematics and Nonlinear Sciences*, 9(1). <https://doi.org/10.2478/amns-2024-0435>
39. Zhao, S., Grasmuck, S., & Martin, J. (2008). Identity construction on Facebook: Digital empowerment in anchored relationships. *Computers in Human Behavior*, 24(5), 1816–1836. <https://doi.org/10.1016/j.chb.2008.02.012>

40. Goh, K., Contractor, S., & Van Belle, S. (2022). A realist-informed review of digital empowerment strategies for adolescents to improve their sexual and reproductive health and well-being. *Journal of Urban Health*, 99(6), 1082–1101. <https://www.google.com/search?q=https://doi.org/10.1007/s11524-022-00680-3>
41. Gomez-Hernandez, J. A., Hernandez-Pedreno, M., & Romero-Sanchez, E. (2017). Social and digital empowerment of vulnerable library users of the Murcia Regional Library, Spain. *Profesional de la Información*, 26(1), 20–28. <https://doi.org/10.13140/RG.2.2.29815.116>
42. Hu, C., Yang, H., & Yin, S. (2022). Insight into the balancing effect of a digital green innovation (DGI) network to improve the performance of DGI for industry 5.0: Roles of digital empowerment and green organization flexibility. *Systems*, 10(4), 97. <https://www.google.com/search?q=https://doi.org/10.3390/systems10040097>
43. Irwansyah, & Hardiah, S. (2020). Digital collaboration in teaching and learning activities: The reflexivity study on educational digital empowerment. *International Journal of Learning, Teaching and Educational Research*, 19(10), 223–242. <https://doi.org/10.26803/ijlter.19.10.12>
44. Li, Z., Li, H., & Wang, S. (2022). How multidimensional digital empowerment affects technology innovation performance: The moderating effect of adaptability to technology embedding. *Sustainability*, 14(23), 15916. <https://doi.org/10.3390/su142315916>
45. Sharma, S., Kar, A. K., Gupta, M. P., Dwivedi, Y. K., & Janssen, M. (2022). Digital citizen empowerment: A systematic literature review of theories and development models. *Information Technology for Development*, 28(4), 738–762. <https://doi.org/10.1080/02681102.2021.1974390>
46. Seale, J., & Dutton, W. (2012). Empowering the digitally excluded: Learning initiatives for (in)visible groups. *Research in Learning Technology*, 20(4). <https://doi.org/10.3402/rlt.v20i.20002>