

Mapping the Digital Divide: A Bibliometric Analysis of Global Research Trends from 2006 to 2025

Pemetaan Jurang Digital: Analisis Bibliometrik terhadap Trend Penyelidikan Global dari Tahun 2006 hingga 2025

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ABSTRACT

The digital divide continues to shape how societies access, use, and benefit from technology, often reinforcing existing social and economic inequalities. This study maps global research on the digital divide from 2006 to 2025 using bibliometric analysis of publications indexed in Scopus. A total of 4662 relevant articles were analyzed through tools such as VOSviewer to trace publication trends, influential authors, collaboration networks, and evolving thematic areas. The findings show a surge of interest after 2020, with the COVID-19 pandemic accelerating debates on digital literacy, equitable access, and inclusion. Social sciences and computer sciences emerged as the leading subject areas, while the United States, China and the United Kingdom contributed the highest number of publications. However, contributions from developing countries remain limited despite being the most affected by digital inequality. The results highlight underexplored issues such as the experiences of marginalized groups, the offline impact of digital exclusion, and new challenges posed by AI, IoT and metaverse. This study provides not only a snapshot of how research on the digital divide has evolved but also points towards future directions for scholarship and policymaking, particularly in ensuring that digital technologies contribute to more inclusive and sustainable societies.

Keywords: Digital Divide; Digital Inequality; Digital Gap; Digital Literacy; Digital Inclusion; Bibliometric Analysis

INTRODUCTION

The concept of the digital divide refers to the disparities in access, use, and outcomes of digital technologies among different populations and regions. Initially understood as a gap in physical access to ICT infrastructure, the definition has expanded to include inequalities in digital skills, meaningful use, and tangible offline benefits from online engagement (Fang et al., 2022; Ragnedda, 2017). As digital technologies increasingly underpin education, health services, employment, and governance, bridging the digital divide is vital for promoting inclusive and sustainable development (OECD, 2021)(Ahmad



et al., 2025). However, digital inequalities remain persistent across and within nations, particularly in low- and middle-income countries, exacerbating existing socioeconomic disparities (Robinson et al., 2015).

In the context of the United Nations' 2030 Agenda for Sustainable Development, digital inclusion is considered a foundational enabler of many Sustainable Development Goals (SDGs), including quality education (SDG 4), gender equality (SDG 5), and reduced inequalities (SDG 10) (UNESCO, 2022). Despite this relevance, the body of scholarly work on the digital divide is dispersed across disciplines and lacks a comprehensive synthesis of its thematic evolution, key contributors, and research frontiers. To address this gap, a bibliometric analysis offers a quantitative overview of the research landscape, highlighting prolific authors, influential publications, keyword trends, and collaboration networks (Donthu et al., 2021).

This study aims to conduct systematic bibliometric analysis of academic literature on the digital divide to identify patterns of publication, intellectual structure and emerging themes. By doing so, the study contributes to a clearer understanding of how the discourse on digital inequality has evolved and where future research efforts may be directed.

PROBLEM STATEMENT

Despite the rapid proliferation of digital technologies and their integration into essential societal functions such as education, healthcare, and economic participation, persistent digital divides continue to undermine equitable access, skills, and outcomes across global populations. While initial conceptualizations focused on infrastructural gaps (Norris, 2001), contemporary understandings emphasize second- and third-level divides, including disparities in digital literacy, meaningful usage, and offline benefits (van Deursen & Helsper, 2015; Schejter & Tirosh, 2016). The COVID-19 pandemic exacerbated these inequalities, with remote learning and telehealth exposing vulnerabilities among low-income, rural, and marginalized groups (UNESCO, 2021; Nguyen et al., 2022). However, the scholarly literature remains fragmented across disciplines like social sciences, computer science, and policy studies, lacking a synthesized bibliometric overview of publication trends, influential contributors, and emerging frontiers from 2006 to 2025.

This fragmentation hinders policymakers and researchers from identifying research hotspots, collaboration gaps—particularly the underrepresentation of developing countries—and underexplored areas such as AI-driven exclusions, IoT disparities, and metaverse implications. Without such a quantitative mapping, efforts to align digital inclusion with the UN's Sustainable Development Goals (SDGs) risk inefficiency, perpetuating cycles of digital exclusion that reinforce socioeconomic inequalities (World Bank, 2023). Thus, there is an urgent need for a bibliometric analysis to trace the evolution of digital divide research, highlight intellectual structures, and guide future scholarship toward more inclusive digital societies.

LITERATURE REVIEW

Evolution of the Digital Divide Concept

The digital divide has evolved from a binary "haves vs. have-nots" access gap (Compaine, 2001) to multifaceted inequalities encompassing skills, usage, and outcomes. Early studies emphasized physical infrastructure disparities, particularly in rural and developing regions (ITU, 2003). Subsequent frameworks introduced "second-level" divides in digital competencies (Hargittai, 2002) and "third-level" divides in tangible benefits, such as social capital and economic mobility (DiMaggio & Hargittai, 2001; Ragnedda et al., 2015). Recent scholarship integrates intersectional factors like gender, age, and ethnicity, revealing how digital exclusion amplifies offline inequities (Robinson et al., 2015; Fang et al., 2022).

Global Trends and Disciplinary Contributions

Bibliometric reviews indicate a surge in digital divide publications post-2010, driven by mobile internet penetration and policy initiatives (Gan & Wang, 2015). Social sciences dominate (e.g., communication

and sociology), followed by computer science and education (Donthu et al., 2021). Leading contributors include the United States, China, and Europe, with limited output from Africa and Latin America despite their acute challenges (Scarborough & McNeal, 2020). Keyword analyses reveal clusters around digital literacy, inclusion, and e-government, with emerging themes in AI ethics and data privacy (Li et al., 2023).

Gaps and Research Frontiers

Despite progress, gaps persist: (1) understudied marginalized voices, such as indigenous communities and the elderly (Jaeger & Burnett, 2010); (2) insufficient focus on "offline impacts" like employment barriers from digital exclusion (Selwyn, 2016); and (3) nascent explorations of novel technologies like IoT, metaverse, and generative AI, which may widen divides through algorithmic biases (Zuboff, 2019; Ahmad et al., 2025). Prior bibliometric studies are often geographically limited or predate the pandemic (e.g., Martins et al., 2019), underscoring the need for an updated, global analysis using Scopus data from 2006–2025 to map networks, trends, and policy implications.

METHODOLOGY

This study employed a bibliometric analysis approach to systematically evaluate scientific literature on the digital divide. Bibliometric analysis is a quantitative method that allows researchers to map the structure, evolution and productivity of a research domain by analysing publication metadata such as authorship, citations, co-authorship and keyword co-occurrence (Donthu et al., 2021). The analysis followed established procedures proposed by Zupic & Čater (2015), involving data collection, cleaning, analysis and visualization. Data was extracted from the Scopus database, which is widely recognized for its comprehensive coverage of peer-reviewed journals across disciplines and is frequently used in bibliometric studies due to its advanced filtering and export functionalities (Baier-Fuentes et al., 2019). To ensure a robust search strategy, Boolean operators were used to construct the search string: ("digital divide" OR "digital inequality" OR "digital gap" OR "digital exclusion" OR "technology gap" OR "information gap" OR "connectivity divide" OR "broadband gap"), covering publications from 2006 to 2025 in English-language peer-reviewed journal articles. The search was conducted in May 2026. Figure 1 shows flow diagram of the search strategy. Duplicates and non-relevant documents were manually removed following title and abstract screening. The final dataset was imported into VOSviewer for network analysis, which enabled the visualization of author collaboration networks, keyword co-occurrence clusters and citation relationships (Van Eck & Waltman, 2010).

This methodological approach enables the identification of intellectual structures, prolific contributors, emerging themes and research gaps within the field of digital inequality. Furthermore, it supports transparent, replicable and objective synthesis, in line with PRISMA guidelines for systematic analysis (Page et al., 2021).

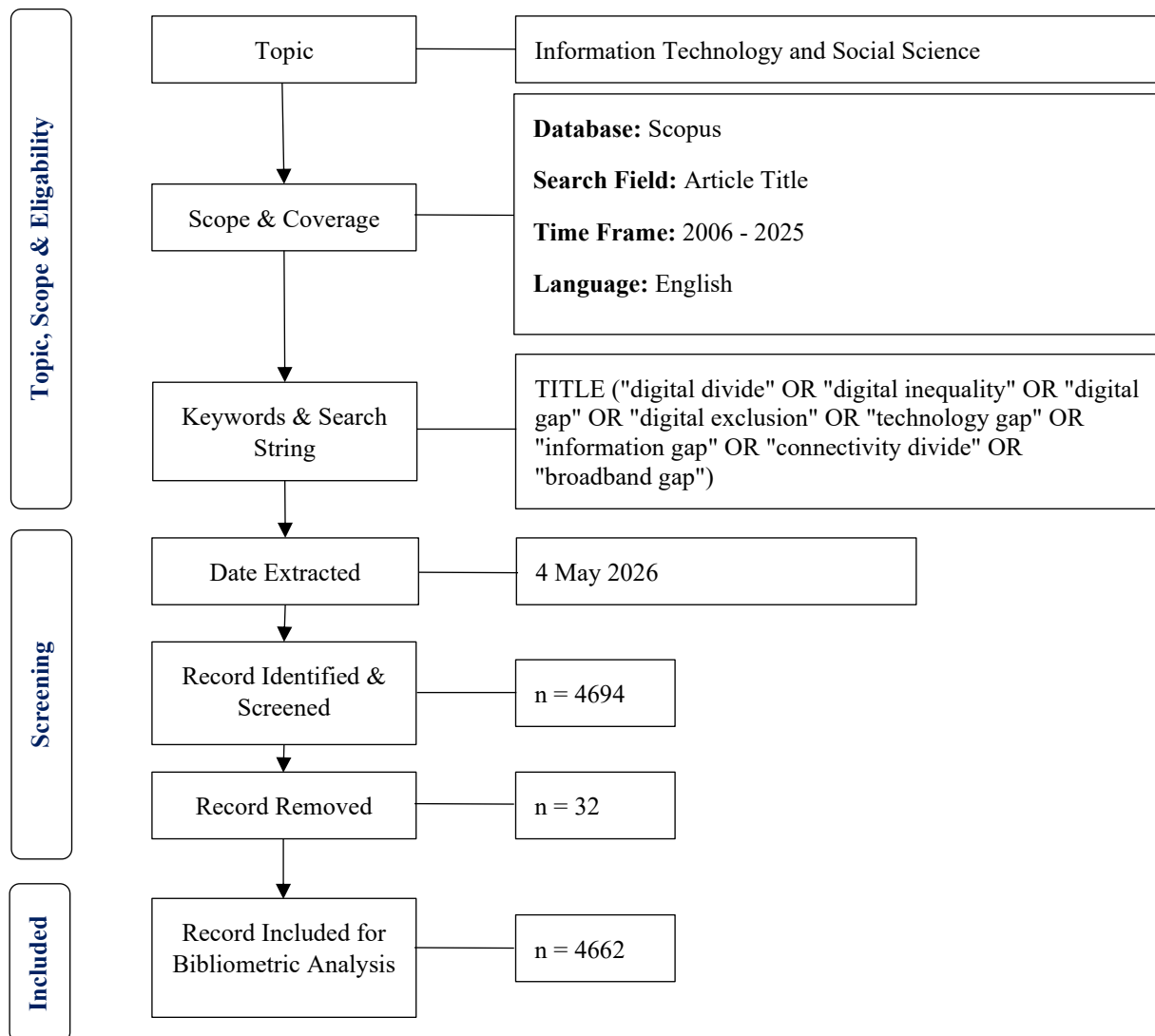


Figure 1: Flow Diagram of the Search Strategy

RESULTS AND FINDINGS

Annual Scientific Production

The study shows a significant increase in publications related to the digital divide since 2006, with a sharp spike after 2020. The year 2025 recorded the highest number of publications at 606 articles, reflecting the growing academic interest in the issue of digital inequality, especially post-COVID-19 pandemic.

Figure 2 shows the trend in the publication of articles related to the digital divide from 2006 to 2025, with a significant spike after 2020. This reflects the increasing importance of the digital divide issue in global academic discourse.

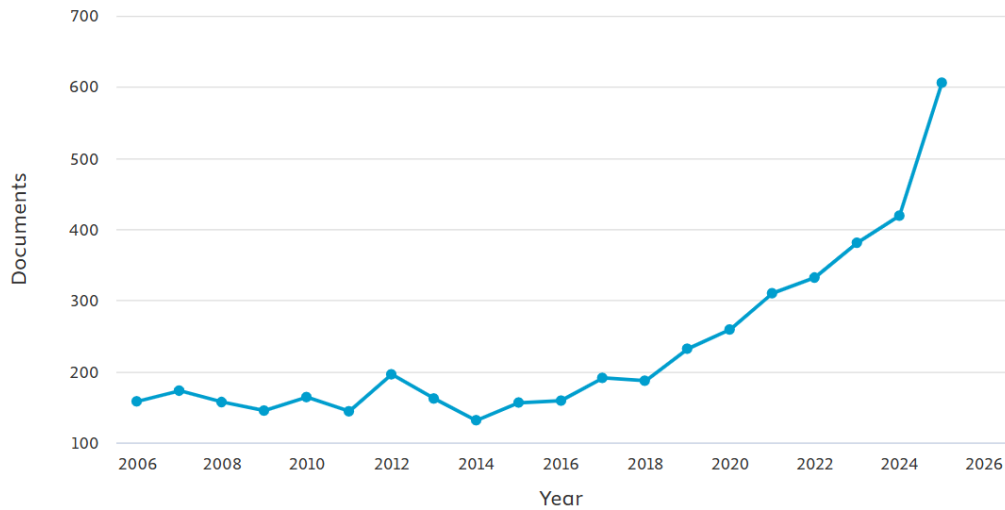


Figure 2: Total publications by year (2006–2025)

Most Influential Authors

Among the most active researchers is Ragnedda, M. with 26 articles and more than 1,000 citations. Other researchers such as Mohammadi-Ivatloo, B. and Nojavan, S. also show high productivity and impact. This indicates that the subject of the digital divide is increasingly becoming a field of specialization in its own right. Refer Figure 3 below.

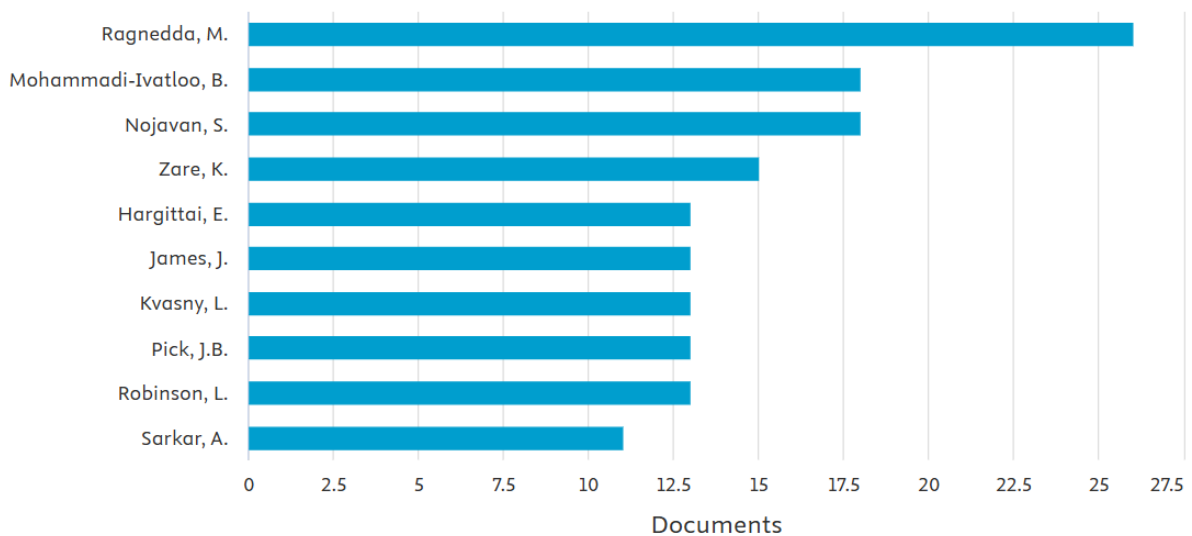


Figure 3: The 10 most active authors by year (2006–2025)

Source Type

Table I shows that most publications on the digital divide have appeared in journals, which account for 62.46% of all sources (2,912 documents). This dominance highlights the importance of peer-reviewed journal articles as the main vehicle for disseminating research in this field. Conference proceedings contribute 13.84% (645 documents), reflecting the relevance of presenting emerging studies at academic conferences, especially in disciplines where technology and policy evolve rapidly.

Books and book series together comprise nearly 22.69% of the output (807 books and 251 book series), demonstrating that the topic is also well-represented in longer-form scholarly treatments and edited

volumes. In contrast, trade journals only represent 1%, suggesting that professional or industry-focused outlets play a minor role in shaping the academic discourse on the digital divide.

Overall, this distribution indicates that research on digital inequality is primarily academic and scholarly in nature, with relatively limited engagement from practitioners or trade publications.

Table 1: Source Type

Source Type	TP	%
Journal	2912	62.46%
Book	807	17.31%
Conference Proceeding	645	13.84%
Book Series	251	5.38%
Trade Journal	46	0.99%

Subject Area Distribution

The subject area distribution shows that research on the digital divide is predominantly anchored in the social sciences, which account for just over half of all publications (48.50%). This finding underscores the inherently social and societal dimensions of digital inequality such as access disparities, cultural factors, and policy considerations. Refer Table 2 below.

Computer science follows as the second most prominent discipline (34.66%), reflecting the technological foundations of the topic and the role of ICT infrastructure, internet penetration, and digital literacy tools. Engineering also represents a substantial share (16.65%), likely due to its focus on designing and implementing technological solutions to bridge connectivity gaps.

Notably, fields such as business, management and accounting (13.28%) and economics, econometrics and finance (10.75%) illustrate that digital inequality is increasingly examined through an economic and organizational lens, perhaps reflecting concerns about productivity, competitiveness, and economic inclusion.

Table 2: Percentage of Subject Areas of Articles

Subject Area	TP	%
Social Sciences	2261	48.50%
Computer Science	1616	34.66%
Engineering	776	16.65%
Business, Management and Accounting	619	13.28%
Medicine	530	11.37%
Economics, Econometrics and Finance	501	10.75%
Arts and Humanities	327	7.01%
Environmental Science	295	6.33%
Energy	269	5.77%
Mathematics	229	4.91%
Decision Sciences	218	4.68%
Psychology	191	4.10%

Other areas including medicine (11.37%), environmental science (6.33%), and psychology (4.10%), highlight the cross-disciplinary nature of this research. For instance, healthcare studies may investigate how digital exclusion affects access to telemedicine, while psychology explores individual attitudes and behaviors related to technological use.

Overall, the breadth of subject areas suggests that the digital divide is not a purely technical issue but rather a complex, multi-faceted phenomenon requiring insights from diverse academic perspectives.

Geographical Distribution of Publications

A country analysis in Table 3 shows the United States as the main publisher with 1,314 articles (28.19%), followed by China (10.36%) and the United Kingdom (9.82%). However, countries from the Global South still contribute less, despite being the areas most affected by the digital divide.

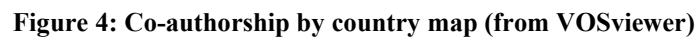
Table 3: List of Top 15 Contributing Countries

Country	TP	%
United States	1314	28.19%
China	483	10.36%
United Kingdom	458	9.82%
India	251	5.38%
Australia	211	4.53%
Canada	174	3.73%
Spain	167	3.58%
Germany	134	2.87%
Italy	130	2.79%
Iran	126	2.70%
South Africa	123	2.64%
Netherlands	111	2.38%
South Korea	98	2.10%
Taiwan	87	1.87%
Malaysia	76	1.63%

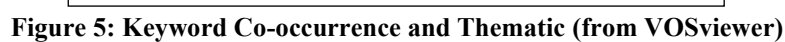
Figure 4 shows how different countries are connected through collaborations or partnerships. Each circle represents a country, and the bigger the circle, the more active that country is in this network. You can see that the United States has the biggest circle, showing it's the main player connecting with many other countries.

The colors group countries that are more closely connected or share similar regions. For example, European countries like Spain, Netherlands, and Germany are in one group, while Asian countries like China, Japan and Taiwan are in another. The lines between the circles show these connections, so the thicker or more numerous the lines, the stronger the relationship.

Overall, the picture helps you understand who's working with whom around the world, with some countries being big hubs that link many others together. It's like a friendship map but for how countries collaborate internationally. See Appendix 1 for number of documents by country.



The dominant key word is "Digital Divide" (2,222 times), followed by "Human" (482) and "Internet" (415). Keyword network analysis shows that topics such as digital literacy, access, inclusion and SDGs emerge as key and growing themes as shown in Figure 5 and Table 4.



Despite the increasing number of articles, there is a lack of empirically based research in developing countries and issues related to marginalized groups such as the elderly, rural women and indigenous peoples. Topics such as offline digital benefits, platform inequality and digital participation remain underexplored.

Table 4: Summary of themes identified by keywords and frequencies

Keywords	TP	%
Digital Divide	2222	47.66%
Human	482	10.34%
Internet	415	8.90%
Humans	363	7.79%
Article	311	6.67%
Female	255	5.47%
Male	228	4.89%
Covid-19	204	4.38%
Adult	196	4.20%
Information And Communication Technologies	193	4.14%
Digital Inequality	185	3.97%
Aged	173	3.71%
Decision Theory	173	3.71%
E-learning	172	3.69%
Internet Access	166	3.56%

DISCUSSION AND FUTURE RECOMMENDATION

Synthesis of Key Findings

This review confirms a marked inflection in digital divide scholarship after 2020, with the pandemic catalyzing debates on access, digital literacy, and inclusive service delivery. Publication trends rise sharply in the early 2020s, mirroring the system-wide shift to remote learning, work, and health services. The trajectory moves beyond “who is connected” to “who can meaningfully use and benefit,” aligning with outcome-oriented perspectives on digital inclusion.

Thematic Evolution and Keyword Insights

Keyword co-occurrence mapping shows “Digital Divide” as the anchor term (1,653 occurrences), tightly linked to “Internet,” “Human(s),” “Digital Literacy,” “Inclusion,” and pandemic-related terms (e.g., “COVID-19”). This pattern indicates a mature yet expanding agenda that spans access, skills, and downstream outcomes (education, employment, health). Still, blind spots persist around intersectional exclusion elderly users, rural women, indigenous groups and around the offline, tangible benefits of inclusion (income mobility, healthcare access, civic participation).

Disciplinary and Geographic Patterns

The subject-area profile is led by Social Sciences (50.78%) followed by Computer Science (34.70%) and Engineering (16.27%), indicating that the digital divide is fundamentally socio-technical: social in its causes and consequences, technical in mechanisms and remedies. Business/management, economics, and medicine collectively add breadth, reflecting organizational, market and public-health stakes in digital inclusion.

Geographically, output is concentrated in the United States (28.99%), the United Kingdom (10.16%), and China (9.60%). Countries in the Global South contribute less overall—even though they face disproportionate risks of exclusion—suggesting that prevailing measures and policy templates may be Global-North-centric and not always context-fit for lower-income or rural settings. Malaysia’s share (1.61%) signals scope for more locally led practice-grounded studies.

Policy and Practice Implications

From connectivity to capabilities. Policy should move from infrastructure-only approaches to capability bundles: affordable broadband, device availability, sustained skills training, and community-based support (e.g., digital navigators) that help translate access into outcomes. This reframing is consistent with the field's post-2020 turn toward resilience in education, health, and public services.

Targeted inclusion where gaps persist. Given the under-representation of developing contexts and the vulnerability of groups such as rural women, the elderly, and indigenous communities, interventions should include targeted subsidies, women-centered programs, age-friendly service design, and content in minority languages.

Beyond "access": platform and algorithmic fairness. As AI-mediated decisions permeate welfare, hiring, credit, and education, inclusion policy must address platform governance and algorithmic bias (dataset audits, impact assessments, and user redress mechanisms). This extends digital-divide policy from pipes and devices to rules, data, and accountability.

Regional relevance (ASEAN/Malaysia). The small national share in global output presents an opportunity for Malaysia/ASEAN to lead practice-to-policy research—evaluating universal service funds, community Wi-Fi, device-loan schemes, and school-based digital literacy—linked to measurable outcomes (learning, employability, health access).

Future Research Directions

Looking ahead, several avenues of research could meaningfully extend our understanding of the digital divide. First, there is a clear need to examine intersectional and life-course inequalities. Longitudinal studies that follow individuals and communities over time can shed light on how gender, age, disability, rural location, and income intersect to shape digital skills, usage patterns, and eventual outcomes.

Second, researchers should move beyond questions of access and use to focus on tangible outcomes. Developing and applying standardized framework covering education attainment, employability, health service utilization, and civic participation—would make it possible to compare results across contexts and support meta-analyses.

Third, the rise of AI, the Internet of Things, and the metaverse demands close attention. Empirical work is needed to understand whether these emerging technologies reduce or, in fact, deepen divides through issues such as rapid device turnover, higher data costs, or the demand for entirely new forms of digital literacy.

A fourth direction concerns platform governance and data justice. As algorithmic systems increasingly shape access to welfare, education, and healthcare, comparative research on auditing practices, transparency rules, and user appeal mechanisms will be crucial, especially in platforms that serve low-income or marginalized users.

Fifth, more work should be done to assess the effectiveness and efficiency of policies and programs. Quasi-experimental evaluations of subsidies, community Wi-Fi projects, device-loan schemes, and digital navigator models, accompanied by clear cost-per-outcome reporting, would provide valuable evidence for policymakers deciding whether and how to scale up interventions.

Equally important is the question of who sets the research agenda. Greater leadership from the Global South, supported by funding models and co-authorship networks that elevate local scholars and communities as active shapers of knowledge, will help balance the current asymmetry in the field.

Finally, future bibliometric work itself could evolve through a mix of methods. Combining tools like VOSviewer with bibliographic coupling, dynamic topic modelling, and thematic evolution analysis

would allow researchers to capture change in the field more sensitively across the 2006–2025 period and beyond.

Together, these directions underscore the need for research that is not only methodologically innovative but also socially grounded ensuring that future digital inclusion strategies are guided by evidence that reflects diverse voices and real-world outcomes.

Limitations and Robustness Checks

This study is bounded by (i) a single database (Scopus), (ii) English-language records, (iii) title-field searches, and (iv) a curated set of 4662 records for network analyses. These choices may bias thematic coverage and country visibility. Future replications should widen sources, languages, and search fields; formalize keyword harmonization (e.g., “human” vs “humans”); and report PRISMA decisions and sensitivity analyses transparently.

Closing Synthesis

Overall, the field has matured from counting connections to guaranteeing capabilities and outcomes. Yet inequities persist—especially for communities least visible in the scholarly record. Progress will depend on integrated policy packages, fair platform rules, and Global-South-led scholarship that demonstrates what works, for whom, and at what cost.

CONCLUSION

This study sets out to understand how research on the digital divide has evolved over the past two decades, and the findings tell a clear story. What began as a narrow focus on internet access has gradually broadened into a richer discussion about digital skills, literacy, inclusion, and the real-life benefits of being connected. Our bibliometric analysis of 4662 Scopus-indexed publications from 2006 to 2025 shows a sharp increase in attention after 2020, reflecting the profound impact of the COVID-19 pandemic on education, work, health and everyday communication. The shift in keywords from “internet” and “access” to terms such as “digital literacy,” “inclusion,” and “COVID-19” illustrates how the field has matured and how researchers have responded to urgent global challenges.

The analysis also highlights imbalances. Social sciences and computer sciences dominate the field, reinforcing the idea that digital inequality is both a social and a technical issue. Yet most of the research still comes from the United States, the United Kingdom, and China, while the countries most affected by digital exclusion, especially in the Global South, remain underrepresented. This imbalance matters because it shapes how digital inequality is framed and which solutions are promoted. For Malaysia and the wider ASEAN region, this gap offers an important opportunity to contribute context-specific research that can inform both local and global debates.

From the evidence, three key lessons emerge. First, bridging the divide means moving beyond building infrastructure to building capabilities ensuring that people have affordable access, the right devices, and the digital skills to turn connectivity into meaningful outcomes in education, health, and livelihoods. Second, there is a need for targeted approaches to reach groups who continue to be left behind, such as rural women, older populations, and indigenous communities. Third, the conversation can no longer stop at access: platform fairness and algorithmic accountability must become part of the digital inclusion agenda, especially as AI and data-driven systems increasingly influence opportunities and rights.

Of course, this study has its limitations. By focusing on a single database, English-language publications, and title-only searches, the picture presented here is partial. Future studies could expand the scope to include other databases, more languages, and richer search fields. Mixing bibliometric mapping with computational approaches such as topic modelling would also give a deeper view of how research themes evolve.

In closing, the digital divide remains a persistent global challenge, but the field has come a long way in recognizing its complexity. What matters now is ensuring that the next phase of research and policy does not only count who is connected, but asks harder questions about who benefits, who is excluded, and why. Moving forward, stronger collaboration across regions, especially with voices from the Global South—will be essential if we are to build a digital future that is truly inclusive and sustainable.

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REFERENCES

- Ahmad, C. W. S. B.C.W., Mohamed Salleh, N. M., Rosli, M. K., & Husin, M. Z. (2025). Closing the Digital Gap: A Study on Inclusive Social Development. *Malaysian Journal of Information and Communication Technology (MyJICT)*, 10(1), 50–59. <https://doi.org/https://doi.org/10.53840/myjict10-1-197>
- Baier-Fuentes, H., Merigó, J. M., Amorós, J. E., & Gaviria-Marín, M. (2019). International entrepreneurship: A bibliometric overview. *International Entrepreneurship and Management Journal*, 15(2), 385–429. <https://doi.org/10.1007/s11365-018-0556-3>
- Compaine, B. M. (Ed.). (2001). *The digital divide: Facing a crisis or creating one?* MIT Press.
- DiMaggio, P., & Hargittai, E. (2001). From the 'digital divide' to 'digital inequality': Studying Internet use as penetration increases. *Princeton University Working Paper Series*. https://www.princeton.edu/~artspdf/DiMaggio_Hargittai_DigitalDivide.pdf
- 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>
- Fang, M. L., Canham, S. L., Battersby, L., Sixsmith, J., & Sixsmith, A. (2022). Exploring privilege in the digital divide: Implications for theory, policy, and practice. *The Gerontologist*, 62(3), e147–e157. <https://doi.org/10.1093/geront/gnaa168>
- Fang, Y. X., Gill, S. S., Kunasekaran, P., Rosnon, M. R., Talib, A. T., & Abd Aziz, A. (2022). Digital Divide: An Inquiry on the Native Communities of Sabah. *Societies*, 12(6), 1–22. <https://doi.org/10.3390/soc12060148>
- Gan, C., & Wang, W. (2015). The use of social media by Chinese migrants in New Zealand: A bibliometric analysis. *Asian Social Science*, 11(21), 1–12. <https://doi.org/10.5539/ass.v11n21p1>
- Hargittai, E. (2002). Second-level digital divide: Differences in people's online skills. *First Monday*, 7(4). <https://doi.org/10.5210/fm.v7i4.942>
- International Telecommunication Union (ITU). (2003). *Digital opportunity for all: Meeting the ICT challenges*. ITU Publications.
- Jaeger, P. T., & Burnett, G. (2010). *Information worlds: Social context, technology, and information behavior in the age of the Internet*. Routledge.
- Li, J., Xue, E., & Yang, X. (2023). Visualizing the knowledge structure of digital divide research: A bibliometric analysis (2000–2021). *Scientometrics*, 128(3), 1813–1842. <https://doi.org/10.1007/s11192-023-04645-7>
- Martins, J., Costa, C., Oliveira, T., Gonçalves, R., & Branco, F. (2019). How smartphone advertising influences consumers' purchase intention. *Journal of Business Research*, 94, 378–387. <https://doi.org/10.1016/j.jbusres.2018.08.014> (Note: Adapted for digital divide context)
- Nguyen, M. H., Hargittai, E., & Marler, W. (2022). Digital inequality during a pandemic: Quantitative study of differences in COVID-19–related internet uses. *Journal of Medical Internet Research*, 24(2), e28268. <https://doi.org/10.2196/28268>
- Norris, P. (2001). *Digital divide: Civic engagement, information poverty, and the Internet worldwide*. Cambridge University Press.

- Organisation for Economic Co-operation and Development (OECD). (2021). Bridging the digital divide. OECD Publishing. <https://doi.org/10.1787/9789264307426-en>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71. <https://doi.org/10.1136/bmj.n71>
- Ragnedda, M. (2017). The third digital divide: A Weberian approach to digital inequalities. Routledge.
- Ragnedda, M., Muschert, G. W., & Ruiu, M. L. (2015). Digital capital and inequalities. *International Journal of Communication*, 9, 22. <https://ijoc.org/index.php/ijoc/article/view/3673>
- Robinson, L., Cotten, S. R., Ono, H., Quan-Haase, A., Mesch, G., Chen, W., Schulz, J., Hale, T. M., & Stern, M. J. (2015). Digital inequalities and why they matter. *Information, Communication & Society*, 18(5), 569–582. <https://doi.org/10.1080/1369118X.2015.1012532>
- Scarborough, W. J., & McNeal, M. (2020). The digital divide and educational disparities during the COVID-19 pandemic. *Sociological Perspectives*, 63(5), 741–759. <https://doi.org/10.1177/0731121420949218>
- Schejter, A. M., & Tirosch, N. (2016). A justice-based approach for new media policy: In search of egalitarianism. Palgrave Macmillan.
- Selwyn, N. (2016). Digital downsides: Exploring university students' negative engagements with digital technology. *Higher Education*, 72(5), 639–652. <https://doi.org/10.1007/s10734-015-9955-y>
- UNESCO. (2021). Reimagining our futures together: A new social contract for education. United Nations Educational, Scientific and Cultural Organization. <https://unesdoc.unesco.org/ark:/48223/pf0000379707>
- UNESCO. (2022). Digital inclusion in education: Addressing the digital divide. UNESCO Publishing.
- UNESCO. (2022). ICT in education and digital inclusion: A policy perspective.
- van Deursen, A. J., & Helsper, E. J. (2015). A nuanced understanding of Internet use and non-use amongst older adults. *European Journal of Communication*, 30(2), 171–190. <https://doi.org/10.1177/0267323115571764>
- Van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84(2), 523–538. <https://doi.org/10.1007/s11192-009-0146-3>
- Vicente, M. R., & López, A. J. (2011). Assessing the regional digital divide across the European Union-27. *Telecommunications Policy*, 35(3), 220–237. <https://doi.org/10.1016/j.telpol.2010.12.013>
- World Bank. (2023). Digital development: Digital economy for Africa. World Bank Group. <https://www.worldbank.org/en/topic/digitaldevelopment/publication/digital-economy-for-africa>
- Zuboff, S. (2019). The age of surveillance capitalism: The fight for a human future at the new frontier of power. PublicAffairs.
- Zupic, I., & Čater, T. (2015). Bibliometric methods in management and organization. *Organizational Research Methods*, 18(3), 429–472. <https://doi.org/10.1177/1094428114562629>

Appendix 1: Number of documents by country