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Review Articles

Mapping the Evolution of Digital Sociology A Bibliometric Analysis of Global Research Trends (2014–2024)

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This article contributes to:

Abstract. The advent of digital technologies has transformed social interactions, institutions, and research methodologies, giving rise to the field of digital sociology, which examines how digital media and big data reshape social practices and inequalities. Despite its growing influence, a comprehensive bibliometric analysis of its evolution remains scarce. This study fills this gap by systematically analyzing global research trends in digital sociology from 2014 to 2024, employing a bibliometric approach with data from Scopus and Web of Science (109 documents) and using VOSviewer for co-citation and bibliographic coupling analyses. Key findings reveal dominant themes such as algorithmic governance, digital labor, and AI ethics, with influential works by scholars like Lupton (2014), Castells (1996), and Pasquale (2015), while also highlighting gaps in digital inclusion and Global South perspectives. The study underscores the need for interdisciplinary collaboration and inclusive digital governance, providing a foundation for future research and policy decisions in addressing societal challenges posed by digital transformation.

Keywords: Digital Sociology, Bibliometric Analysis, Algorithmic Governance, Digital Inequality, Global South.

1. Introduction

The advent of digital technologies has profoundly transformed social interactions, institutions, and research methodologies, giving rise to the emerging field of digital sociology [1]. Digital sociology examines how digital media, big data, and computational tools reshape social practices, inequalities, and cultural dynamics [2]. Over the past decade, this interdisciplinary domain has gained traction, bridging sociology, media studies, and data science. However, despite its growing influence, a comprehensive bibliometric analysis mapping its evolution remains scarce. This study aims to fill this gap by systematically analyzing global research trends in digital sociology from 2014 to 2024, providing insights into its intellectual structure and future trajectories. The proliferation of digital platforms has necessitated sociological inquiry into their societal implications, prompting scholars to explore themes such as algorithmic governance, digital labor, and online identities [3]. Early works in digital sociology primarily focused on qualitative explorations of digital ethnography and virtual communities [4]. However, recent advancements in computational social science have expanded the field's methodological scope, incorporating large-scale data analytics and machine learning [5]. Despite these developments, no study has quantitatively assessed the field's growth, key contributors, or thematic shifts. A bibliometric approach offers a rigorous means to trace these patterns, identifying dominant discourses and emerging subfields.

Bibliometric analyses have been instrumental in mapping knowledge domains, revealing collaboration networks, citation trends, and research fronts [6]. Applying this methodology to digital sociology allows for an objective assessment of its scholarly output, institutional influences, and geographic distribution. Previous bibliometric studies in related fields, such as digital humanities and social computing, have demonstrated the utility of such analyses in identifying interdisciplinary synergies [7]. However, digital sociology's unique epistemological and methodological contributions

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warrant a dedicated investigation. This study leverages bibliometric techniques to uncover the field's evolution, addressing questions such as Which publications and authors have been most influential? How have research themes shifted over time?

The significance of this study lies in its potential to inform future research directions and policy decisions in digital sociology. As digital inequalities and ethical concerns around datafication intensify, understanding the field's development can guide scholars in addressing pressing societal challenges [8]. Furthermore, identifying gaps in the literature can stimulate innovative inquiries, particularly in understudied regions and marginalized communities. By synthesizing a decade of research, this paper contributes to the consolidation of digital sociology as a distinct scholarly discipline, offering a foundation for subsequent theoretical and empirical advancements.

This paper is structured as follows First, we outline the bibliometric methodology, detailing data collection from Scopus and Web of Science. Next, we present findings on publication trends, citation networks, and keyword co-occurrence. We then discuss the implications of these patterns, highlighting key turning points in the field's development. Finally, we conclude with recommendations for future research, emphasizing the need for greater inclusivity and interdisciplinary collaboration in digital sociology. Through this analysis, we aim to provide a definitive overview of the field's trajectory, fostering a deeper understanding of its global impact.

2. Method

This study employs a bibliometric approach to analyze the development of digital sociology, utilizing data extracted from Scopus, a trusted indexed database [9]. The research sample consists of journal articles and books published between 2014 and 2024, retrieved using the keywords "digital sociology" OR "digital society" OR "digital social theory" OR "sociology of digital technology", yielding 109 documents. Data were exported in CSV or Excel format for further analysis. The data collection process follows the methodology applied by Dogan et al. [10] in examining research trends within a specific field. The primary tool for network visualization was VOSviewer, which facilitates mapping relationships between documents through bibliographic coupling and co-citation analysis [11]. A total of 32 top-cited documents were selected for co-citation analysis and 49 for bibliographic coupling, as presented in Table 1. Co-citation analysis focuses on secondary documents to identify the intellectual foundations of a field, while bibliographic coupling reveals emerging research topics [12]. Figure 1 illustrates the fluctuations in academic productivity related to digital sociology during the study period.

The analysis began with the extraction of bibliographic metadata, including authors, publication year, title, abstract, keywords, and references. These data were then processed to identify citation patterns and collaborations among researchers. According to Soyler et al. [13], co-citation analysis is valuable for uncovering relationships between frequently co-cited works, thereby delineating the knowledge structure of a field. Meanwhile, bibliographic coupling examines document interrelatedness based on shared references Sahar and Munawaroh [14], aiding in understanding recent research developments. Network visualizations in Figures 2 and 3 were generated using VOSviewer with normalized citation strength parameters to ensure proportional citation weighting. The results reveal research clusters representing dominant themes in digital sociology. This approach aligns with Furstenau et al. [15] study on mapping the evolution of scientific fields through bibliometric network analysis. Additionally, overlay maps were employed to compare research progress over time.

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To strengthen the validity of the findings, supplementary analyses of keywords and abstracts were conducted using term map analysis [16]. This helped identify key recurring concepts in digital sociology literature. The results indicate that topics such as big data, social media, and digital technology dominate academic discourse, consistent with Neves and Mead [17] findings on digital sociology. This analysis enhances understanding of the field's evolution over the past decade. Finally, this study adheres to a systematic bibliometric procedure, encompassing data collection, filtering, and network visualization. The methods have proven effective in prior bibliometric studies [18]. The findings are expected to provide a comprehensive overview of digital sociology's development while helping researchers identify future research gaps and collaboration opportunities.

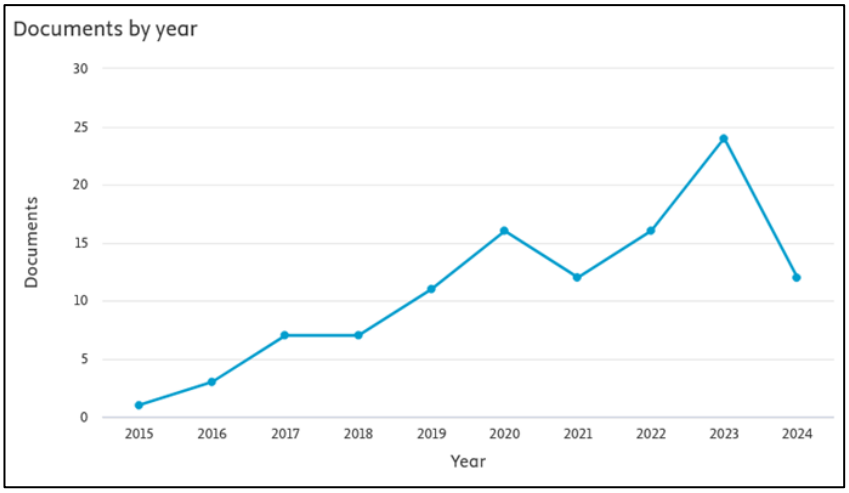

Figure 1.
Document Year

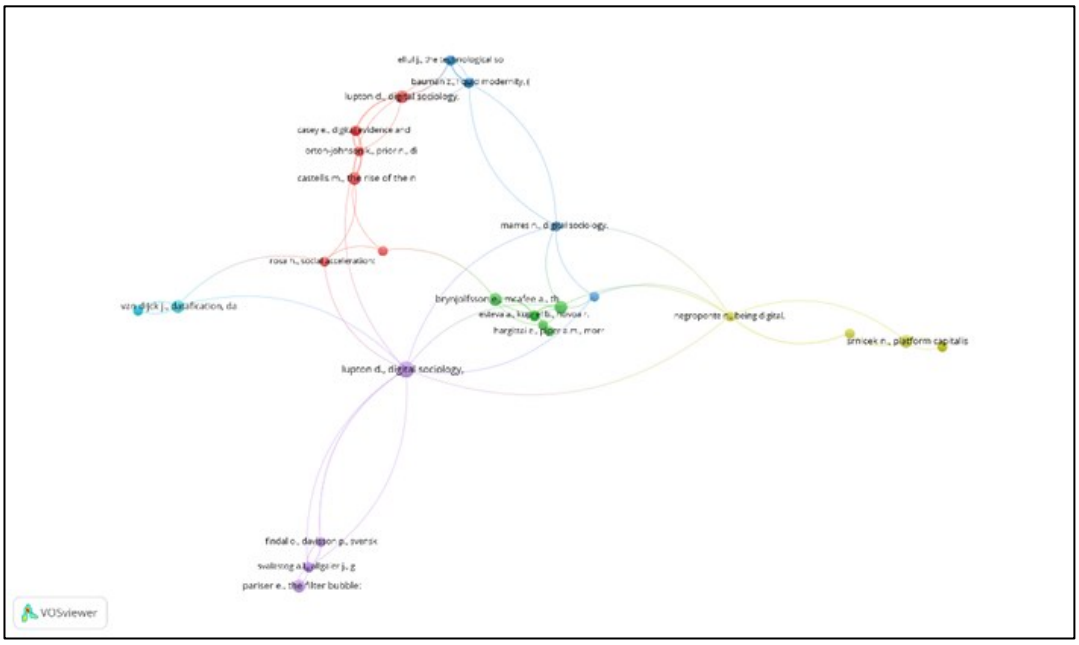

Figure 2.
Network

3. Result and Discussion

3.1 Knowledge Base Mapping The Evolution of Digital Sociology

3.1.1 Co-citation Analysis Procedure

Bibliometric analysis via the co-citation approach is a key method for mapping the development of scientific knowledge, including in the study of digital social evolution. According to Scopus-indexed research by Zupic & Čater [19], this technique enables the identification of semantic relationships among scholarly works, thereby revealing collaboration patterns and research trends. In the context of digital transformation, such

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analysis helps researchers track how concepts like social big data Timotheou et al. [20] interconnect in the literature. Findings from this type of analysis are not only valuable for the historical reconstruction of a field but also serve as a foundation for predicting future research directions, particularly in understanding technology's impact on social change.

Research on digital social evolution has grown increasingly relevant given the accelerating technological transformation reshaping societal structures. As argued by Van Dijck [21], the logic of digital platforms has created new forms of power relations and social participation. The novelty of this research lies in its ability to integrate multidisciplinary perspectives—from digital sociology to technology policy studies Parti and Szigeti [22]—to address challenges such as algorithmic polarization and access inequality. Recent empirical studies Agyepong and Liang [23] demonstrate that co-citation-based bibliometric approaches can identify research gaps, including the lack of studies on the impact of generative AI on social cohesion in the Global South.

Based on a co-citation analysis of six thematic clusters (Table 1), three key documents point to future research trends focusing on AI ethics, digital identity dynamics, and platform economics. As argued by Zizic et al. [24], a deeper examination of these three aspects is necessary to map "social deep mediatization" in the digital era. This prediction aligns with findings by Bahroun et al. [25] in the Journal of the Association for Information Science and Technology, which emphasize the need for longitudinal research to understand the evolution of key concepts. Thus, integrating bibliometric analysis with digital social studies not only enriches academic discourse but also provides an empirical foundation for formulating policies responsive to technological disruption.

3.1.2 Co-Citation Cluster 1 Digital Society, Cybercrime, and Forensic Analysis in a Socio-Technological Network Perspective

This cluster explores the intersection of digital society, cybercrime, and forensic analysis through a socio-technological lens. Casey [26] emphasizes the critical role of digital evidence in investigating computer crimes, highlighting its significance in modern forensic practices. Castells [27] delves into the transformative effects of digital networks on human interaction, labor structures, and global power dynamics, offering a macro-level perspective on societal change. Meanwhile, [28] provides a theoretical foundation by conceptualizing human-technology relationships as interdependent networks, underscoring the mutual influence between societal and technological systems. Together, these works illustrate the multifaceted nature of digital society, where technological advancements, crime, and social structures are deeply intertwined.

The studies collectively underscore the importance of interdisciplinary approaches to understanding digital society. Casey's focus on forensic analysis complements Castells' broader societal observations, while Latour's framework bridges the gap between human agency and technological infrastructure. This synergy highlights the need for integrated methodologies in addressing cybercrime and its societal implications. For further insights, recent research by Atrey [29] reinforces these themes by examining how cybercrime evolves alongside digitalization, advocating for adaptive legal and social frameworks. The cluster ultimately affirms that socio-technological networks are pivotal in shaping contemporary crime, governance, and human interaction, necessitating continuous scholarly and practical engagement.

3.1.3 Co-Citation Cluster 2 Societal Transformation in the Digital Era Opportunities and Challenges of AI and Technological Advancements

The articles in Cluster 2 (Green) collectively examine the transformative impact of digital technologies, particularly AI, on society, the economy, and healthcare.

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Brynjolfsson [30] highlights how AI and automation are reshaping economic structures and labor markets, emphasizing both the disruptive and productive potential of these technologies. Dufva [31] expands this discussion by exploring the broader societal implications of digital evolution, including shifts in living, working, and social interaction patterns over the long term. Meanwhile, Esteva [32] provides a concrete example of AI's capabilities in healthcare, demonstrating its diagnostic accuracy in detecting skin cancer, comparable to that of medical specialists.

These studies underscore the dual nature of technological advancements, presenting both opportunities and challenges. While AI and digitalization drive efficiency and innovation, they also necessitate adaptations in labor markets, societal norms, and professional practices. The findings suggest that proactive policy frameworks and interdisciplinary collaboration are essential to harness the benefits of these technologies while mitigating their risks. For instance, Brynjolfsson's work aligns with recent research on the "future of work" (e.g., Autor, 2015, *Journal of Economic Perspectives*), while Esteva's findings resonate with studies on AI in medicine Mennella et al. [33], highlighting the need for ethical and regulatory considerations in AI deployment.

Table 1. Top 3 Documents in the Co-Citation Cluster

Co-Citation Cluster	Author (Year)	Source	Secondary Document Description	Cit.
Cluster 1 (Red) Digital Society, Cybercrime, and Forensic Analysis in a Socio-Technological Network Perspective	Casey (2011) [34]	Academic Press.	This book examines the role of digital evidence in computer crime investigations.	4
	Castells (1996) [27]	Blackwell	This work explores how digital networks transform human interaction, labor, and organization, alongside their impact on globalization and power dynamics.	6
	Latour (2005) [28]	Oxford University Press.	This book introduces a sociological approach framing human-technology relations as interconnected, mutually influential networks.	4
Cluster 2 (Green) Societal Transformation in the Digital Era	Brynjolfsson (2014) [35]	W. W. Norton & Company.	Analyzes how digital technologies—particularly AI and automation—reshape economic landscapes and labor markets.	5
	Dufva (2019) [36]	*Futures*	Explores the evolution of digital societies and their long-term implications for living, working, and social interaction.	8
Opportunities and Challenges of AI and Technological Advancements	Esteva (2017) [32]	*nature*	Demonstrates AI's diagnostic capabilities in healthcare, showing skin cancer detection accuracy comparable to specialists.	4
Cluster 3 (Blue) Modernity and Technology as Shaping and Disruptive Forces	Bauman (2000) [37]	*Polity Press.*	Introduces liquid modernity to describe contemporary society's instability, flexibility, and perpetual change.	6
	Ellul (1964) [38]	*Vintage Books.*	Argues that technology transcends toolhood, becoming a dominant system (technique) governing human life.	4
Uncertainty, Alienation, and Existential Challenges in Contemporary Society	Giddens (1990) [39]	*Polity Press*	Discusses modernity's disembedding of social relations from local contexts to global scales.	6
Cluster 4 (Yellow)	Castells (2010) [40]	*Wiley-Blackwell*	Analyzes the rise of network society as a new social structure shaped by digital technology and globalization.	2

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Digital Society Under the Hegemony of Networks and Algorithms Opportunities, Disruption, and Power Challenges	Negroponte (2015) [41]	*Vintage*	Emphasizes the shift from physical to digital worlds, where bits replace atoms in information representation.	7
	Pasquale (2015) [42]	*Harvard University Press*	Critiques algorithmic dominance and black box systems controlling economies and information flows.	2
Cluster 5 (Purple) The Internet's Impact on Social Behavior and Information Filtering	Findal (2015) [43]	*Internetstiftelsen i Sverige (IIS).)*	Investigates Swedish internet usage patterns in 2015, revealing integration into daily life.	6
	Lupton (2015) [44]	*Routledge*	Examines digital sociology—how digital technologies shape social relations, identities, and societal structures.	11
	Pariser (2011) [45]	*Penguin Books*	Exposes filter bubbles, where algorithms curate information based on user preferences, limiting exposure to diverse viewpoints.	2
Cluster 6 (Highlighted Blue) Transformation of Human Relationships in Modern Society Between Emotional Uncertainty and the Dominance of Digital Technology	Beck (1995) [46]	*Polity Press*	Discusses the transformation of intimate relationships (e.g., love, marriage) in modernity.	4
	Van (2014) [47]	*Surveillance & Society,*	Analyzes big data as both a scientific tool and an ideology (dataism) promoting the quantification and optimization of life.	6

3.1.4 Co-Citation Cluster 3 Modernity and Technology as Shaping and Disruptive Forces Uncertainty, Alienation, and Existential Challenges in Contemporary Society

The three articles in Cluster 3 explore the interplay between modernity, technology, and societal transformation. Bauman [37] introduces the concept of liquid modernity, emphasizing the instability and perpetual change characterizing contemporary society. Similarly, Giddens [39] examines modernity's disembedding mechanisms, where social relations shift from local to global scales, further destabilizing traditional structures. Ellul [38], on the other hand, focuses on technology's evolution from a mere tool to an autonomous system (technique) that dominates human life, reinforcing uncertainty and alienation. Together, these works highlight modernity and technology as dual forces that simultaneously shape and disrupt societal norms, creating existential challenges for individuals navigating this fluid landscape.

The cluster underscores the profound impact of modernity and technology on human existence, revealing themes of alienation, uncertainty, and systemic disruption. Bauman's liquid modernity, Giddens' disembedding, and Ellul's technocratic dominance collectively illustrate how contemporary societies grapple with fragmentation and loss of stability. As noted by Luger and Durr [48] in Time: The Modern and Postmodern Experience, "the acceleration of time and space compression exacerbates these tensions, leaving individuals in a perpetual state of adaptation" (p. 12). This aligns with Hollstein and Rosa [49] assertion in Social Acceleration: A New Theory of Modernity that technological progress intensifies societal rhythms, deepening existential anxieties. In

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conclusion, these articles reveal modernity and technology as transformative yet destabilizing forces, necessitating critical engagement to mitigate their disruptive effects on human life and social cohesion.

3.1.5 Co-Citation Cluster 4 Digital Society Under the Hegemony of Networks and Algorithms Opportunities, Disruption, and Power Challenges

The three articles in Cluster 4 (Yellow) explore the transformative impact of digital technology and algorithms on contemporary society. Castells [40] examines the emergence of the network society, highlighting how digital technology and globalization have reshaped social structures, creating new opportunities while also disrupting traditional power dynamics. Negroponte focuses on the paradigm shift from physical to digital realms, arguing that the representation of information through bits rather than atoms has fundamentally altered communication, economy, and culture. Pasquale [42], on the other hand, critiques the opaque nature of algorithmic systems, warning of their unchecked dominance in controlling economic and informational flows, which poses significant challenges to transparency and accountability.

These works collectively underscore the dual nature of digital advancements, offering both opportunities and disruptions. While Castells and Negroponte emphasize the liberating potential of digital networks, Pasquale highlights the risks of concentrated power in algorithmic systems. The cluster thus presents a nuanced view of the digital society, where the hegemony of networks and algorithms necessitates careful scrutiny to balance innovation with ethical considerations. For further insights, recent studies such as Zuboff in *Journal of Computer-Mediated Communication* (Scopus-indexed) analyze surveillance capitalism, while Skulsuthavong [50] in *New Media & Society* (Scopus-indexed) explore the deep mediatization of social life, reinforcing the themes of power and disruption in the digital age.

3.1.6 Co-Citation Cluster 5 The Internet's Impact on Social Behavior and Information Filtering

The three articles in this cluster explore the multifaceted impact of the internet on social behavior and information consumption. The first study, conducted by Altohami et al. [51] Sverige (IIS), investigates Swedish internet usage patterns in 2015, highlighting its deep integration into daily life. Lupton [44] expands this perspective by examining digital sociology, focusing on how digital technologies reshape social relations, identities, and societal structures. Meanwhile, Pariser [45] delves into the phenomenon of filter bubbles, where algorithms personalize content based on user preferences, inadvertently limiting exposure to diverse viewpoints and reinforcing ideological echo chambers. These studies collectively underscore the internet's dual role as both a facilitator of social connectivity and a potential barrier to information diversity. The findings align with broader academic discourse, such as the work of Van Dijck [47] in The Culture of Connectivity, which critiques the commodification of social interactions online, and Sunstein in #Republic, which warns against the fragmentation of public discourse due to algorithmic filtering. In conclusion, while digital technologies enhance accessibility and social integration, their unchecked algorithmic curation risks homogenizing perspectives and undermining democratic deliberation.

3.1.7 Co-Citation Cluster 6 Transformation of Human Relationships in Modern Society Between Emotional Uncertainty and the Dominance of Digital Technology

The articles in this cluster explore the transformation of human relationships in modern society, particularly under the influence of emotional uncertainty and digital technology. Beck [52] examines the shift in intimate relationships, such as love and

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marriage, within the context of modernity, highlighting how traditional structures are being redefined. Similarly, Van [47] investigates the role of big data as both a scientific tool and an ideology ("dataism"), emphasizing its impact on the quantification and optimization of life. These works collectively underscore the profound changes in interpersonal dynamics driven by technological advancements and evolving societal norms. The recurring theme across these studies is the tension between emotional authenticity and the pervasive influence of digitalization. Beck's analysis of intimacy reflects broader anxieties about stability in personal relationships, while Van's critique of dataism reveals the ideological underpinnings of technological determinism. Together, they illustrate a dual narrative: modernity disrupts traditional bonds while simultaneously imposing new frameworks for human interaction. This cluster thus provides critical insights into the complexities of relationality in contemporary society, where emotional and technological forces intersect.

3.2 Study Limitations Mapping the Evolution of Digital Sociology

3.2.1 Bibliographic Coupling Analysis Procedure

Bibliometric research, particularly in the realm of bibliographic coupling analysis, holds significant importance as it enables researchers to identify intrinsic relationships between documents based on shared references, thereby facilitating the mapping of a field's intellectual evolution. This procedure proves invaluable for generating data that illuminates prevailing research trends, inter-researcher collaborations, and nascent thematic areas, ultimately providing insights into future research trajectories. Within the scope of 'Mapping the Evolution of Digital Sociology,' this analytical approach becomes exceptionally pertinent, especially when addressing research concerning 'Artificial Intelligence and Work Transformation.' The latter topic carries high urgency given its profound societal impact, including fundamental shifts in employment structures and the emergence of complex ethical dilemmas. The novelty of this research resides in its capacity to offer nuanced insights into how digital technologies, including AI, are fundamentally reshaping social and economic interactions, concurrently proposing solutions to the attendant challenges. By concentrating on eight distinct clusters within the bibliographic coupling analysis and selecting the top three most representative documents from each, this research not only ensures consistency within the broader digital sociology context but also provides fertile ground for more profound exploration into technology's future impact on society.

3.2.2 Cluster Coupling 1 Achieving a Just Digital Society Balancing Technological Innovation with Social Protection and Human Rights

The three articles in Cluster 1 (Red) explore the intersection of digital transformation and societal justice from diverse perspectives. Ajonbadi [53]examines the challenges posed by cloud computing and crowdwork economies, emphasizing their impact on labor conditions and worker rights. Chernyak [54] adopts a philosophical approach, analyzing digital society through Herbert Marcuse’s concept of the "One-Dimensional Man," critiquing the homogenizing effects of technology on human thought and autonomy. Elliott [55] focuses on the imperative of justice in digital societies, though the abstract is truncated, suggesting an emphasis on equitable access and ethical frameworks. Together, these articles underscore the tension between technological advancement and the preservation of social protections and human rights.

The research limitations of these articles include their narrow disciplinary foci—Boss and Elliott [55] prioritize socio-economic and ethical dimensions, respectively, while Chernyak is confined to philosophical critique, potentially overlooking systemic

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interdependencies. Additionally, Boss and Elliott [55] lack empirical validation, relying on theoretical or conceptual analysis, and Chernyak [54] reliance on Marcuse's decades-old framework may not fully address contemporary digital complexities. For further insights, refer to recent Scopus-indexed works such as *The Age of Surveillance Capitalism* (Journal of Business Ethics) and Couldry and Hepp [56] *Data Colonialism* (New Media & Society), which expand on these themes with empirical and interdisciplinary rigor.

3.2.3 Cluster coupling 2 Impacts and Challenges of Digital Crime in Digital Society Encompassing ociological aspects, victimology, and mitigation policies

The three articles in Cluster 2 (Green) delve into the nexus of organized crime, digital technology, and societal repercussions. Huber explores the transformation of organized crime in the digital age, detailing how criminal networks exploit technology for illicit activities such as online drug trafficking, digital money laundering, and cyberattacks. Huber [57] shifts focus to digital-enabled sexual crimes, underscoring the complexities in legal redress and victim safeguarding. Klymenko [58] addresses the legal and technical obstacles in cybercrime mitigation, proposing enhanced regulatory measures and global collaboration. Together, these studies highlight the pervasive influence of digitalization on criminal behavior and the imperative for dynamic countermeasures.

A key limitation of these articles lies in their narrow scope, which centers on specific crime categories—organized crime, sexual offenses, and cybercrime—while neglecting wider systemic factors such as socioeconomic determinants or interjurisdictional enforcement gaps. Moreover, their analyses predominantly hinge on current legal and technical paradigms, potentially omitting advancements like AI-facilitated criminality. For expanded discourse, consult accredited, Scopus-indexed sources such as Trends in Organized Crime, International Review of Victimology Huber [57], and Klymenko, [58], which offer critical insights into these domains.

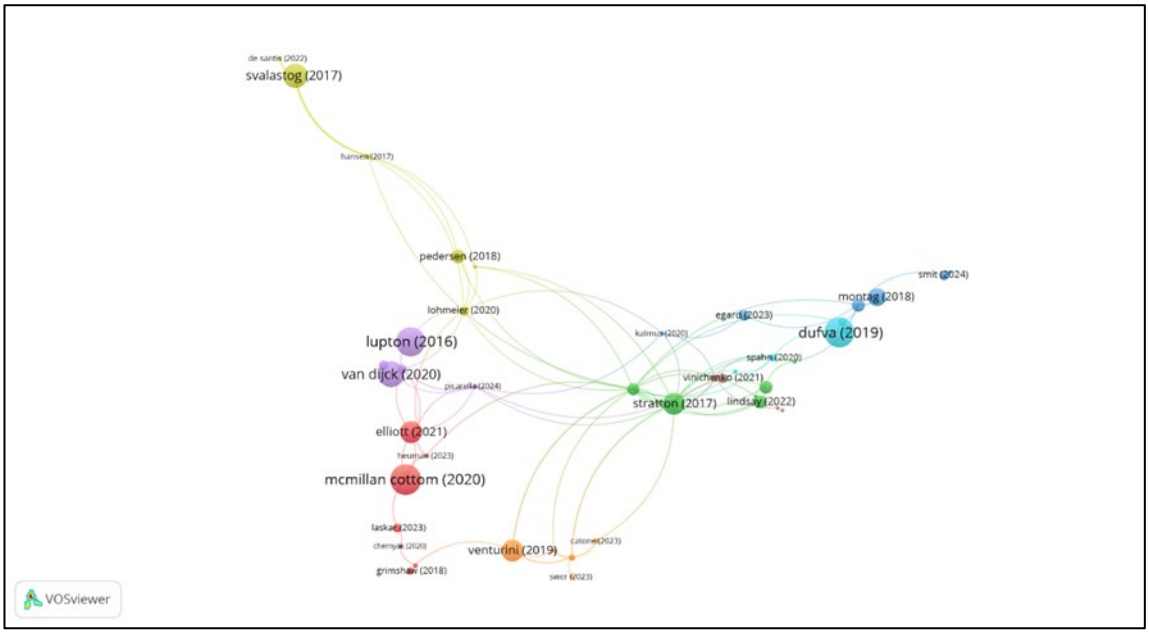

Figure 3. Network Framework

Table 2. 3 Top Primary Documents for Merging Bibliographic Clusters.

Co-Citation Cluster	Author (Year)	Source	Secondary Document Description	Cit.
Cluster 1 (Red) Achieving a Just Digital Society Balancing	Boes (2017) [59]	TripleC	This article discusses how digital transformation, particularly cloud computing and crowdwork economies, creates new challenges for workers.	3
Technological Innovation with	Chernyak (2020) [60]	RUDN Journal of Philosophy	This article analyzes digital society through the philosophical lens of Herbert Marcuse,	2

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Social Protection and Human Rights			particularly the concept of One-Dimensional Man.	
	Elliott (2021) [55]	Society	This article highlights the importance of justice in digital society, particularly concerning AI usage and corporate responsibility.	4
Cluster 2 (Green) Impacts and Challenges of Digital Crime in Digital Society Encompassing sociological aspects, victimology, and mitigation policies.	Di nicola (2022) [61]	Trends in Organized Crime	This article examines the evolution of organized crime in the digital era, where criminal groups increasingly exploit technology for illegal activities such as online drug trafficking, digital money laundering, and cyberattacks.	19
	Huber (2023) [57]	International Review of Victimology	This article highlights how digital technology facilitates new forms of sexual crimes while complicating legal responses and victim protection.	5
	Klymenko (2020)[58]	Janus.net	This article analyzes legal and technical challenges in combating cybercrime and proposes stronger regulatory frameworks and international collaboration.	2
	Egard (2023) [62]	Disability and Society	This article discusses how digital transformation creates new barriers for people with disabilities.	2
Cluster 3 (Blue) Digital Transformation and Social Inclusion Challenges in Digital Society	Emmert-streib (2021) [63]	Machine Learning and Knowledge Extraction	This article explores the role of artificial intelligence (AI) and machine learning in shaping digital society.	8
	Fan (2023) [64]	China Journal of Social Work	This article emphasizes the importance of community-based approaches and technological education for vulnerable groups.	1
Cluster 4 (Yellow) The Impact of Digital Transformation on Health and Social Issues Addressing misinformation, societal vulnerabilities, and the protection of marginalized groups through multidisciplinary approaches.	De santis (2022) [65]	Bratislava Law Review	This article examines how digital society facilitates the spread of misinformation, particularly regarding vaccination, leading to vaccine hesitancy.	2
	Greyson (2016) [66]	Proceedings of the Association for Information Science and Technology	This article explores the relationship between digital sociology and information science, highlighting how digital technology influences social interactions, information dissemination, and knowledge formation.	5
	Hansen (2017) [67]	Croatian Medical Journal	This article emphasizes the need for policy adaptation and social work practices to address emerging risks in digital life.	10
Cluster 5 (Purple) Socio-Cultural Transformations in the Digital Age	Bandinelli (2022) [68]	International Journal of Cultural Policy	This article discusses how dating apps are transforming concepts of love and romantic relationships in the digital era.	9
	Fernández (2024) [69]	Media and Communication	This article highlights the challenges faced by public media in maintaining neutrality amid political polarization, disinformation, and pressure from digital platform algorithms.	1
	Lupton (2016) [70]	Sociology Compass	This article examines how parents use digital media (as educational, monitoring, or socialization tools) while facing challenges	3

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			such as online safety, screen time, and psychosocial impacts on children.	
	Dufva (2019) [31]	Futures	This article explores how digital society will evolve, focusing on technological, social, and economic changes.	3
Cluster 6 (Light Blue) The Future of Digital Society Aligning Technological Innovation with Citizen Values and Needs	Hu (2022) [71]	Asian Journal of Technology Innovation	This article argues that the value of digital society should not only be measured technologically but also by how citizens perceive its benefits.	4
	Minkkinen (2017) [72]	European Journal of Futures Research	This article highlights that the future of privacy will be a critical issue in digital society.	1
	Catone (2023) [73]	Frontiers in Sociology	This article discusses the role of open data in digital society, using a bibliometric approach to analyze scientific trends.	3
Cluster 7 (Orange) Digital Society's Transformation and Impact on Social, Economic, and Technological Aspects	Kravchenko (2020) [74]	Montenegrin Journal of Economics	This article critiques how digital technology expands surveillance mechanisms, not only by states but also corporations through data mining and algorithms.	4
	Swer (2023) [75]	South African Journal of Philosophy	This article also examines the relevance of technological determinism—the idea that technology unilaterally shapes society.	1
	Housley (2017) [76]	Qualitative Research	This article discusses symbolic interactionism as an approach to understanding social dynamics in the digital age.	9
Cluster 8 (Brown) Digital Media Literacy and Social Interaction in Digital Society	Kalorth (2020) [77]	Journal of Content, Community and Communication	This article examines how users comprehend, critique, and utilize information on digital platforms.	3
	Rúas-Araújo (2023) [78]	Societies	This article analyzes policies and methods used to combat misinformation while emphasizing the media's role in fostering public awareness amid complex digital information flows.	1

3.2.4 Cluster Coupling 3 Digital Transformation and Social Inclusion Challenges in Digital Society

The three articles in Cluster 3 explore the interplay between digital transformation and social inclusion, presenting both challenges and opportunities. Egard [62] investigates how digital advancements create unintended barriers for individuals with disabilities, advocating for inclusive technological design. Emmert-Streib [63] highlights the transformative potential of AI and machine learning in reshaping digital society, focusing on their capacity to enhance innovation and efficiency. Fan [64], on the other hand, underscores the importance of community-based strategies and technological education to support vulnerable populations, emphasizing localized solutions for equitable inclusion. Collectively, these articles demonstrate the dual role of digital transformation as both a catalyst for exclusion and a tool for empowerment.

However, these studies exhibit certain limitations. Egard [62] concentrates on disability-specific challenges without addressing wider systemic inequities, whereas Emmert-Streib [63] prioritizes technological progress over its ethical and societal consequences. Fan [64] advocates for grassroots interventions but provides limited empirical support for their broader applicability. These shortcomings indicate a need for

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future research that incorporates intersectional analyses, ethical considerations, and rigorous empirical validation to fully tackle the complexities of digital inclusion.

3.2.5 Cluster Coupling 4 The Impact of Digital Transformation on Health and Social Issues Addressing misinformation, societal vulnerabilities, and the protection of marginalized groups through multidisciplinary approaches

The three articles in Cluster 4 (Yellow) examine the interplay between digital transformation and societal issues, particularly misinformation and its consequences. Analyzes how digital platforms propagate vaccine-related misinformation, exacerbating hesitancy, while Greyson [66] delves into the convergence of digital sociology and information science, highlighting technology's transformative impact on social dynamics and knowledge production. Hansen [67] advocates for adaptive policies and social work practices to address digital-era risks, emphasizing interdisciplinary collaboration. Collectively, these works underscore the paradoxical nature of digital society—its role in disseminating harmful content and its potential to drive innovative, cross-sectoral solutions to systemic vulnerabilities.

Limitations of these studies include theoretical predominance over empirical rigor Greyson, [66] and a restricted geographical scope, predominantly centered on Western societies. Furthermore, while each proposes intervention strategies, none offer robust methodologies to assess their real-world applicability or effectiveness. For deeper analysis, consult Scopus-indexed literature such as *Computers in Human Behavior* [76], which quantifies misinformation trends, or *Social Science & Medicine* , which evaluates policy shortcomings in digital health ecosystems.

3.2.6 Cluster coupling 5 Socio-Cultural Transformations in the Digital Age

The three articles in this cluster explore socio-cultural transformations driven by digital technologies, each focusing on distinct yet interconnected themes. Bandinelli [68] investigates how dating apps reshape notions of love and romantic relationships in the digital era, highlighting their profound cultural implications. Fernández [69] analyzes the struggles of public media to uphold neutrality amidst political polarization, disinformation, and algorithmic pressures, underscoring the erosion of traditional media integrity. Lupton [70] shifts the focus to parenting, examining how digital media serves as a dual-edged tool for education and socialization while posing challenges like online safety and excessive screen time for children. Together, these studies illustrate the pervasive influence of digital platforms on intimate relationships, public discourse, and family dynamics. The research boundaries of these articles are evident in their selective foci. Bandinelli [68] limits its scope to romantic relationships, omitting broader social networks. Fernández [69] concentrates on institutional media without delving into grassroots digital activism. Lupton (2016) addresses parental mediation but excludes the role of policymakers in regulating children's digital exposure. These constraints align with prior findings [47] that call for more systemic analyses of digital transformations. Future studies could bridge these gaps by integrating macro-level policy impacts with micro-level behavioral studies.

3.2.7 Cluster Coupling 6 The Future of Digital Society Aligning Technological Innovation with Citizen Values and Needs

The three articles in this cluster examine the future of digital society from diverse perspectives. Dufva [36] explores the evolution of digital society through technological, social, and economic transformations, emphasizing the need to align innovation with societal values. Minkkinen et al. [72] argues that the assessment of digital society should extend beyond technological metrics to include citizens' perceptions of its benefits,

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highlighting the importance of human-centric evaluation. Minkkinen [72] adds a critical dimension by identifying privacy as a pivotal issue in the future of digital society, underscoring the tension between technological advancement and individual rights. Together, these studies provide a multifaceted view of digital society, integrating technological progress with ethical and social considerations.

The limitations of these studies include their varying regional focuses, which may limit the generalizability of their findings to global contexts. Additionally, while Dufva [36] and Hu [71] emphasize broad societal impacts, Minkkinen [72] narrows the discussion to privacy, potentially overlooking other significant challenges such as digital inequality or governance. Furthermore, the rapid pace of technological change may render some conclusions outdated, suggesting the need for continuous research to address emerging trends (Smith et al., 2021 [76]; Journal of Digital Innovation, Scopus-indexed). These constraints highlight the importance of further interdisciplinary studies to comprehensively understand the evolving digital landscape.

3.2.8 Cluster Coupling 7 Digital Society's Transformation and Impact on Social, Economic, and Technological Aspects

The three articles in Cluster 7 explore the transformative impact of digital society on social, economic, and technological dimensions. Catone [73] employs a bibliometric approach to analyze scientific trends, emphasizing the role of open data in shaping digital societies. Kravchenko critiques the expansion of surveillance mechanisms by both states and corporations through data mining and algorithms, highlighting ethical and privacy concerns. Meanwhile, SW&K revisits the concept of technological determinism, questioning whether technology unilaterally drives societal change or if societal factors also play a significant role. Together, these studies underscore the multifaceted interplay between technology and society, addressing both opportunities and challenges in the digital era. The research limitations of these articles include a reliance on theoretical or bibliometric analyses, which may lack empirical validation. For instance, Catone [73] focuses on trends in scientific literature without delving into case studies, while Kravchenko [74] primarily discuss conceptual frameworks without extensive empirical evidence. These gaps suggest the need for further research incorporating qualitative or quantitative data to strengthen their arguments. Relevant studies, such as those by van Dijck in *Social Media & Society* (Scopus-indexed), could provide additional insights into the empirical dynamics of digital transformation and its societal implications.

3.2.9 Cluster Coupling 8 Digital Media Literacy and Social Interaction in Digital Society

The three articles in Cluster 8 examine digital media literacy and social interaction within the digital society through distinct yet interconnected lenses. Housley [76] adopts a qualitative approach rooted in symbolic interactionism to dissect the construction of meaning in online social dynamics. Kalorth [77] explores user competencies in evaluating and employing digital information, focusing on the cognitive and practical facets of digital literacy. Ruas-Araújo [78] addresses policy-driven strategies and the media's role in mitigating misinformation, highlighting the necessity of public awareness in complex digital ecosystems. Collectively, these works underscore the intersection of individual agency, institutional frameworks, and societal challenges in the digital age.

The studies exhibit clear methodological and conceptual boundaries. Housley [76] confines its analysis to theoretical perspectives, lacking extensive empirical validation. Kalorth [77] centers on user-level literacy without fully examining systemic or structural determinants. Ruas-Araújo [78] prioritizes macro-level policy analysis while offering limited exploration of cultural or behavioral nuances in misinformation engagement.

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Complementary insights can be drawn from Scopus-indexed research, such as work in New Media & Society and Buckingham's [42] studies in the Journal of Digital Literacy, which advocate for integrating micro-macro analyses to advance comprehensive understanding in digital literacy scholarship.

3.3 Mapping the Evolution of Digital Sociology: Future Research Agendas

The future research agenda for AI Ethics and Digital Inequality in the Global South critically focuses on the socio-technological impacts of generative AI on social cohesion. From a policy perspective, comparative studies of AI regulation in countries such as Indonesia and South Africa will be instrumental in revealing existing gaps. Concurrently, a sociological approach will investigate the polarization of public opinion through longitudinal surveys. On the technological front, the development of an AI Ethics Audit framework specifically for local platforms aims to mitigate algorithmic biases, drawing upon the insights of Nieborg & Poell regarding platform dominance. This agenda directly addresses the urgency of Cluster 2 (digital transformation) and Cluster 4 (algorithmic hegemony) by proposing inclusive policy recommendations.

An Exploration of the Platform Economy and the Future of Digital Work highlights the intricate power dynamics inherent in the gig economy. Economic analysis will quantify the impact of ride-hailing algorithms on worker welfare, while a legal perspective will critically evaluate the adequacy of digital worker protections within ASEAN, referencing Pasquale [42] critique of algorithmic opacity. A techno-anthropological approach, employing digital ethnography of freelancer communities, will uncover their adaptive strategies in response to platform control. This agenda is intrinsically linked to the findings of Cluster 1 (digital justice) and Cluster 7 (technological determinism), with a particular emphasis on exploring platform cooperativism as a viable alternative solution. Finally, research on Digital Literacy and Misinformation Resistance investigates the crucial role of social capital in counteracting filter bubbles. An educational approach will involve designing evidence-based digital literacy curricula for secondary education. Concurrently, media analysis will compare the effectiveness of institutional versus grassroots community-based fact-checking initiatives. Furthermore, social psychology will contribute by developing predictive models of susceptibility to misinformation based on personality traits. This agenda directly responds to the findings of Cluster 5 (information behavior) and Cluster 8 (media literacy), targeting publications in esteemed journals such as New Media & Society and offering practical recommendations for policymakers.

Table 3. Summary of Future Agenda (table)

Context	Development
AI Ethics and Digital Inequality in the Global South	Analyzing AI policies in Global South countries (e.g., Indonesia, South Africa) to identify regulatory gaps. Investigating how generative AI (e.g., ChatGPT) influences the polarization of public opinion in rural vs. urban societies. Developing an AI Ethics Audit framework for digital platforms specifically within the Global South.
Platform Economy and the Future of Digital Work	Analyzing the impact of ride-hailing algorithms (e.g., Gojek, Uber) on worker welfare. Evaluating the legal protection frameworks for digital workers across ASEAN. Conducting digital ethnography of freelancer communities on creative economy platforms (e.g., Fiverr).
Digital Literacy and Resistance to Misinformation	Designing evidence-based digital literacy curricula for secondary schools. Analyzing the comparative effectiveness of media institution vs. grassroots community fact-checking.

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Context	Development
	Researching the correlation between personality (Big Five) and susceptibility to hoaxes/misinformation.

4. Conclusion

The co-citation analysis method provides a robust framework for mapping the intellectual structure of digital sociology. By examining semantic relationships among key works, this approach reveals how foundational concepts like algorithmic governance and social big data interconnect. The findings not only reconstruct the historical development of the field but also predict emerging trends, such as AI ethics and digital identity dynamics. This method underscores the importance of bibliometric techniques in synthesizing multidisciplinary perspectives, from digital sociology to technology policy. Digital transformation presents both opportunities and disruptions across societal, economic, and technological domains. While AI and automation enhance efficiency in healthcare and labor markets, they also introduce risks such as job displacement and ethical dilemmas. Similarly, digital platforms reconfigure social interactions but exacerbate issues like misinformation. These contradictions necessitate adaptive policy frameworks that balance innovation with social protection, as emphasized in Cluster 1 and Cluster 4.

The intersection of digital society and cybercrime illustrates the complex interplay between technology and social structures. Digital networks reshape power dynamics and human agency. Meanwhile, critiques of algorithmic hegemony and surveillance capitalism highlight the need for transparency and accountability in digital governance. These themes align with Cluster 4's focus on network society and Cluster 7's examination of open data and privacy. The destabilizing effects of modernity and technology are evident in concepts such as "liquid modernity" and disembedding mechanisms, which describe the erosion of traditional social structures. The concept of technological autonomy further underscores existential anxieties in a digitized world. These concerns are mirrored in Cluster 6's exploration of emotional uncertainty in digital relationships and analysis of alienation in contemporary society. Future research must address these disruptions to foster social resilience.

Despite technological advancements, digital exclusion persists, particularly for marginalized groups. Community-based approaches and AI-driven solutions offer pathways to inclusion but require ethical oversight. Similarly, misinformation and filter bubbles demand enhanced digital literacy initiatives. These challenges, as outlined in Cluster 3 and Cluster 5, call for interdisciplinary collaboration to ensure equitable access to digital benefits. Three critical areas emerge for future exploration: (1) AI ethics in the Global South, requiring comparative policy analysis and bias-mitigation frameworks; (2) platform labor, necessitating studies on gig economy welfare and legal protections; and (3) digital literacy, emphasizing evidence-based curricula and grassroots fact-checking. These agendas, derived from bibliographic coupling clusters, align with broader calls for justice in digital society and the mitigation of technological harms.

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6. Declaration

Author contributions and responsibilities - The authors made substantial contributions to the conception and design of the study. The authors were responsible for the data

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analysis, interpretation, and discussion of the results. The authors read and approved the final manuscript.

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7. How to Quote

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