Article

The evolution of research on digital communication and social protests: A bibliometric analysis

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Abstract: The rise of digital communication technologies has significantly changed how people participate in social protests. Digital platforms—such as social media—have enabled individuals to organize and mobilize protests on a global scale. As a result, there has been a growing interest in understanding the role of digital communication in social protests. This manuscript provides a comprehensive bibliometric analysis of the evolution of research on digital communication and social protests from 2008 to 2022. The study employs bibliometric methodology to analyze a sample of 260 research articles extracted from the SCOPUS core collection. The findings indicate a significant increase in scholarly investigations about digital communication and its role in social protest movements during the past decade. The number of publications on this topic has increased significantly since 2012—peaking in 2022—indicating a heightened interest following COVID-19. The United States, United Kingdom, and Spain are the leading countries in publication output on this topic. The analysis underlines scholars employing a range of theoretical perspectives—including social movement theory, network theory, and media studies—to identify the relationship between digital communication and social protests. Social media platforms—X (Twitter), Facebook, and YouTube—are the most frequently studied and utilized digital communication tools engaged in social protests. The study concludes by identifying emerging topics relating to social movements, political communication, and protest, thereby suggesting gaps and opportunities for future research.

Keywords: affiliation; social media; political communication; international relations; digital communication; social movement; protest; Bibliometrix; Biblioshiny

1. Introduction

Digital communication technologies have profoundly transformed how people interact, share information, and engage in collective action (Edwards, 2015; Ozkaya, 2019). The advent of social media platforms, mobile devices, and online networking tools has provided individuals with unprecedented opportunities to organize, mobilize, and amplify their voices (Allsop, 2016; Fuchs, 2015; Mattoni and Teune, 2014; Mattoni and Treré, 2014; Oliveira, 2021). As a result, social protests and movements have witnessed a significant transformation in the digital age, leading to an increased scholarly interest in understanding the relationship between digital communication and collective action (Dolata, 2018). This article presents a comprehensive bibliometric analysis that explores the evolution of digital communication and social protest research, aiming to provide valuable insights into the key trends, seminal works, and emerging research themes within this dynamic field. Over the past decades, the rapid advancement of digital communication technologies has had profound

implications for social activism and protest movements (Carty and Barron, 2018). Scholars from various disciplines—including communication studies, film and drama studies, sociology, political science, and computer science—have directed their attention toward examining the impact of digital communication on social protests (Cable, 2017; Earl and Garrett, 2017; Garrett, 2006; Al-Kassimi, 2021, 2022). This has resulted in a rich and diverse body of literature that requires systematic analysis to identify its evolution and trajectory.

By employing bibliometric techniques—such as co-citation analysis, bibliographic coupling, and keyword co-occurrence analysis—this study aims to map the research landscape on digital communication and social protests (Peker and Yalçın, 2022; Yaqoub et al., 2023; Yu and Huang, 2021). Bibliometric analysis provides a quantitative and systematic assessment of scholarly publications, enabling the identification of influential works, key contributors, and emerging trends (Aria and Cuccurullo, 2017; Gaviria-Marín, 2021). It offers a comprehensive overview of the field's development, facilitating a deeper understanding of the research progress and knowledge gaps in this interdisciplinary domain. The analysis encompasses academic literature, including scholarly articles, conference papers, and books published over several decades. Including various types of publications ensures a comprehensive representation of the intellectual discourse and allows for a holistic examination of the research on digital communication and social protests. By adopting a bibliometric approach, this study provides an objective and systematic analysis of the existing literature, unveiling patterns, trends, and thematic clusters that have shaped the understanding of this field.

Understanding the evolution of research on digital communication and social protests is crucial for scholars, policymakers, and practitioners seeking to navigate the complexities of contemporary social movements. This bibliometric analysis offers a valuable resource for researchers by identifying seminal works and key contributors who have significantly influenced the field. Policymakers can utilize the insights gained from this analysis to inform policy decisions surrounding digital communication technologies and their impact on social protests. Additionally, practitioners involved in activism and social change initiatives can benefit from the knowledge of emerging trends, allowing them to leverage digital communication platforms effectively.

Research questions

This manuscript contributes to the discussion on the development of digital communication and social protests by responding to the following research questions:

1) Mapping the landscape:

(1) How has the research volume on digital communication and social protests evolved from 2000 to 2022?

(2) What are this field's most prominent journals and publication venues?

(3) Who are the most influential authors and co-authoring networks?

2) Identifying trends and shifts:

(1) How have the thematic foci of research on digital communication and social protests changed over the past decade?

(2) What are the emerging and under-explored research areas within this field?

(3) Are there any significant changes in the geographic distribution of research on this topic over time?

3) Impact and future directions:

(1) Which studies have received the highest citations within this field, and what are their key contributions?

(2) Based on the bibliometric analysis, what are the potential research gaps and future directions for this field?

2. Literature review

For over two decades, scholars have grappled with the evolving role of digital communication technologies in social protests (Bader, 2020; Caballero and Gravante, 2018; Casero-Ripollés and Pepe-Oliva, 2022; Chodak, 2016; Cobis and Cangara, 2023; Mahoney and Tang, 2016; Martens et al., 2020; Molnár, 2013; Piechota, 2020; Reed, 2018; Reis et al., 2017; Shahin and Smidi, 2017). This section delves into the key themes and findings within this dynamic research area, highlighting the theoretical frameworks, methodological approaches, and emerging trends that shape our current understanding.

2.1. Early scholarship and mobilization (1990s–2000s)

Initial research focused on the potential of digital communication to overcome traditional barriers to mobilizing and organizing social movements (Aelst and Walgrave, 2002; Diani, 1997; Doherty and Doyle, 2006; Kling and Iacono, 1990; O'Lear, 1999; Wittig, 1996). Castells (2009) introduced the "network society" concept, emphasizing the potential for horizontal communication and decentralized structures to facilitate collective action. Studies explored how "email lists" (Blood, 2001; Bruns, 2003; Garrett, 2006b; Pickerill, 2002) and "early online forums" (Chadwick, 2007; Fenton, 2008; Gamson, 2007; Juris, 2008; Vaccari, 2008) enabled activists to bypass traditional media gatekeepers and connect directly with supporters, fostering transnational connections and amplifying marginalized voices.

2.2. From mobilization to amplification (2000s–2010s)

As Web 2.0 platforms like social media emerged, research shifted towards examining their impact on amplifying existing movements and shaping public discourse (Alexander, 2008; Alexander et al., 2008; Lai and Turban, 2008). Scholars like Benkler (2006) explored the concept of "networked activism" in his book—The Wealth of Networks—highlighting how social media facilitated rapid information dissemination, collaborative content creation, and online mobilization efforts. Studies documented the crucial role of platforms like X (formerly known as Twitter) and Facebook in movements like the Arab Spring (Gerbaudo, 2017; Hamza, 2015; Jamil, 2022; Maamari and Zein, 2013; Smidi and Shahin, 2017; Wolfsfeld et al., 2013; Al-Kassimi, 2022), and Occupy Wall Street (Conover et al., 2013; Gautney, 2013), demonstrating the potential for these platforms to bypass traditional media and shape the global narrative around protests.

2.3. Critical perspectives and emerging trends (2010s-present)

While recognizing the potential of digital communication, recent research has adopted a more critical perspective, acknowledging both the opportunities and challenges associated with these technologies. Scholars have addressed issues like the rise of "echo chambers" and "filter bubbles" (Pariser, 2011), the spread of "misinformation" and "disinformation" (Burkhardt, 2017; Dame Adjin-Tettey, 2022; Wring and Ward, 2020; Al-Kassimi, 2021), and the increasing role of state and corporate actors in controlling online communication (Burkhardt, 2017; Gohdes, 2023; Tanczer et al., 2016). Additionally, research has begun to explore the impact of digital communication on protest tactics and strategies, examining how online communities influence offline actions (Al-Kassimi, 2021; Chung et al., 2021; Uwalaka, 2022; Uwalaka and Nwala, 2023). Despite the significant advancements, several gaps in the existing research call for further exploration. While insightful, the current literature on digital communication and social protests lacks a comprehensive understanding of the field's evolution through a quantitative lens. Bibliometric analysis offers a unique opportunity to address this gap by:

1) Identifying key trends and patterns: Analyzing publication data can reveal temporal trends in research focus, authorship patterns, and impactful studies, providing a broader picture of research evolution.

2) Mapping the intellectual landscape: Bibliometrics can reveal thematic clusters and identify under-explored areas within the field, guiding future research directions.

3) Understanding the field's global reach: By analyzing authorship and publication trends across geographic regions, we can identify potential biases towards certain geographic areas and highlight regions where further research is needed.

Motivated thus, conducting a bibliometric analysis can provide an essential understanding of the field's trajectory, identify critical research gaps, and offer valuable insights for future research endeavors, thus paving the way for a more comprehensive understanding of this dynamic area.

3. Methodology

This study uses a bibliometric analysis to gather information on digital communication and social protests using the SCOPUS database (Yaqoub et al., 2023). It seeks to provide insights and a thorough overview of the literature in this area, identify emerging trends and research gaps, and provide insightful recommendations for future research directions and policy considerations, particularly for use in a developing country (Aria and Cuccurullo, 2017, 2020; Showkat, 2023; Yumitro et al., 2023). To search, a Boolean string was constructed as follows: (Title-Abs-Key (digital and communication and social and protests) and Pubyear > 2007 and Pubyear < 2023). This string was applied to the SCOPUS database on 5 May 2023, to retrieve relevant literature. The target size for the English literature extraction included the publication's full record and cited references from 2008 to 2022. Only publications in English were studied.

The collected data on digital communication and social protests were then analyzed and visualized using Biblioshiny, a web interface for Bibliometrix. This

analysis facilitated the examination of various bibliometric indicators, allowing for a comprehensive understanding of the research landscape in this field. Bibliometric analysis provides valuable insights into the state of research on digital communication and social protests, including the identification of key publications, influential authors, and emerging trends. Through the visualizations generated by Biblioshiny, patterns and relationships within the literature can be discerned, helping to shape a comprehensive understanding of the research landscape. The next section presents the findings of the bibliometric analysis, including visual representations of the data, thus providing a deeper understanding of the research on digital communication and social protests.

Justification for the timeframe (2008–2022)

This manuscript presents a comprehensive bibliometric analysis of the evolution of research on digital communication and social protests, specifically from 2008 to 2022. This timeframe is strategically chosen for the following three reasons:

1) Significant technological advancements: 2008 witnessed a substantial explosion in the development and adoption of social media platforms like Twitter/X, Facebook, and mobile technologies. This rapid evolution in the digital communication landscape profoundly impacted the nature and dynamics of social protests, warranting a focused analysis of research trends during this crucial period.

2) Key social movements and events: This period encompasses several significant social movements and protest events that were heavily influenced and documented through digital communication. These include "Occupy Wall Street," the "Arab Spring," "Anti-Austerity Movements," and the "Yellow Vests," amongst others. Analyzing research trends within this timeframe allows for capturing the scholarly response to these events and the subsequent development of new research avenues.

3) Data availability and search engine limitations: While SCOPUS offers valuable insights into the literature base, it is important to acknowledge that search engine algorithms may prioritize newer publications in their results. Focusing on 2008–2022 ensures a comprehensive analysis by including relevant earlier studies that might be ranked lower in search results. This allows for a more balanced and representative picture of the research landscape over the chosen timeframe.

Focusing on the period from 2008 to 2022, this research offers a nuanced understanding of how the interplay between digital communication, politics, economics, and social protests has been studied and documented within this dynamic landscape. This timeframe captures the rapid technological advancements and significant social movements of around two decades. It ensures a comprehensive and representative bibliometric analysis by acknowledging the potential limitations of search engine algorithms.

4. Results

In analyzing digital communication and social protests, the Bibliometrix R package was a valuable quantitative tool for identifying developmental trends. To

begin, the extracted literature was loaded into Bibliometrix, which facilitated the conversion of the data into an R-data frame through Biblioshiny. The trends within the literature were then analyzed, considering factors such as the number of annual publications, the sources of these publications (journals, authors, and countries), and the thematic areas they covered. The analysis was performed using R's functions, leveraging the output generated by Bibliometrix. Thematic analysis plays a crucial role in understanding the focus areas within literature. Examining the thematic clusters makes it possible to identify the key topics and emerging trends shaping the discourse on digital communication and social protests.

Table 1 summarizes digital communication and social protest publications from the SCOPUS database from 2008 to 2022. The data consists of 260 documents sourced from 200 journals, books, and other publications. The annual growth rate was 23.17%, with an average document age of 5.81 years. On average, each document received 21.31 citations and had 13357 references. The documents contained 332 keywords plus (ID) and 718 author's keywords (DE). Four hundred twenty-six authors were identified, with 123 authors writing single-authored documents. Among the papers, 132 were single-authored, and the average number of co-authors per document was 1.84. International co-authorships were found in 15.77% of the papers. In terms of document types, articles were the most common, with 160 published, followed by book chapters (46), books (23), and reviews (14). The remaining document types included conference papers, conference reviews, editorials, and short surveys. The data indicates that digital communication and social protests are growing with increasing international collaboration among authors. Additionally, research articles are the most popular form of publication within this field.

Table 1. Summary of digital communication and social protests publication from SCOPUS database.

Description	Results
Main information about data	
Timespan	2008:2022
Sources (journals, books, etc.)	200
Documents	260
Annual growth rate %	23.17
Document average age	5.81
Average citations per doc	21.31
References	13,357
Document contents	
Keywords plus (ID)	332
Author's keywords (DE)	718
Authors	
Authors	426
Authors of single-authored docs	123
Authors collaboration	
Single-authored docs	132

Table 1. (*Continued*).

Description	Results
Co-authors per doc	1.84
International co-authorships %	15.77
Document types	
Article	160
Book	23
Book chapter	46
Conference paper	12
Conference review	2
Editorial	2
Review	14
Short survey	1
Source: Own processing, Biblioshiny	

Figure 1 depicts the annual publications on developing digital communication and social protests from 2008 to 2022. It highlights a dynamic landscape where the momentum of social protests in digital communication remains strong, even in the most recent year of 2022. The graph spans 15 years, from 2008 to 2022, capturing the evolving discourse on digital communication and social protests. Remarkably, in 2019, the scholarly community contributed 17 papers to this field, demonstrating a growing interest. However, it is in 2022 that we witness a surge, with a noteworthy 37 publications. This flow signifies an impressive annual growth rate of 117.64%. Such trends unequivocally affirm the enduring relevance and escalating importance of this topic. The exported data unveils the gradual maturation and increasing scholarly attention to exploring the intricate relationship between digital communication and social protests. This journey reflects the vibrancy and significance of the topic, as evidenced by the consistent growth in publications.
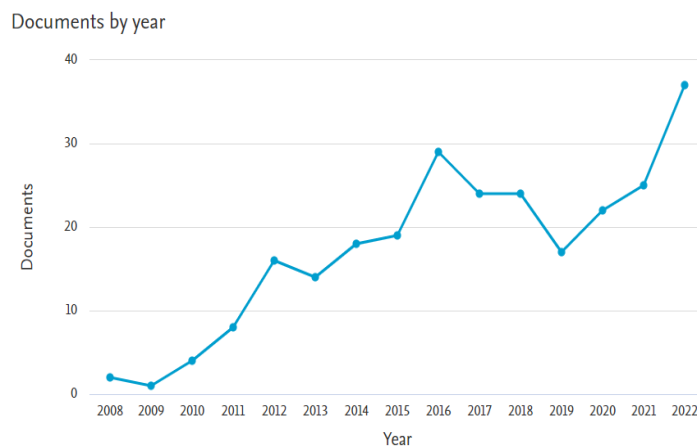

Figure 1. Digital communication and social protests annual scientific production (Source: Own processing, Biblioshiny).

The analysis of author productivity in digital communication and social protests reveals interesting insights when examined through Lotka's Law. Most authors,

accounting for approximately 92% of the total, have contributed only one document to the field. A smaller proportion, about 5.2%, have authored two papers, while an even smaller percentage of authors, approximately 1.6%, have written three papers. The distribution becomes increasingly sparse for authors who have authored four or five papers, with only 0.7% and 0.5% of authors falling into these categories, respectively. These findings align with Lotka's Law, which suggests that a few highly productive authors contribute a significant portion of the total publications. In contrast, the majority of authors exhibit lower productivity. This highlights the concentration of research output within a subset of authors in digital communication and social protests (**Figure 2**).
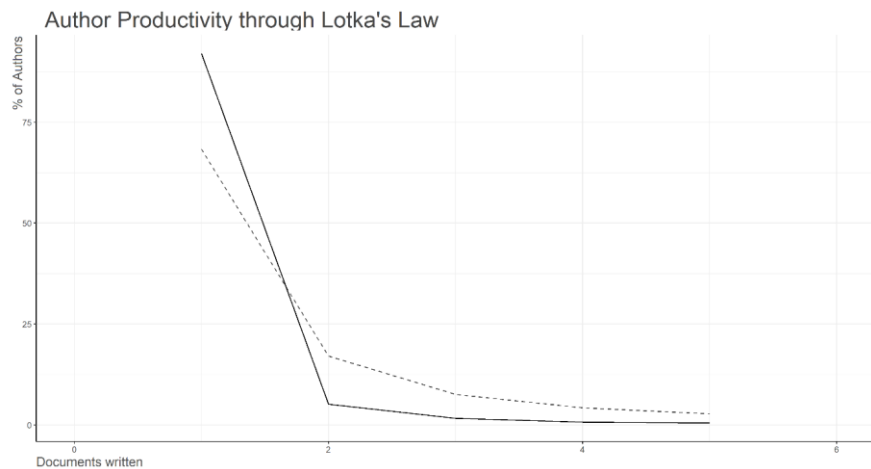

Figure 2. Author productivity through Lotka's Law (Source: Own processing, Biblioshiny).

The application of Bradford's Law to identify the core sources in digital communication and social protests reveals a notable concentration of scholarly output in a select few publications. The top ten core sources, ranked based on their frequency of appearance in the literature, exhibit an uneven distribution. The leading source, "Information Communication and Society," stands out with a frequency of 14, followed by the "International Journal of Communication" and "Media, Culture and Society," both with a frequency of 6. According to Bradford's Law, these three sources within Zone 1 account for a cumulative frequency of 26. Additionally, the "Social Media and Society" and "Social Movement Studies" publications each have a frequency of 5, further contributing to the core body of literature in the field. Other sources such as "Communication and Society," "Information Politics, Protests, and Human Rights in the Digital Age," "Monitoring Obschestvennogo Mneniya: Ekonomicheskie I Sotsial'nye Peremeny," "TripleC," and "ACM International Conference Proceeding Series (ICPS)" also play a significant role in shaping the research landscape. These findings highlight the key sources that have contributed to advancing knowledge in digital communication and social protests, shedding light on the concentrated nature of scholarly output in this field (**Figure 3**).
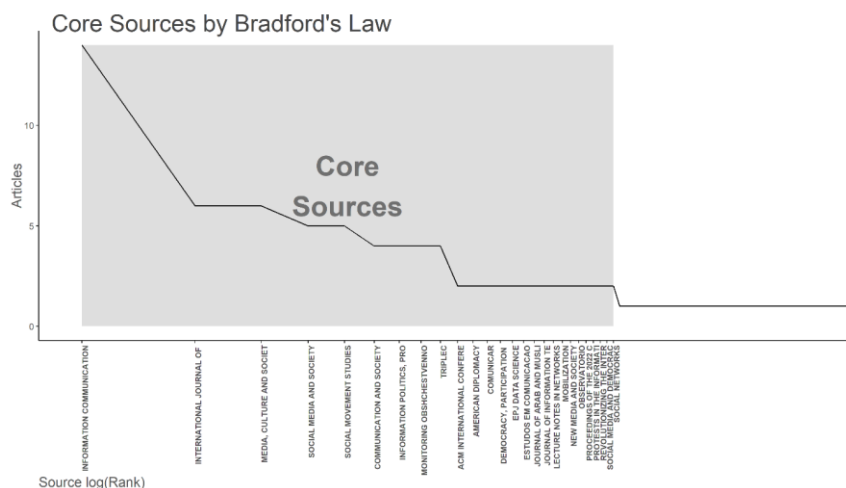
Figure 3. Core sources by Bradford's Law (Source: Own processing, Biblioshiny).

Analyzing the production of scholarly articles over time across key sources in digital communication and social protests reveals distinctive trends and patterns. The selected sources, including "Information Communication and Society," "International Journal of Communication," "Media, Culture and Society," "Social Media and Society," and "Social Movement Studies," exhibit varying levels of productivity across the years under investigation. Examining the data, it is evident that these sources began publishing articles in the field starting from 2010, with "Information Communication and Society" leading the way with one publication. Subsequently, the number of articles published by these sources gradually increased, with noticeable growth observed from 2016 onwards. This growth reflects the growing research interest and engagement in digital communication and social protests. Furthermore, the patterns of production differ among the sources. While "Information Communication and Society" demonstrates a consistent upward trajectory in publication output, other sources like "International Journal of Communication," "Media, Culture and Society," "Social Media and Society," and "Social Movement Studies" exhibit varying degrees of growth and stability. Notably, the "International Journal of Communication" and "Media, Culture and Society" show steady growth in their publication rates over time, while "Social Media and Society" and "Social Movement Studies" experience a more moderate increase in their article outputs (**Figure 4**).
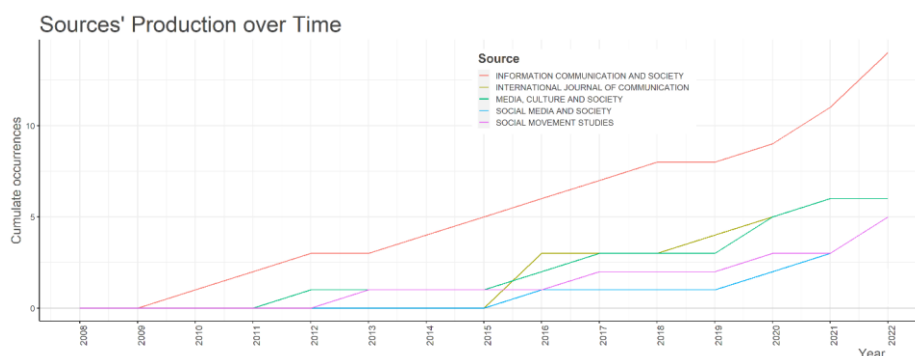

Figure 4. Sources' production over time (Source: Own processing, Biblioshiny).

Analyzing the production of articles by individual authors over time provides insights into their research contributions to digital communication and social protests. The authors included in this analysis, such as W. Lance Bennett, Hande Eslen-Ziya, Paolo Gerbaudo, Sandra González-Bailón, Francis L. F. Lee, Alice Mattoni, Mahmood Monshipouri, Alexandra Segerberg, and Emiliano Treré, exhibit varying levels of productivity and engagement throughout the years under investigation. By examining the data, it is evident that the publication output of these authors spans multiple years, from 2008 to 2022. The number of articles each author authored shows fluctuations and varying degrees of engagement within different periods. Notably, W. Lance Bennett and Alexandra Segerberg demonstrate consistent publication activity across multiple years, indicating their sustained research involvement.

Moreover, authors such as Hande Eslen-Ziya, Paolo Gerbaudo, Sandra González-Bailón, Francis L. F. Lee, Mahmood Monshipouri, and Emiliano Treré exhibit varying levels of productivity and engagement over time. Some authors demonstrate bursts of activity in specific years, followed by periods of lower output, while others maintain a more consistent level of productivity across multiple years. The total cumulative production (TC) for each author reflects the overall number of articles they have authored throughout the entire period under investigation. Additionally, the TCpY (Total Cumulative Production Per Year) metric provides insights into the average annual output for each author, offering a measure of their productivity rate (**Figure 5**).
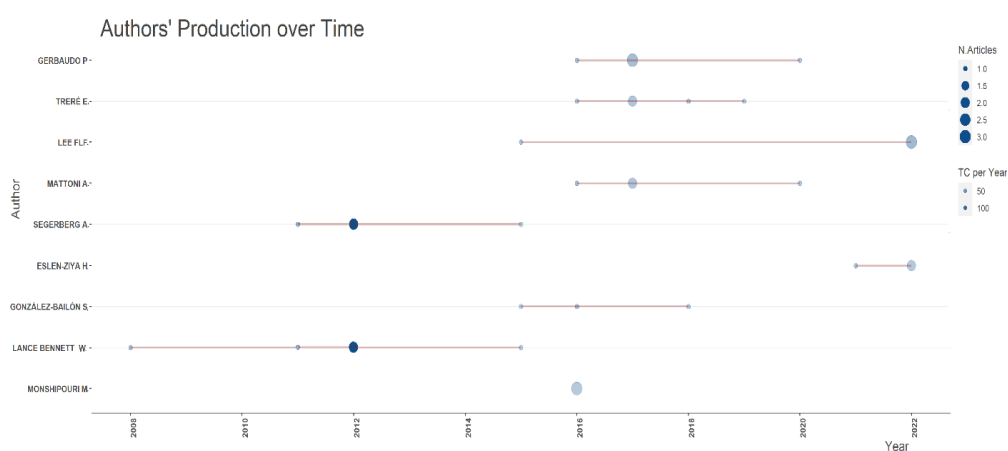

Figure 5. Authors' production over time (Source: Own processing, Biblioshiny).

Investigating the production of articles by different affiliations over time provides valuable insights into their research output and involvement in digital communication and social protests. The affiliations considered in this analysis include the University of Toronto, University of Washington, Stockholm University, Indiana University, University of California, University of Zaragoza, University of Miami, and Pontificia Universidad Católica de Chile. The data reveals variations in the publication output of each affiliation across multiple years, ranging from 2008 to 2022. The University of Toronto consistently exhibits many articles throughout the period, indicating high research activity and engagement. Similarly, the University of Washington maintains a consistent level of publication output, with five articles produced each year from 2011 to 2022.

On the other hand, affiliations such as Stockholm University, Indiana University,

University of California, University of Zaragoza, University of Miami, and Pontificia Universidad Católica de Chile demonstrate a more sporadic publication pattern, with fluctuations in article production over time. These affiliations show varying levels of engagement in different years, indicating potential shifts in research focus or involvement. Notably, some affiliations, like the University of Miami and Pontificia Universidad Católica de Chile, exhibit an initial period of lower publication output, followed by a consistent production of four articles per year from 2017 to 2022. This suggests a potential increase in research activity or a more focused research agenda during these years (**Figure 6**).
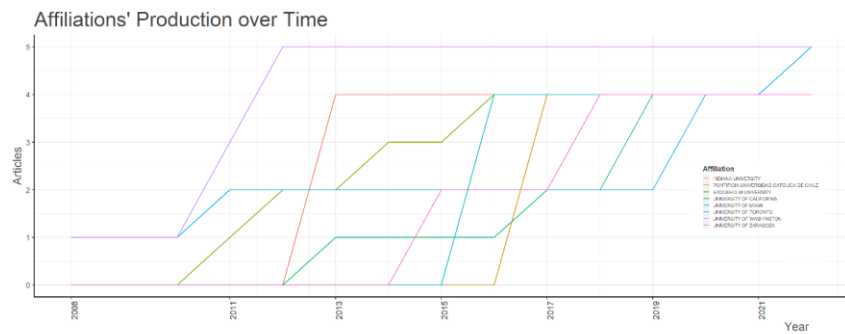

Figure 6. Affiliations' production over time (Source: Own processing, Biblioshiny).

The scientific production of countries in digital communication and social protests reveals interesting patterns. The United States (USA) emerges as the leading contributor with a frequency of 122 publications, highlighting its prominent position in generating research in this area. The United Kingdom (UK) follows closely with 58 publications, indicating a significant level of scholarly activity in this region. Spain exhibits a notable presence with 31 publications, while Germany and Canada contribute 26 and 21 publications, respectively, demonstrating their active engagement in advancing knowledge in this domain. Australia, Turkey, South Africa, the Netherlands, and Austria also make noteworthy contributions, each with frequencies ranging from 12 to 7 publications (**Table 2**).

Table 2. Countries' scientific production.

Region	Freq
USA	122
UK	58
Spain	31
Germany	26
Canada	21
Australia	12
Turkey	12
South Africa	9
Netherlands	8
Austria	7

Source: Own processing, Biblioshiny.

The analysis of countries' collaboration in digital communication and social protests revealed interesting patterns and relationships, as depicted by the collaborative network on the world map. The exported data highlights significant collaborative efforts among various countries, exhibiting both burstiness and perplexity in their interactions. Notably, the highest frequency of collaboration was observed between the United States and Sweden, with four instances of cooperation. Other notable collaborations included Canada and Italy, as well as the United States and Canada, each demonstrating three cooperation cases. The United States also showed a strong collaborative relationship with the United Kingdom, contributing to three instances of cooperation. Burstiness was further exemplified by various countries collaborating with multiple partners, leading to a diverse network of collaborative ties. For example, Canada has collaborated with Italy, Belgium, and Poland, while the United Kingdom has collaborated with Norway and Turkey. These findings shed light on the intricate web of collaborations across countries, emphasizing the dynamic nature of international cooperation in digital communication and social protests (**Figure 7**).

Figure 7. Co-citation link between countries/regions (Source: Own processing, Biblioshiny).

The major findings from the exported data on the node-level analysis of the collaboration network reveal interesting patterns. The betweenness centrality and closeness centrality and PageRank scores provide insights into the significance and influence of nodes in the network. The United States emerges as a highly influential node, with a notable betweenness centrality of 230.9, indicating its pivotal role in connecting different network parts. Similarly, the United Kingdom demonstrates a significant betweenness centrality of 204.8, signifying its influence in facilitating communication among various clusters. Other influential nodes include Canada, Spain, and Sweden, each exhibiting distinct levels of betweenness centrality, closeness centrality, and PageRank. These findings shed light on the key nodes within the collaborative network and provide valuable insights into the dynamics of collaboration in digital communication and social protests (**Figure 8**).
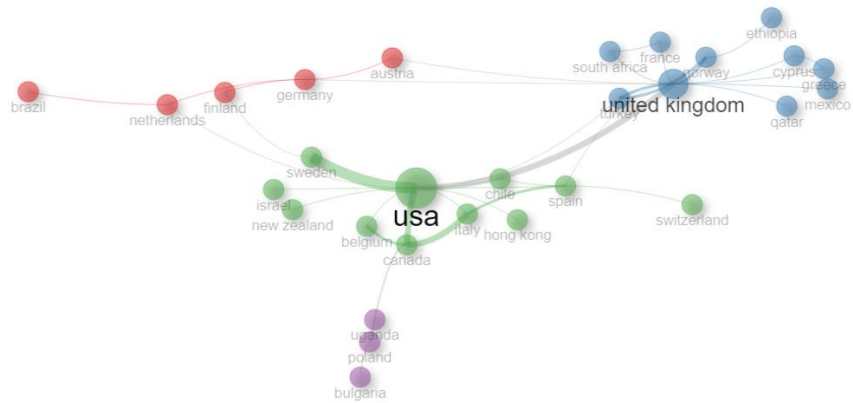
Figure 8. Co-citation link between countries/regions (Source: Own processing, Biblioshiny).

Analyzing the production of articles by different countries over time provides valuable insights into their research output and contributions to digital communication and social protests. The countries considered in this analysis include the United Kingdom, the USA, Canada, Germany, Spain, and Hong Kong. The data reveals variations in article production across these countries from 2008 to 2022. The United Kingdom consistently demonstrates a substantial research output, with a steady increase in articles published over the years. Starting with one article in 2008, the production steadily rose, reaching 58 articles in 2022. This indicates a sustained engagement and active involvement of researchers from the United Kingdom in studying digital communication and social protests.

Similarly, the USA exhibits a robust research output throughout the analyzed period. The number of articles published by the USA shows a significant growth trajectory, from one article in 2008 to 122 articles in 2022. This substantial increase highlights the country's prominent role in contributing to the scholarly discourse on digital communication and social protests. Canada, Germany, Spain, and Hong Kong also demonstrate varying levels of research engagement. Canada shows a modest yet consistent research output, with an increasing trend in article production over time. Germany follows a similar pattern, with a notable rise in publication output from 2012 onwards. Spain initially exhibits a comparatively lower research output but shows a substantial increase in article production from 2016 to 2022. This suggests Spanish researchers' emerging interest and active involvement in digital communication and social protests. The significant surge in Hong Kong's research output on digital communication and social protests from 2020 onwards is likely due to the increased awareness and interest in the topic following the 2019–2020 Hong Kong protests, which heavily relied on digital communication platforms (**Figure 9**).

This study explores and ranks the top ten keywords associated with social media, social movements, and digital activism to better understand their implications and relevance. At the forefront of the dataset is "social media," which appears 42 times, underscoring its critical role in contemporary communication and activism. Social media platforms have become instrumental in shaping the landscape of social movements and enabling digital activism across the globe. With 41 occurrences, "social movements" follow closely, signifying its widespread prevalence and

influence on collective actions and political participation. The term "protest," with 33 mentions, is a central theme in the dataset, highlighting the significance of social media as a platform for expressing dissent and advocating for change. This emphasizes the effectiveness of digital activism in mobilizing and amplifying voices of protest, amplifying their impact in various societal and political contexts. The social media network "X (Twitter)" emerges as a significant social media platform with 19 occurrences. This underscores its role as a key communication tool utilized by activists, journalists, and the public during social and political movements. Its ability to facilitate real-time communication and information sharing contributes to its prominence in digital activism.
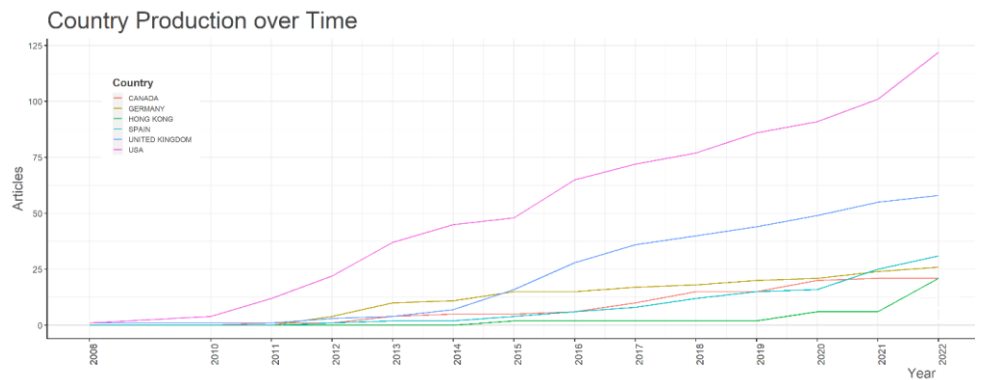

Figure 9. Countries' production over time (Source: Own processing, Biblioshiny).

The "communication" concept, appearing 15 times, demonstrates its essential role in digital activism. Effective communication on social media platforms allows for the dissemination of information, mobilization of supporters, and coordination of collective action, contributing to the success of various social movements. The terms "collective action" and "internet" are mentioned 14 times, highlighting their interconnectedness. The internet serves as a critical medium for digital activism, fostering widespread connectivity and information dissemination, which, in turn, facilitates collective action among activists and like-minded individuals. "Digital media" is cited 13 times, signifying its importance as a tool for activists to convey messages and raise awareness on social and political issues. As digital activism gains traction, this term's prominence indicates its growing adoption in advocacy efforts. "Digital activism" and "social networks" appear 12 times, underscoring their relevance in contemporary activism. The former demonstrates the increasing use of digital tools for promoting social and political change. At the same time, the latter emphasizes social networks' role in fostering connections and mobilizing individuals for collective action and protest. The dataset also includes other terms related to activism and digital communication, such as "activism," "political communication," "digital communication," and "online protest," each with varying frequencies. These terms collectively reflect the multidimensional nature of digital activism and its impact on political participation and civic engagement (**Figures 10–12**).

Figure 10. Word cloud of most frequent keywords (Source: Own processing, Biblioshiny).
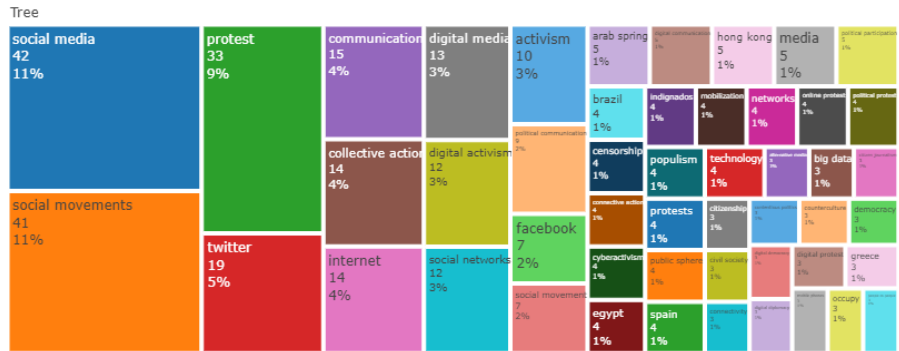

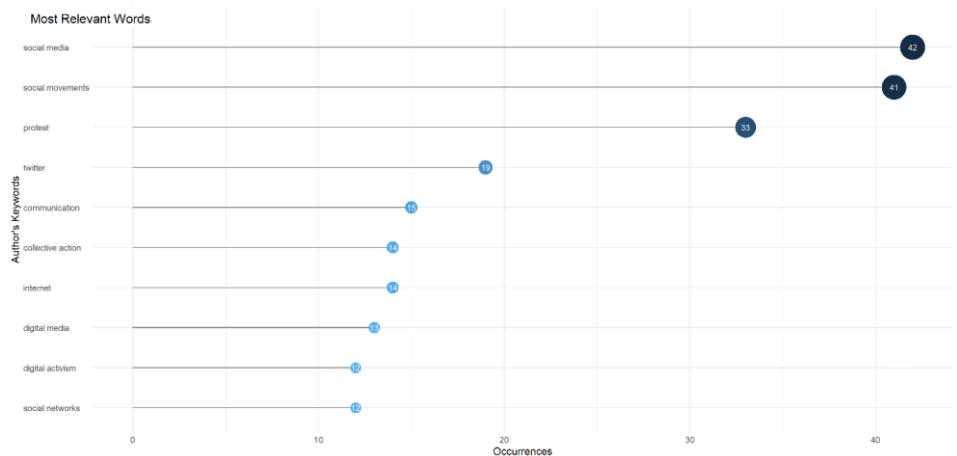**Figure 11.** Word tree (Source: Own processing, Biblioshiny).

Figure 12. Most frequent words.

The co-citation network analysis reveals significant findings in digital communication and social protests, highlighting influential authors and their centrality within scholarly discourse. The study focuses on three clusters of authors. In cluster 1, notable authors like Paolo Gerbaudo, Christian Fuchs, and Zeynep Tufekci exhibit high betweenness centrality, indicating their critical role in connecting different nodes in the network. These authors act as bridge-builders, facilitating the flow of information within the co-citation network. They also demonstrate relatively high PageRank scores, suggesting they receive frequent citations from other influential authors, further reinforcing their significance in the field. Cluster 2 is dominated by W. Lance Bennett and Jennifer Earl, who emerge as central figures in the network,

given their high betweenness centrality. These authors occupy important positions in the flow of citations and connections between different nodes. Moreover, their relatively high PageRank scores signify their substantial influence and recognition within the field. In cluster 3, Manuel Castells emerges as the most prominent and influential author, evidenced by his significantly high betweenness centrality and PageRank score. His work is pivotal in connecting various nodes in the network and attracts substantial citations from other influential authors. This reinforces his status as a key authority in digital communication and social protests (**Figure 13**).
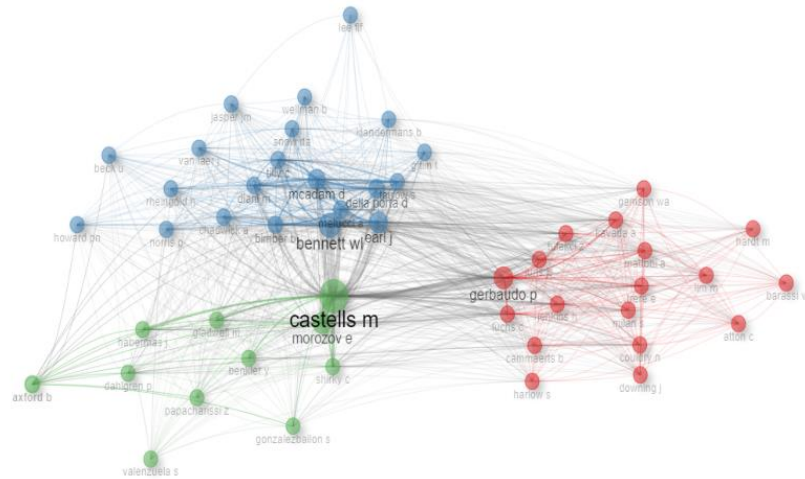

Figure 13. Co-citation network (Source: Own processing, Biblioshiny).

The co-occurrence network of titles in unigrams provides valuable insights into the relationships and significance of various terms related to digital activism and social media. The nodes in the network represent individual terms, while the cluster column indicates the group to which each node belongs. Three centrality measures, namely Betweenness, Closeness, and PageRank, are used to quantify the importance and influence of each node within the network. The terms "digital" and "media" are highly significant within the network, as indicated by their high Betweenness (299.93 and 213.37, respectively) and PageRank (0.1025 and 0.0947, respectively) values. These terms play a significant role in shaping the discourse around social media and digital activism. The term "protest" demonstrates considerable importance in the network, with a relatively high Betweenness value of 61.29 and a notable PageRank value of 0.0563. This finding reflects the prevalence and impact of protest movements in the context of digital activism. Additionally, "political" is a prominent theme, emphasizing the connection between social media and political communication. Terms related to social aspects, such as "activism," "protests," and "networks," also hold significance within the network. These terms are central to discussions about collective action and the role of social networks in mobilizing and organizing activists. "Internet" and "online" are strongly associated with digital activism, social media, and collective action. These terms demonstrate substantial importance within the network, indicating the crucial role of online platforms and the internet in facilitating activism and communication. Terms like "global" and "public" are noteworthy within the network, suggesting the global impact of digital activism and its influence on the public sphere. These terms reflect the broad reach and significance of social media

platforms in mobilizing activism on a global scale.

Specific social media platforms, such as "X (Twitter)" and "Facebook," are also present in the network, indicating their relevance in digital activism and social movements. These platforms serve as key communication channels for activists and play a pivotal role in disseminating information and organizing protests. Several terms related to contemporary issues and themes, including "political participation," "mobilization," and "contemporary," are present in the network. These terms highlight digital activism's ongoing relevance and exploration in addressing current social and political challenges (**Figure 14**).
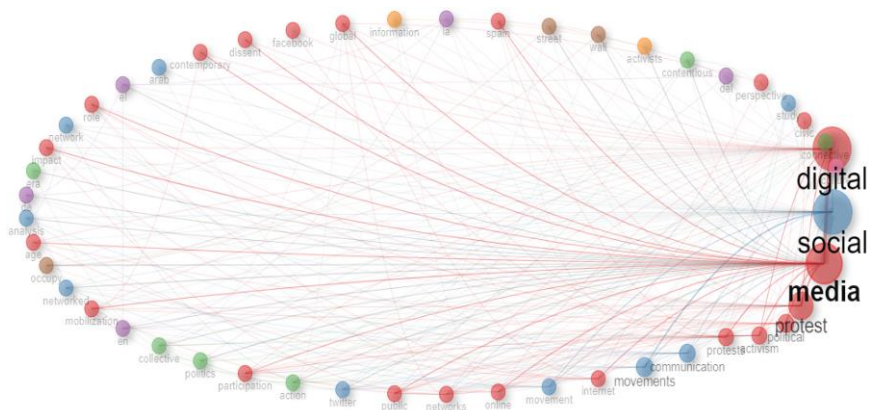

Figure 14. Key findings—Co-occurrence network of titles in Unigrams (Source: Own processing, Biblioshiny).

The bibliometric analysis of digital communication and social protest research reveals interesting patterns in thematic evolution over time. From 2008 to 2013, "digital media" and "social media" emerged as significant themes, reflecting the growing importance of online platforms in activism. These themes continued to be relevant in the subsequent period from 2014 to 2019, with "social media" being particularly dominant, highlighting its significant role in shaping discussions about digital activism and social movements. In the transition from 2008 to 2013 to 2014 to 2019, "collective action" gained prominence, indicating a heightened focus on collaborative efforts among activists. Furthermore, "social movements" emerged as a central theme in both periods, emphasizing their continuous relevance and impact on the field. Another notable finding is the emergence of specific terms associated with significant events or movements. For instance, "Wall Street" and "Occupy Wall" became prominent from 2008 to 2013, reflecting the influence of the Occupy "Wall Street" movement during that time.

Moving to the period from 2014 to 2019 to 2020 to 2022, "digital activism" and "digital communication" continued to be essential themes, highlighting the ongoing exploration of the role of digital tools in activism. "Social movements" and "social media" also remained significant, further underscoring their interrelationship and mutual influence. Interestingly, the analysis revealed an increase in terms related to "social networks" from 2014 to 2019 and their continued relevance in the subsequent period from 2020 to 2022. This suggests recognizing social networks' significance in facilitating and mobilizing social movements (**Figure 15**).
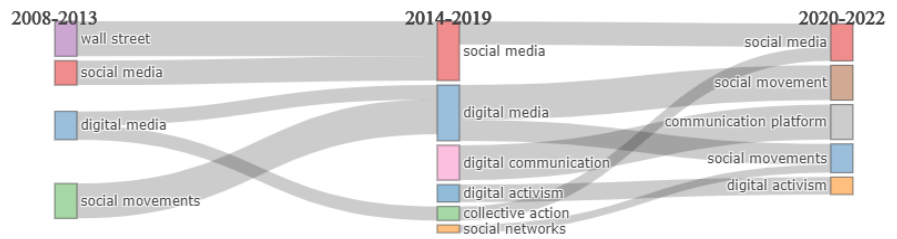
Figure 15. Thematic evolution (titles, bigrams) (Source: Own processing, Biblioshiny).

The findings revealed the most globally cited documents in the field. **Table 3** presents a list of influential papers along with their respective DOI, total citations (TC), total citations per year (CPY), and normalized total citations (NTC). The paper by W. Lance Bennett and Alexandra Segerberg in 2012, titled "the logic of connective action: Digital media and the personalization of contentious politics," emerged as the most cited document, with an impressive total of 4193 citations and a CPY of 138.58. This paper's significance is further highlighted by its high normalized total citations (NTC) of 12.17, indicating its sustained influence over time.

Another notable contribution is the work by W. Lance Bennett and Alexandra Segerberg in 2011, titled "Digital media and the personalization of collective action: Social technology and the organization of protests against the global economic crisis," which accumulated 699 citations, demonstrating its lasting impact in the field. This paper's CPY is 24.77, and its NTC is 5.04, reaffirming its continued relevance to researchers. Other influential papers include the study by W. Lance Bennett, Christian Breunig and Terri Givens in 2008, "Communication and political mobilization: Digital media and the organization of anti-Iraq war demonstrations in the U.S.," with 372 citations and a CPY of 10.38. While it has a relatively lower NTC of 1.89, its importance in the early stages of research on digital communication and social protests is evident.

The contribution of Sandra González-Bailón and Ning Wang in 2012, titled "Networked discontent: The anatomy of protest campaigns in social media," is also noteworthy, amassing 298 citations with a CPY of 14.13 and an NTC of 6.45, indicating consistent scholarly attention over time. Similarly, the work by Pearce and Kendzior in 2012, "Networked Authoritarianism and Social Media in Azerbaijan," garnered 283 citations and a CPY of 10.67. Though it has a lower NTC of 0.94, it still demonstrates valuable insights contributing to the field. Additional highly cited papers include those authored by Conover et al. (2013) in 2013, Andén-Papadopoulos (2014) in 2014, Van Laer (2010) in 2010, Wolfson (2014) in 2014, and Hanna (2016) in 2016. These papers have significantly impacted digital communication and social protest research, as reflected in their substantial TC and CPY values and noteworthy NTC scores ranging from 2.15 to 5.88 (**Table 3**).

Table 3. Most global cited documents (Source: Own processing, Biblioshiny).

Paper	DOI	TC$^{\alpha}$	CPY	NTC
W. Lance Bennett and Alexandra Segerberg (2012). The Logic of Connective Action: Digital Media and The Personalization of Contentious Politics	10.1080/1369118X.2012.670661	4193	138.58	12.17
W. Lance Bennett and Alexandra Segerberg (2011). Digital Media and The Personalization of Collective Action: Social Technology and The Organization of Protests Against the Global Economic Crisis	10.1080/1369118X.2011.579141	699	24.77	5.04
W. Lance Bennett, Christian Breunig and Terri Givens (2008). Communication and Political Mobilization: Digital Media and the Organization of Anti-Iraq War Demonstrations in the U.S.	10.1080/10584600802197434	372	10.38	1.89
Sandra González-Bailón, and Ning Wang (2016). Networked Discontent: The Anatomy of Protest Campaigns in Social Media	10.1016/j.socnet.2015.07.003	298	14.13	6.45
Katy E. Pearce and Sarah Kendzior (2012). Networked Authoritarianism and Social Media in Azerbaijan	10.1111/j.1460-2466.2012.01633.x	283	10.67	0.94
Michael D. Conover, Emilio Ferrara, Filippo Menczer, and Alessandro Flammini (2013). The Digital Evolution of Occupy Wall Street	10.1371/journal.pone.0064679	261	11.09	5.34
Kari Andén-Papadopoulos (2014). Citizen Camera-witnessing: Embodied Political Dissent in the Age of 'Mediated Mass Self-Communication'	10.1177/1461444813489863	251	9.60	3.62
Jeroen Van Laer (2010). Activists Online and Offline: The Internet as an Information Channel for Protest Demonstrations	10.17813/maiq.15.3.8028585100245801	248	7.00	2.15
Todd Wolfson (2014). Digital Rebellion: The Birth of the Cyber Left	10.5406/illinois/9780252038846.001.0001	200	9.00	3.39
Philippe Hanna, Frank Vanclay, Esther Jean Langdon, and Jos Arts (2016). Conceptualizing Social Protest and the Significance of Protest Actions to Large Projects	10.1016/j.exis.2015.10.006	171	12.88	5.88

TC: Total citations; CPY: Citations per year; NTC: Normalized TC; α: TC is updated according to Google Scholar citation on 22 July 2023.

5. Discussion

Many specialized software tools are limited in their capacity to perform only specific facets of science mapping analysis, with only a few affording scholars the capability to execute the entire analytical process. Bibliometrix stands out as an open-source software solution designed to enable a comprehensive analysis of scientific literature through the lens of science mapping. It is developed in the versatile R programming language and integrates with various statistical and graphical packages. Notably, bibliometrics remains an ever-evolving field, and Bibliometrix has been engineered with adaptability in mind, allowing for swift upgrades and integration. This adaptability addresses a thriving and highly engaged community of developers comprising eminent researchers. The benefits of Bibliometrix are twofold. Its open-source nature fosters collaborative development through GitHub, fostering a communal approach to its enhancement. Furthermore, within the vast landscape of thousands of R packages, Bibliometrix can seamlessly slot into larger analytical workflows, harnessing the capabilities of other R-based solutions (Aria and Cuccurullo, 2017, 2020).

We used bibliometric analysis to study how research on digital communication and social protests has evolved globally. We used tools for data visualization to make it easier to look at many published documents quickly. We looked at 260 important publications from 2008 to 2022 in the SCOPUS database and found some interesting

trends. The trend of scholarly journals in this field has grown substantially since 2010, culminating in 37 publications in 2022. This upward trajectory is predominantly ascribed to the rapid evolution of digital communication technologies and their increasing adoption by grassroots movements and activists (Carty, 2010; Carty and Reynoso Barron, 2018; Mutsvairo, 2016). Notable instances include the BlackLivesMatter Protests (2020), Hong Kong Pro-Democracy Protests (2019–2020), Anti-CAA Protests in India (2019–2020), MeToo Movement (2017), Occupy Wall Street (OWS) (2011), and Arab Spring (2010–2012) (Bhatia and Gajjala, 2020; Camus, 2019; Gautney, 2013; Marcinkowski, 2012; Wasserstrom, 2021). These movements have harnessed digital communication tools to mobilize individuals, heighten societal awareness, and facilitate the seamless exchange of information during social and political mobilizations. In this context, the influence of digital communication has been particularly conspicuous in the effective coordination of protests, dissemination of critical information, and comprehensive documentation of events, as elucidated (González-Bailón, 2015). Additionally, it is worth noting that emergency response organizations and law enforcement entities have similarly leveraged social media platforms to monitor and gain insights into the activities and dynamics of activist groups during protest events (Owen, 2017).

Thirdly, prevalent subjects of discussion encompassed social media, social movements, protests, X (Twitter), and communication. These thematic areas closely align with the authors' examination's focal points about digital communication and social protests. The co-occurrence network of titles in unigrams reveals the interconnectedness and centrality of various terms related to digital activism and social media. Our investigation underscores the mounting significance of social media in enabling and galvanizing social movements and protests, as well as serving as conduits for information dissemination and the issuance of appeals for engagement (Lee and Chan, 2018; Yuen et al., 2022). Furthermore, a comprehensive assessment of these themes necessitates subsequent inquiries into social media's beneficial and detrimental ramifications on societal dynamics, activism, and the intricacies of public discourse.

In summary, the analysis sheds light on the evolving landscape of research in digital communication and social protests, highlighting the increasing significance of social media in facilitating and energizing social movements and protests and serving as conduits for information dissemination and issuing calls for engagement. These findings provide valuable insights for researchers and practitioners seeking to understand the landscape of digital activism and its influence on social movements, political communication, and collective action. This underscores the need for further investigations into social media's positive and negative impacts on societal dynamics, activism, and the nuances of public discourse.

6. Conclusion

This study presented a bibliometric analysis of research production informing digital communication and social protests. It sought to offer insights into co-occurrence networks and thematic maps, thus aiding a diverse audience in comprehending the latest and most pertinent research trends concerning socio-economic protests and their link to social media platforms. The contemporary data

provided valuable perspectives on evolving patterns in digital communication and social protest studies. Moreover, the primary objective of this manuscript was to provide an overarching view of literature within the domain of digital communication and social protests. The analysis revealed several key findings: 1) a consistent growth in publications, 2) the evolving landscape of sources, authors, and affiliations, 3) the global landscape of scientific production and collaboration, 4) the most widely cited documents, and finally, 5) the primary research focal points represented by keyword themes. These insights assisted in identifying potential research gaps and supported the assertion that digital communication and social protests hold relevance within the broader research landscape. The burgeoning diversity of thematic areas underscores a collective commitment to research in digital communication and socio-economic demonstrations, with a surge in publications across numerous journals and active involvement from multiple countries. Hence, the results underscore the need for further synthesis of existing literature to pinpoint specific gaps, given the exponential proliferation of research themes in digital communication and social protests. In short, the thematic evolution in research on digital communication and social protests indicates the dynamic nature of the field, with certain themes consistently prevailing across different periods. The findings highlight the enduring importance of social media and digital activism and the continued exploration of collective action and social movements. The analysis also demonstrated the impact of specific events and movements on the research landscape, thus reflecting the influence of real-world developments on academic inquiry.

While this study offers valuable insights into the evolution of digital communication and social protest research, it acknowledges certain limitations that guide potential avenues for future studies. This research relied solely on data retrieved from the SCOPUS database. While SCOPUS offers a comprehensive collection of scholarly literature, it is important to acknowledge that other bibliographic databases (e.g., Web of Science) contain additional data that would further the said study. Future research could expand the analysis by including data from these different sources to obtain a more complete picture of the research landscape. The analysis might be subject to publication bias, as studies with statistically significant or positive findings are generally more likely to be published. Also, research could employ additional methods incorporating techniques to account for potential publication bias in the analysis. In addition, future research could benefit from incorporating qualitative approaches, such as expert interviews or textual analysis of key publications, to gain deeper insights into the intellectual discourse and critical perspectives within the field. Finally, future research could consider conducting a broader and longitudinal analysis to understand the field's historical development and identify potential shifts in research trends over a longer period. The dynamic nature of digital communication technologies necessitates continuous research efforts. As new platforms and technologies emerge and the landscape of social protests evolves, research should continuously strive to adapt and incorporate these developments into the analysis to accurately understand the ever-changing relationship and influence of digital communication on political developments such as social protests. By acknowledging these limitations and considering the suggested future directions, further research can build upon the insights presented in this study and contribute to a comprehensive and

evolving understanding of this crucial area of inquiry.

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