West Science Social and Humanities Studies
Vol. 02, No. 10, October 2024, pp. 1602-1612

Bibliometric Analysis on the Dynamics of Income Inequality in the Digital Economy

Loso Judijanto[1], Irmayanti[2], Tera Lesmana[3]
[1] IPOSS Jakarta, Indonesia
[2] Politeknik Tunas Pemuda
[3] Ciputra University

Article Info

Article history:

Received Oct, 2024
Revised Oct, 2024
Accepted Oct, 2024

Keywords:

Digital Inequality
Income Inequality
Bibliometric Analysis
VOSviewer

ABSTRACT

This study utilizes bibliometric analysis to explore the evolving discourse surrounding income inequality in the digital economy, identifying key thematic shifts and central scholarly contributions from 2000 to 2024. By employing VOSviewer to map keywords and author networks, the research reveals a significant transition in academic focus—from traditional aspects of economic disparity to more complex issues such as digital inequality and globalization. The findings underscore the increasing concern over how digital advancements intersect with and potentially exacerbate socioeconomic inequalities. A detailed examination of author collaborations suggests a robust, albeit evolving, network of scholarship that highlights the need for more interdisciplinary approaches and integration of emerging researchers into mainstream discourse. This study not only provides a comprehensive overview of the academic landscape but also offers insights into the practical implications for policy aimed at mitigating inequality in the digital age.

Corresponding Author:

Name: Loso Judijanto
Institution: IPOSS Jakarta, Indonesia
Email: losojudijantobumn@gmail.com

1. INTRODUCTION

In recent years, the digital economy has become a cornerstone of global economic growth, reshaping industries, employment, and economic practices. The proliferation of digital technologies has not only streamlined production and distribution processes but also significantly altered the labor market landscape. It has facilitated the creation of new business models and spurred innovation across various sectors [1]. However, alongside these advancements, there has been an increasing concern regarding the widening income inequality observed in many economies. This disparity is often attributed to the differential access to digital resources and varying capacities to leverage these technologies [2].

Income inequality in the digital economy is multifaceted, influenced by factors such as educational disparities, access to technology, and differing levels of digital literacy. Studies have shown that while high-skilled workers who can navigate the digital landscape tend to thrive, low-skilled workers often face stagnating wages and job insecurity

[3]. The digital divide not only perpetuates existing income disparities but potentially exacerbates them, creating a cycle where only the technologically adept can benefit fully from digital innovations [4]. This scenario suggests a critical need for comprehensive studies that map the nuances of how the digital economy impacts income inequality.

The dynamics of income inequality in the context of the digital economy are complex and require a nuanced understanding of various influencing factors, such as policy environments, corporate practices, and individual skills. Bibliometric analysis, a method used to quantitatively analyze academic literature, offers a systematic approach to understanding these dynamics over time. By examining the volume, authors, and citation networks of relevant literature, researchers can identify key themes, trends, and gaps in the existing body of knowledge [5]. This approach not only helps in understanding the scholarly landscape but also in identifying the predominant narratives and potentially underexplored areas within the field of income inequality in the digital economy.

Moreover, a bibliometric analysis focused on income inequality within the digital economy can elucidate the trajectory of research and policy discourse. It can reveal how perceptions and approaches toward addressing digital divide issues have evolved and highlight the effectiveness of strategies implemented across different regions. Such an analysis can also shed light on the interplay between technological advancement and socio-economic structures, offering insights into the mechanisms through which technology either mitigates or intensifies income inequality [6].

Despite the extensive body of literature on income inequality and the digital economy, there remains a significant gap in synthesizing these findings to paint a comprehensive picture of the landscape. Many studies have focused either on the economic impacts of digitalization or on aspects of income inequality, with less attention given to their intersection. Furthermore, the rapid evolution of digital technologies continues to outpace academic research, creating a lag in understanding the current and future implications of these advancements on societal disparities. This study aims to address these gaps by conducting a bibliometric analysis of existing literature, providing a detailed overview of how income inequality in the digital economy has been explored, debated, and understood within academic circles.

The purpose of this research is to provide a thorough bibliometric analysis of the literature pertaining to income inequality in the digital economy. This study seeks to delineate the current academic environment by identifying pivotal themes, authors, and publications that have influenced the comprehension of how digital economic processes affect income distribution. This analysis aims to identify dominant research trends, key contributors, and significant gaps in the literature. Ultimately, the results will assist in effectively informing policymakers and stakeholders regarding methods to mitigate income disparity in an increasingly digital landscape.

2. LITERATURE REVIEW

2.1 Digital Economy and Income Distribution

The digital economy is characterized by its intensive use of digital technologies in the production and distribution of goods and services. [7] define the digital economy as encompassing all economic transactions that occur through digital platforms, including e-commerce, digital services, and online freelance work. This broad definition captures the transformation in how businesses operate and how workers are employed, which has significant implications for income inequality. [8] argue that digital technologies, particularly

automation and artificial intelligence, have the potential to displace a large segment of the workforce, particularly those in routine-based occupations. This displacement is often cited as a primary driver of increasing income disparities, as it disproportionately affects lower-wage workers who have less access to new, technology-driven job opportunities.

2.2 *Skill Gap and the Digital Divide*

The digital divide, a term that describes the disparity between those who have access to digital technologies and those who do not, is a critical factor in understanding income inequality in the digital economy. [4] highlights that this divide extends beyond mere access to hardware and includes disparities in digital skills, which are increasingly required for higher-paying jobs. Research by [9] supports this view, showing that regions with higher digital literacy rates exhibit lower levels of wage inequality among digital workers. Conversely, areas with limited digital skillsets face heightened risks of income disparity, as workers are unable to transition into emerging digital roles.

2.3 *Polarization of Job Markets*

The polarization of job markets, where job opportunities cluster at the high and low ends of the skill spectrum, leaving a dwindling middle, is another outcome of digital economic dynamics. [10] discuss how middle-skilled roles, characterized by routine cognitive and manual tasks, are increasingly being automated or offshored. This shift leads to a "hollowing out" of the job market, exacerbating income inequality by reducing the availability of middle-income roles. Those who can upgrade their skills move up the job ladder, while others fall into lower-income brackets, widening the economic divide.

2.4 *Globalization and Digital Platforms*

The rise of digital platforms has also globalized labor markets, allowing companies to source talent globally at competitive rates. [11] investigate the impact of digital platforms like Upwork and Freelancer on income inequality. They find that while these platforms provide new opportunities for workers in low-income countries, they also contribute to a race to the bottom in wages for certain skills worldwide. This globalization of the workforce, facilitated by digital platforms, often leads to downward pressure on wages in more developed economies, further contributing to income disparity.

2.5 *Government Policy and Regulation*

The role of government policy in addressing income inequality in the digital economy is significant. Policies aimed at enhancing digital literacy, providing access to technology, and supporting displaced workers are vital. [12] emphasize the importance of government intervention in education and training programs to prepare workers for the changing job landscape. Additionally, redistributive policies, such as progressive taxation and social security enhancements, are suggested by [13] as methods to

mitigate the adverse effects of income inequality.

3. METHODS

This research employs a bibliometric analysis to systematically review and synthesize existing literature on income inequality in the digital economy. Following the guidelines outlined by [5], the study will extract data from Google Scholar, focusing on peer-reviewed articles published from 2000 to 2024. The selection criteria include articles that explicitly discuss the digital economy and its relation to income inequality, utilizing keywords such as "digital economy," "income inequality," "digital divide," and "automation." The bibliometric analysis will be conducted using VOSviewer, a tool designed for constructing and visualizing bibliometric networks [14]. This tool will allow for the analysis of co-citation, bibliographic coupling, and keyword co-occurrence networks, thereby identifying the most influential studies, authors, and emerging trends within this research domain. The results are expected to reveal the thematic structure of the field and highlight the scholarly dialogue surrounding the impacts of the digital economy on income inequality.

4. RESULTS AND DISCUSSION

4.1 Research Data Metrics

Table 1. Data Citation Metrics

Publication years	2000-2024
Citation years	24 (2000-2024)
Paper	999
Citations	470973
Cites/year	19623.88
Cites/paper	471.44
Cites/author	289107.73
Papers/author	587.43
Author/paper	2.31
h-index	351
g-index	660
hI,norm	261
hI,annual	10.88
hA-index	116
Papers with ACC	: 1,2,5,10,20:997,993,959,854,638

Source: Publish or Perish Output, 2024

With an emphasis on income inequality in the digital economy, Table 1 provides an extensive collection of bibliometric metrics based on a dataset of 999 publications published between 2000 and 2024. With 470,973 citations amassed over 24 years, an average of 19,623.88 citations annually and 471.44 citations per paper, these papers have clearly made an impact and are still relevant in the academic community. Based on authorship metrics, there are 2.31 authors on average per publication. Each author contributes to about 587.43 papers, which results in an average of 289,107.73 citations per author. The high caliber and significance of the research output are highlighted by the 351 h-index, which indicates that 351 publications have each acquired at least 351 citations. With a g-index of 660, it is even more evident that the most cited papers have a significant overall impact. The annualized h-index (hI,annual) at 10.88 and the normalized h-index (hI,norm) at 261 highlight the importance of consistent

research quality and impact over time. Based on papers with several authors, the hA-index, which is now at 116, represents author productivity. Nearly all papers (997 out of 999) are cited at least once, with a significant number still highly cited, demonstrating the field's ongoing relevance and the enduring utility of its research contributions. This is evident from the distribution of citations across papers, such as those receiving over 1, 2, 5, 10, and 20 citations.

Table 2. Top Cited Research

Citations	Authors and year	Title
9758	[15]	Digital divide: Civic engagement, information poverty, and the Internet worldwide
7379	[16]	The spirit level
4958	[17]	Technology and social inclusion: Rethinking the digital divide
4832	[18]	Beyond money: Toward an economy of well-being
4825	[19]	Closing the gap in a generation: health equity through action on the social determinants of health
4520	[20]	Economics of the welfare state
4269	[21]	Precarious work, insecure workers: Employment relations in transition
4267	[13]	Inequality: What can be done?
3789	[22]	Trends in US wage inequality: Revising the revisionists
3786	[23]	Human resource management

Source: Publish or Perish Output, 2024

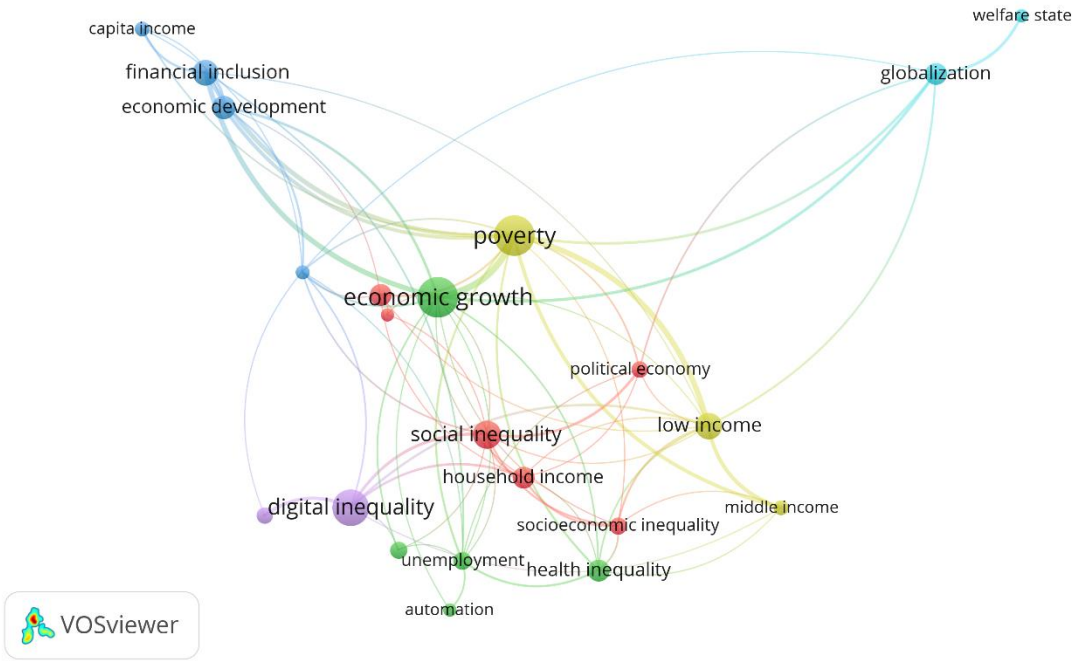

Figure 1. Network Visualization
Source: Data Analysis Result, 2024

The bibliometric study shown by this VOSviewer visualization focuses on the linkages and clusters created by important phrases related to income inequality in the context of economic research. Each node represents a distinct term, and the lines or

links indicate the strength and frequency of co-occurrences between terms. The size of the node indicates how frequently the term appears throughout the examined literature.Terms like "poverty," "economic growth," "social inequality," and "digital inequality" are prominent and closely related in the network's center, indicating that these subjects are frequently covered together in the literature. This cluster suggests a considerable academic focus on the relationship between economic growth and different types of inequality, such as the digital divide, which represents differences in access to technology. The relationship between "economic growth" and "poverty" draws attention to the importance of studying the potential effects of rising national economic output on income distribution and poverty rates.An other noteworthy cluster relates "globalization" to "low income," "political economy," and "welfare state," demonstrating a scholarly interest in the macroeconomic and policy-oriented dimensions of inequality. It is clear from this that studies frequently examine the ways in which domestic economic policies and their effects on populations with lower incomes are influenced by global economic integration. The term "welfare state" and "globalization" are sometimes used interchangeably, indicating a continuous discussion concerning national approaches to social welfare in the face of international economic pressures.The phrases "economic development" and "financial inclusion" cluster together less tightly, suggesting a specialized but important field of study that looks at how financial services contribute to overall economic development and how they could lessen income inequality. The relative exclusion of "financial inclusion" from fundamental terms such as "poverty" and "economic growth" may indicate that, although acknowledged as a crucial element in economic development, it is not as often discussed in close relation to the major themes of poverty and inequality. This might be a promising field for additional study integration, especially in studies looking at ways to reduce economic inequities.

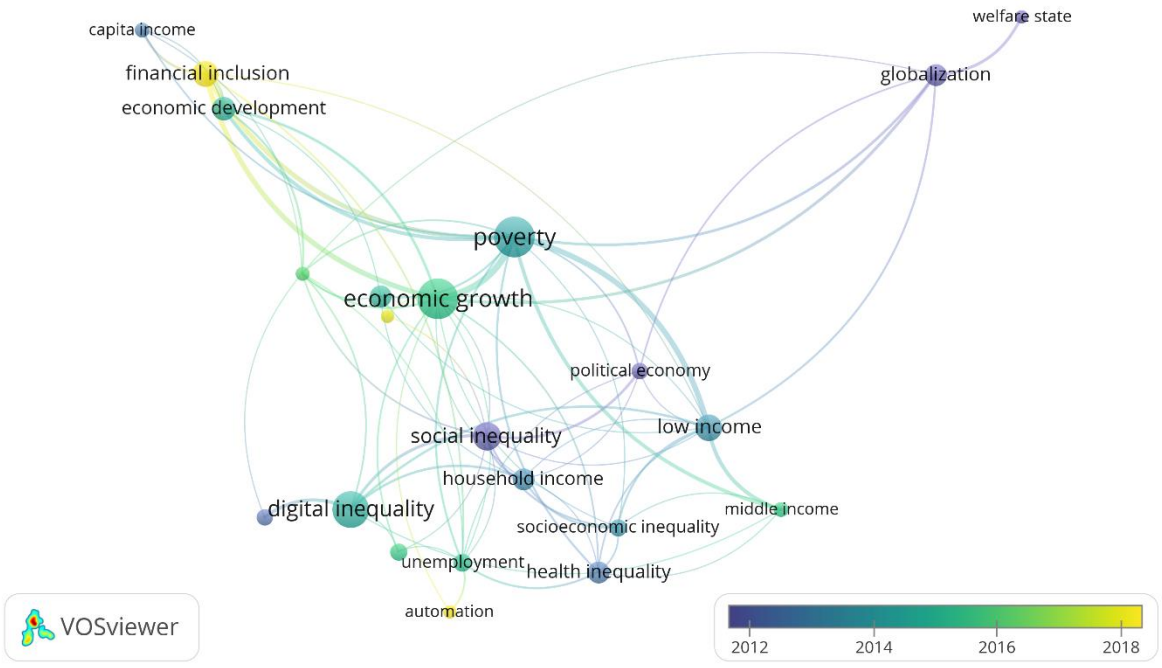

Figure 2. Overlay Visualization
Source: Data Analysis Result, 2024

This VOSviewer visualization illustrates the evolution of research focus from 2012 (represented in blue) to 2018 (represented in yellow) within the context of income inequality and related economic factors. The color gradient indicates a temporal shift in the prominence and connectivity of various research topics over these years, providing insights into how academic interest and scholarly discourse have evolved in response to changing global economic conditions and technological advancements.

In the earlier years marked by blue, we see a strong concentration around terms like "poverty," "economic growth," and "social inequality." This suggests that during 2012, academic discussions were heavily focused on the broader impacts of economic changes on poverty levels and social disparities. The significant connections between "poverty" and "economic growth" indicate a robust exploration of how macroeconomic performance influences poverty and inequality levels, a reflection of the post-2008 financial crisis academic environment where such themes were of prime concern.

By 2018, as indicated by the yellow tones, there is a noticeable shift towards topics such as "digital inequality" and "globalization," reflecting an increased academic interest in the nuanced impacts of digital technologies and global economic integration on income distribution. This shift is particularly pertinent given the rapid advancements in digital technologies and their integration into everyday economic activities during this period. The prominence of "globalization" in the later years and its connections to "welfare state" and "political economy" suggest that there was growing concern about how global economic policies and the expanding reach of multinational corporations influence domestic economies and income inequality. This transition underscores a broader scholarly attempt to grapple with the complex interplay between technological advancement, global economic policies, and their social implications.

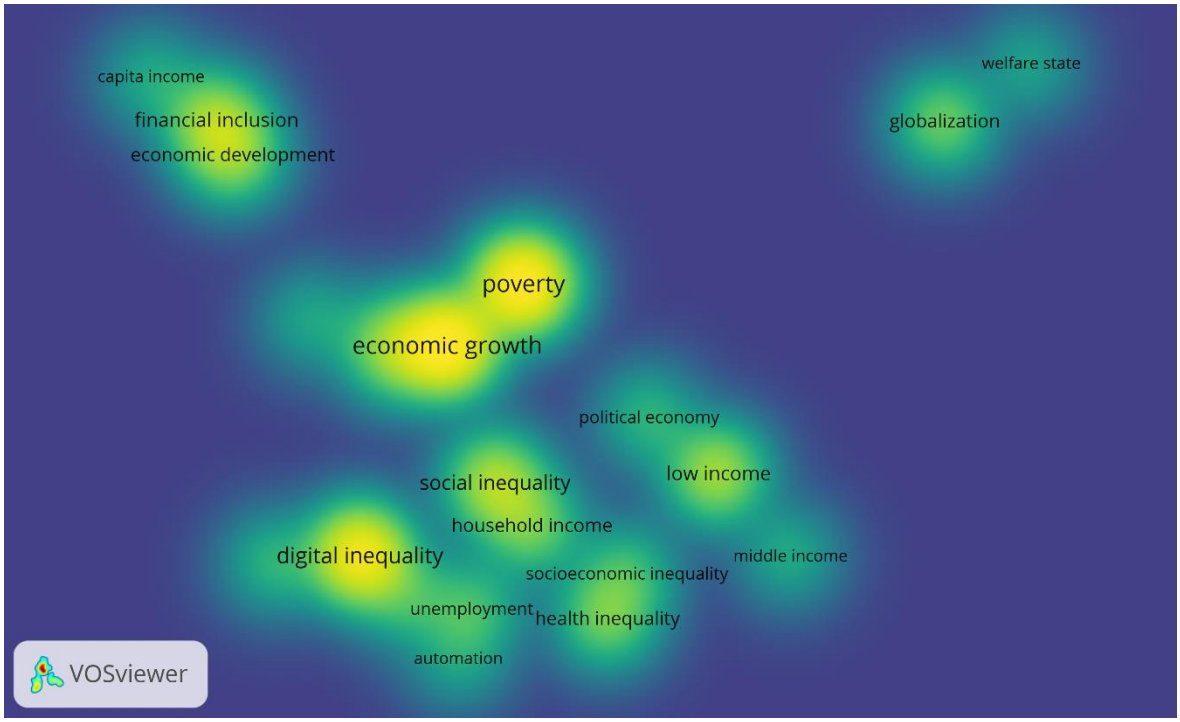

Figure 3. Density Visualization

Source: Data Analysis, 2024

This VOSviewer visualization employs a heat map to highlight the intensity of focus on various research topics related to economic inequality and development. The visualization's spectrum ranges from blue (indicating lesser focus) to yellow and green (indicating higher focus), which provides insights into the most extensively researched areas within the field. The central and most vibrant areas of the map, predominantly shaded in yellow and green, encompass terms like "poverty," "economic growth," "social inequality," and "digital inequality." This concentration suggests that scholarly focus intensely revolves around these concepts, reflecting ongoing academic and policy debates about how economic growth patterns affect poverty and inequality levels, both socially and digitally. The spatial distribution of topics shows that "poverty" and "economic growth" are closely linked, signifying a robust dialogue about the direct effects of economic expansion or contraction on poverty rates. Adjacent to these are "social inequality" and "digital inequality," which are also highlighted in warmer colors, indicating significant research interest. These topics are crucial in understanding how advancements in technology and shifts in socio-economic structures influence disparities within societies. In contrast, areas like "capita income" and "financial inclusion" are in cooler tones, suggesting these are less dominant in the current research landscape but are still connected to the central themes.

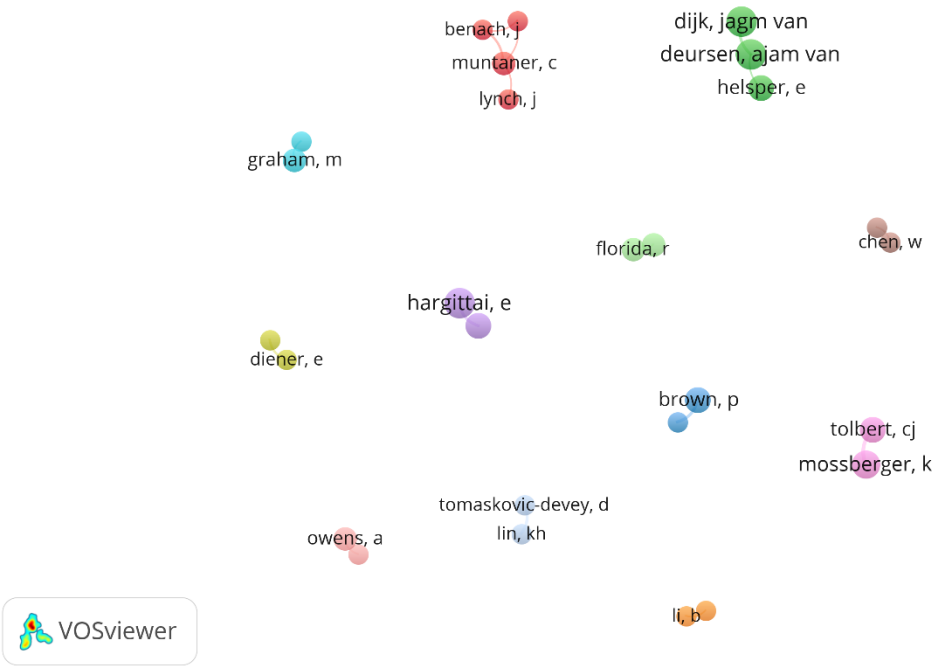

Figure 4. Author Collaboration Visualization
Source: Data Analysis, 2024

A network map of authors who have made major contributions to a specific field of study—possibly in social science, digital inequality, or similar multidisciplinary fields—is presented in this VOSviewer visualization. An author is represented by each node in the network, and the size of each node reflects the amount of effort or influence (number of publications or citations, for example) the author has in the field. The nodes' various colors may stand for various author clusters or groups that commonly collaborate or whose work is strongly tied to one another using methodological or thematic approaches. When authors such as "van Dijk" and "van Deursen" appear next to one another

and share the same hue, it indicates that their works have a strong thematic or collaborative connection. Authors like "Florida, R" and "Graham, M." are positioned at distinct places in the research area, indicating different subfields or techniques. This type of mapping is helpful in determining important research clusters within a topic, recognizing prominent researchers, and comprehending the environment of academic cooperation.

Discussion

Synthesis of Key Findings

The keyword analysis highlighted an evolving focus within the literature from traditional economic indicators like "poverty" and "economic growth" to more contemporary issues such as "digital inequality" and "globalization." This shift reflects a broader recognition of the digital economy's impact on socio-economic structures and the complexities it introduces into the income inequality discourse. The prominence of terms like "social inequality," "household income," and "unemployment" alongside "digital inequality" underscores a critical intersection: the digital divide not only mirrors existing social inequalities but potentially exacerbates them. Such findings suggest that as digital technologies become more ingrained in economic systems, they influence various facets of economic inequality, demanding more integrated approaches in both research and policy formulation.

The author network visualization elucidates the central figures in the research community and the collaborative patterns that exist among scholars. Authors such as Van Dijk and Van Deursen, known for their work on the digital divide and social implications of digital technologies, appear prominently, indicating their influential contributions to understanding the nuanced impacts of the digital economy on society. This network also highlights potential gaps in collaboration and possibly in knowledge, with some key researchers positioned on the periphery of the main clusters. These peripheral positions could indicate emerging researchers or novel subfields that might require more integration into the mainstream discourse.

The heat map analysis further reinforces the dense concentration of research around "poverty" and "economic growth," with a noticeable expansion towards "digital inequality" over time. This temporal component shows how academic focus has responded to global economic trends, particularly post-2008 financial crisis and the subsequent rapid digitalization of economies. It reveals an academic acknowledgment of digital technologies' dual role as both a driver of economic opportunity and a catalyst for further inequality.

Implications for Research and Policy

The findings from this bibliometric analysis have several implications for future research. First, the transition in focus towards issues like "digital inequality" suggests a need for studies that delve deeper into how digital access and literacy impact economic opportunities across different demographics. Research could explore interventions that mitigate the adverse effects of the digital divide, examining the efficacy of policy measures such as digital literacy programs, equitable access to technology, and inclusive economic planning. Second, the clustering of authors and the emergence of new scholars in the field call for increased collaboration across disciplines to tackle the multifaceted challenges of income inequality in the digital age. Interdisciplinary research could integrate insights from technology studies, economic sociology, and development economics to provide more comprehensive strategies that address both the symptoms and root causes of inequality. Third, the dynamic nature of the keyword interconnections and their evolution over time suggests that income inequality research must continuously adapt to the changing technological and economic landscapes. This could involve real-time monitoring of economic trends and the impacts of digital innovation on various population segments, providing

policymakers with timely data to inform decisions.

Theoretical and Practical Contributions

Theoretically, this analysis contributes to the literature by mapping the evolution of research themes and highlighting how academic focus shifts in response to societal changes. It provides a macroscopic view of the discourse, helping to identify not only the predominant theories and methodologies but also the underexplored areas that could benefit from further scholarly attention. Practically, the insights gained from this bibliometric study can help policymakers identify key areas where interventions are necessary. For instance, the strong link between "economic growth" and "poverty" in the literature underscores the importance of inclusive growth strategies that distribute the benefits of economic expansion more equitably. Similarly, the focus on "digital inequality" suggests that technology policy should be a crucial component of social policy, aiming to ensure that the digital economy does not leave behind the underprivileged.

5. CONCLUSION

The bibliometric analysis conducted in this study highlights the evolving landscape of scholarly discourse surrounding income inequality in the digital economy. Through systematic mapping of keywords, author networks, and thematic shifts over a defined period, we have uncovered a progressive shift in focus from traditional economic concerns to more nuanced issues like digital inequality and its intersections with socioeconomic factors. This shift reflects a growing recognition of the complex ways digital technologies influence economic disparities, demanding more comprehensive and integrated approaches in both research and policy-making. The study emphasizes the need for interdisciplinary collaboration and adaptive research methodologies to address the dynamic challenges posed by digitalization. Ultimately, the insights derived from this analysis not only enhance our understanding of the academic terrain but also provide valuable guidance for policymakers aiming to mitigate income inequality in an increasingly digital world.

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