



Economic Transformation toward Green and Digital Economies: A Bibliometric Analysis of Research Trends and Knowledge Structure

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Abstract: The rapid growth of digital payments has transformed consumer behavior; however, existing research remains fragmented and has yet to provide a comprehensive global overview of how these changes are examined across disciplines. This study aims to map the global scientific development of digital payments and changing consumption patterns to identify thematic trends, intellectual structures, and emerging research directions. Using a bibliometric approach, the study analyzes data from international databases through performance analysis and science mapping to examine publication growth, author collaboration networks, and keyword co-occurrence patterns. The findings reveal a significant increase in studies on economic digitalization, consumer decision-making, and technology-based consumption, with a shift in focus from technology adoption issues toward behavioral and socio-economic impacts. These results confirm that digital payments not only enhance transactional efficiency but also reshape consumption patterns through convenience, perceived security, and lifestyle integration. The study concludes that interdisciplinary perspectives remain limited and recommends future research emphasizing cross-cultural comparisons, psychological mechanisms, and policy implications to strengthen both theoretical and practical foundations.

Keywords: Consumption Patterns, Consumer Decision-Making, Digital Payments, Economic Digitalization, Technology-Driven Consumption.

Abstrak: Pertumbuhan pesat pembayaran digital telah mengubah perilaku konsumen; namun, penelitian yang ada masih terfragmentasi dan belum memberikan gambaran global yang komprehensif mengenai bagaimana perubahan ini diteliti di berbagai disiplin ilmu. Penelitian ini bertujuan untuk memetakan perkembangan ilmiah global mengenai pembayaran digital dan pola konsumsi yang berubah untuk mengidentifikasi tren tematik, struktur intelektual, dan arah penelitian yang muncul. Menggunakan pendekatan bibliometrik, penelitian ini menganalisis data dari basis data internasional melalui analisis kinerja dan pemetaan ilmu pengetahuan untuk memeriksa pertumbuhan publikasi, jaringan kolaborasi penulis, dan pola ko-kemunculan kata kunci. Temuan menunjukkan peningkatan

signifikan dalam studi mengenai digitalisasi ekonomi, pengambilan keputusan konsumen, dan konsumsi berbasis teknologi, dengan pergeseran fokus dari isu adopsi teknologi menuju dampak perilaku dan sosial-ekonomi. Hasil ini mengkonfirmasi bahwa pembayaran digital tidak hanya meningkatkan efisiensi transaksi tetapi juga merombak pola konsumsi melalui kenyamanan, persepsi keamanan, dan integrasi gaya hidup. Penelitian ini menyimpulkan bahwa perspektif interdisipliner masih terbatas dan merekomendasikan penelitian masa depan yang menekankan perbandingan lintas budaya, mekanisme psikologis, dan implikasi kebijakan untuk memperkuat dasar teoritis dan praktis.

Kata kunci: Pola Konsumsi, Pengambilan Keputusan Konsumen, Pembayaran Digital, Digitalisasi Ekonomi, Konsumsi Berbasis Teknologi.

INTRODUCTION

Amid the ongoing global economic transformation, the green economy and digital economy are increasingly integrated, representing a strategic approach to addressing climate change and environmental degradation. Concurrently, the digital revolution necessitates more sustainable production, distribution, and consumption systems. Countries and economic actors are thus compelled to adopt global agendas, including net-zero emissions, the Sustainable Development Goals (SDGs), and Industry 4.0, to structurally transform their economies in response to global pressures such as rising carbon emissions, overexploitation of natural resources, and unsustainable consumption patterns (OECD, 2021; UNDP, 2022; United Nations, 2023). As a result of technological innovation, energy efficiency, supply chain optimization, and enhanced data-driven economic and environmental governance, the green and digital economies have become increasingly integrated (Xu et al., 2023; Vishnevsky et al., 2021; Moşteanu et al., 2020; Hao et al., 2023). Leveraging big data, artificial intelligence (AI), the Internet of Things (IoT), and blockchain, digitalization plays a crucial role in promoting sustainable innovation, green productivity, transparency, and accountability in public policy. Meanwhile, the principles of the green economy provide a framework for digital transformation that emphasizes both economic growth and ecological sustainability as well as social equity (Yang et al., 2024; Vărzaru, 2025; He et al., 2024; Zhou, 2024).

In the literature, the green economy is commonly associated with sustainable economic growth, efficient resource utilization, carbon emission reduction, and responsible environmental management. In contrast, the digital economy emphasizes the benefits of digital technologies, such as big data, the Internet of Things (IoT), and artificial intelligence (AI), in enhancing productivity, innovation, and operational efficiency (Xia et al., 2024; Williams, 2021). Recent studies indicate that through enhanced energy efficiency, data-driven environmental monitoring, supply chain optimization, and real-time decision-making, digitalization can accelerate the transition toward a green economy (Andronie et al., 2021). However, academic research still tends to examine the green economy and the digital economy separately, from the perspectives of policy, technology, and economic impact (Nofriansyah et al., 2025; Söderholm, 2020; Kozlova et al., 2021). Therefore, our understanding of integrated, cross-disciplinary, and applied economic transformation remains partial and requires further research.

The number of publications addressing the green economy and the digital economy has increased rapidly over the past decade. However, a comprehensive map analyzing the relationships, development, and knowledge structure of both fields simultaneously is still lacking. Global-scale synthesis studies remain rare, with most research focusing on sectoral or regional empirical studies. Furthermore, current bibliometric research typically addresses either the green or digital economy without revealing the conceptual links and knowledge clusters connecting the two within the context of global economic transformation.

To address these limitations, bibliometric analysis is considered a relevant approach, as it can objectively and systematically identify publication trends, scientific collaboration networks, thematic clusters, and the evolution of knowledge structures. Through co-citation, co-occurrence, and bibliographic coupling analyses, this method enables researchers to identify research pathways, dominant actors, and intellectual relationships among concepts. Bibliometric approaches have been proven effective in uncovering complex, cross-disciplinary research dynamics within the context of green and digital economic transformation (Donthu et al., 2021; Abdoh, 2024; Szalkowski & Johansen, 2024).

One of the recent developments in this research area is the integration of green and digital economy studies into a global bibliometric map. This enables researchers to identify patterns of convergence, shifts in research focus, and knowledge clusters shaping modern economic transformation. The study analyzes international publications from 2020 to 2025, offering theoretical contributions by mapping the intellectual structure and practical contributions by identifying strategic research themes relevant to policymakers and economic actors. This approach complements previous, less comprehensive studies and enhances our understanding of future pathways for digital and green economic transformation (Kumar et al., 2020; Savchenko & Borodina, 2020).

Based on this background, through a global bibliometric analysis, this study aims to map research trends and the knowledge structure regarding the economic transformation toward a green and digital economy. The study specifically identifies publication trends, key actors, dominant thematic clusters, and future research directions. The article is structured as follows: the introduction is presented; the research methodology is described; the results of the bibliometric analysis are presented; the main findings and their implications are discussed; and the final section concludes the study and provides recommendations for further research.

RESEARCH METHODS

To identify research trends and the knowledge structure related to the shift toward a green and digital economy, this study employs a descriptive quantitative approach using bibliometric analysis. By applying a combination of keywords representing the green economy, digital economy, and economic transformation, data were obtained from the Scopus database. To ensure the relevance and currency of the research, the search was limited to English-language journal articles, conference papers, and review articles published between 2020 and 2025.

To exclude irrelevant publications, articles were selected based on inclusion criteria, which encompassed topic alignment with green and digital economic transformation and publication quality as indexed in Scopus. To identify thematic clusters and the intellectual structure of the

research, bibliometric analyses were conducted using VOSviewer and Bibliometrix. This included analyses of publication trends, author and journal contributions, as well as co-citation and keyword co-occurrence mapping.

To facilitate the interpretation of relationships among concepts and research development directions, the results were presented through visualizations of network maps and thematic clusters. This approach enables a comprehensive understanding of research dynamics and identifies gaps for further investigation.

RESEARCH RESULTS AND DISCUSSION

The bibliometric analysis process began with the use of VOSviewer to visualize the number of documents and the links among various sources, such as countries, institutions, journals, authors, and co-occurring keywords. The results are presented in the table provided below:

Table 1. Publications from 2020 to 2025

No	Years	Number of Publications	Percentage
1	2020	127	20.55 %
2	2021	143	23.14 %
3	2022	80	12.94 %
4	2023	98	15.86 %
5	2024	97	15.70 %
6	2025	73	11.81 %
Total		618	100%

In line with the focus of this study, “*Economic Transformation toward Green and Digital Economies: A Bibliometric Analysis of Research Trends and Knowledge Structure*”, the table represents the dynamics of scholarly publications addressing the economic transformation toward green and digital economies during the period 2020–2025, with a total of 618 publications. The number of publications increased from 127 articles (20.55%) in 2020, peaking in 2021 at 143 articles (23.14%), indicating growing academic attention to the integration of green and digital economies in the early phase of the decade, alongside the strengthening global sustainability agenda and accelerated post-pandemic digitalization. In 2022, the number of publications decreased to 80 articles (12.94%), reflecting a consolidation phase in research, before rising again in 2023 to 98 articles (15.86%) and remaining relatively stable in 2024 with 97 articles (15.70%). The subsequent decline in 2025 to 73 articles (11.81%) suggests that, although interest in green and digital economic transformation continues, the research focus is shifting from merely increasing publication quantity toward deepening themes, mapping knowledge structures, and developing more specific and interdisciplinary studies, as captured through the bibliometric approach employed in this study.

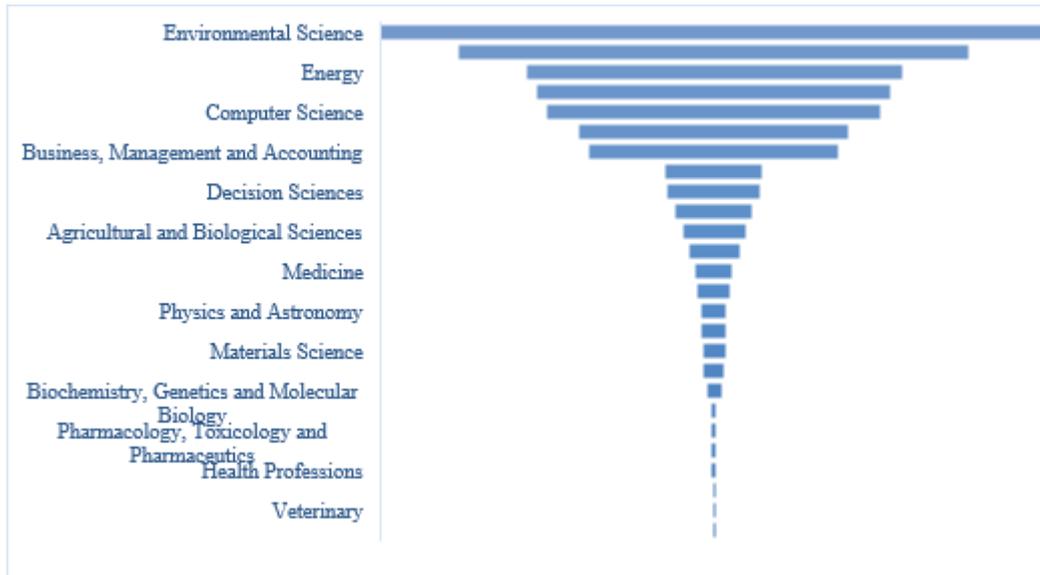


Figure 1. Publication Trends by Subject Area

The figure illustrates the distribution of subject areas in publications addressing the economic transformation toward green and digital economies. *Environmental Science* and *Energy* dominate the number of publications, emphasizing that environmental issues, renewable energy, and sustainability are primary focuses in the literature. Additionally, *Computer Science* and *Business, Management and Accounting* occupy significant positions, reflecting the role of digitalization, technological innovation, and managerial aspects in driving economic transformation. Other fields, such as *Decision Sciences*, *Agricultural and Biological Sciences*, as well as *Medicine* and *Materials Science*, appear in smaller proportions, indicating that the topic is multidisciplinary, with a primary concentration at the intersection of environment, energy, digital technology, and economics.

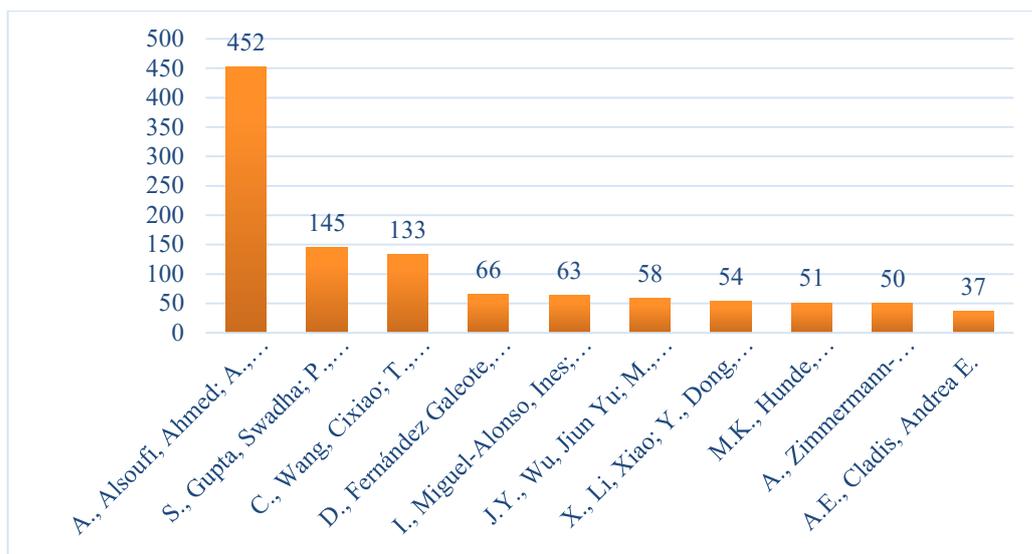


Figure 2. Distribution of Authors with the Highest Citations

The figure shows that the most-cited author is Alsoufi et al., with 452 citations, while the tenth-ranked author, Cladis et al., has 37 citations.

VOSviewer presents a keyword network visualization illustrating the knowledge structure and research trends on the economic transformation toward digital and green economies. *Sustainable well-being* emerges as a central node connecting the main clusters, highlighting its role as a key conceptual framework. The green economy cluster (green) focuses on economic growth, green energy, and energy efficiency, reflecting a sustainable growth orientation. In contrast, the digital economy cluster (red) emphasizes the role of digital transformation, the digital economy, and Industry 4.0 in driving structural economic change. The blue cluster represents economic development and policy, while the yellow cluster represents environment and carbon emissions, both indicating links between innovation, policy, and emission control. Overall, this visualization demonstrates that the economic transformation toward green and digital economies is multidimensional and convergent. Globally, the literature frequently associates digitalization with environmental sustainability.

CONCLUSION

This study concludes that the economic transformation toward green and digital economies is a continually evolving field characterized by multidisciplinary, marked by the convergence of digitalization, environmental sustainability, and economic policy, although conceptual integration across fields remains limited. Theoretically, this study contributes by mapping the knowledge structure and major thematic clusters through a bibliometric approach, while practically, the findings provide a foundation for policymakers and economic actors to design digital technology-based transformation strategies that support sustainable development. Therefore, future research is recommended to adopt a more interdisciplinary approach, expand cross-country and cross-sector coverage, and integrate social and institutional dimensions to strengthen the understanding and implementation of inclusive green and digital economic transformation.

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