

Enhancing Secondhand Market Dynamics through Circular Economy Principles and Technological Advancements: A Bibliometric Analysis

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Abstract. Given the increasing focus on sustainability and resource efficiency, the interest in the secondhand market as a vital segment of the circular economy has also risen tremendously. This paper offers a bibliometric analysis of the changing features of the secondhand market that focus on circular economy aspects and technological development that transform this market. In the scope of this review, we strive to establish how the integration of circular strategies such as reuse, recycling, and product life extension as well as advances in technology have improved market efficiency, accessibility experiences for consumers, and efficiency on nature. Important conclusions emphasize the role of digital platforms, blockchain, artificial intelligence, and the Internet of Things in improving the efficiency of product tracking, trust, and transaction transparency in the secondhand market. The knowledge acquired proposes ways in which some of the stakeholders can use to implement technological solutions to the circular economy and enhance the concept of circularity in the economy.

Keywords: Secondhand Market, Circular Economy, Bibliometric Analysis, Sustainability, Digital Innovation

Introduction

The secondhand market has become an essential component of the circular economy, reflecting the growing global emphasis on sustainability and resource efficiency. As a platform for reusing and recycling products, the secondhand market contributes to reducing waste and extending product life cycles, thereby aligning with circular economy principles (Nobre & Tavares, 2017). This approach not only mitigates the environmental impact of production and consumption but also creates economic opportunities by unlocking the value of previously discarded goods. Such shifts in market dynamics highlight the need to understand how these systems are evolving in response to technological and strategic innovations (Araujo Galvão et al., 2018).

Technological advancements are increasingly playing a transformative role in reshaping the secondhand market. Digital platforms and blockchain technology are streamlining operations by enhancing transaction transparency and trust between buyers and sellers (Chi et al., 2023). Similarly, artificial intelligence (AI) and the Internet of Things (IoT) are being deployed to improve product tracking and automate processes, further improving market efficiency. These technologies enable businesses and consumers to engage more effectively in circular practices, ensuring that resources are utilized optimally and waste generation is minimized (Alonso-Muñoz et al., 2023).

Research underscores the growing academic interest in the integration of circular economy strategies with technological innovations. Bibliometric analyses of these intersections reveal key trends, such as the increasing application of IoT in resource tracking and the use of AI to predict market behaviors, as critical areas driving the secondhand market forward (Araujo Galvão et al., 2018). Moreover, blockchain technology

has been identified as a significant enabler for enhancing trust, particularly in verifying the provenance and quality of secondhand goods (Nobre & Tavares, 2017).

This paper contributes to the growing body of knowledge by presenting a bibliometric analysis of the secondhand market through the lens of circular economy principles and technological advancements. By examining existing research, it identifies strategic opportunities for stakeholders to leverage technology in fostering circular practices. Ultimately, this study aims to guide both academics and practitioners in their efforts to enhance the secondhand market's contribution to sustainability and economic resilience. Such insights are critical in advancing the global transition toward a more sustainable, circular economic model (Chi et al., 2023).

Methods

This study employs a bibliometric analysis approach to examine the scientific landscape of secondhand market dynamics through circular economy and technological advancement perspectives. "Biblioshiny", an integrated package within the Bibliometrix R application, is the primary instrument for scientific mapping and bibliometric analysis. The author then uses string "secondhand market" OR "second-hand market" OR "used goods market" OR "preloved market" AND "circular economy" OR "circular business" OR "sustainability" AND "technology" OR "digital platform" OR "technological advancement." We found 378 documents to generate the data.

Result and Discussion

In the analysis presented in Figure 1 using Biblioshiny, several categories are available to help interpret and assess research findings. Among these is a thematic map that is divided into four quadrants, namely Niche Themes, Emerging or Declining Themes, Motor Themes, and Basic Themes.

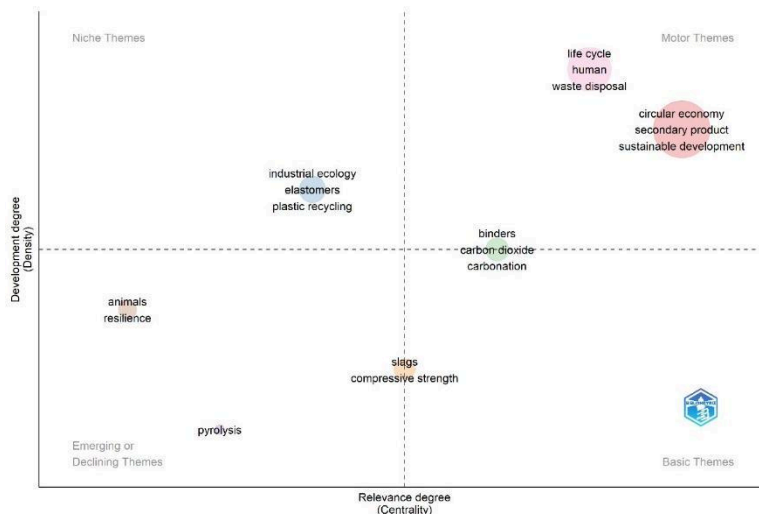


Figure 1. Bibliometric thematic map

This theme map illustrates a strong focus on the circular economy, lifecycle analysis, and sustainable development as central and mature areas of research and practice. The field is well-defined by motor themes in the upper-right quadrant, emphasizing the importance of integrating sustainable practices throughout product lifecycles and waste management.

Additionally, specialized areas like industrial ecology and plastic recycling show depth but are more niche, potentially indicating specific applications in industries that need further linkage to the main sustainability field. Basic themes related to materials and carbon management reflect essential, underdeveloped areas crucial for progress in sustainable construction and carbon capture.

Emerging themes such as resilience and pyrolysis may signal potential growth in understanding environmental impacts and waste conversion technologies but currently have limited centrality.

In summary, this diagram highlights that the field is mature and concentrated on integrating circular economy principles but still has room to grow in areas like material science, carbon management, and emerging conversion technologies.

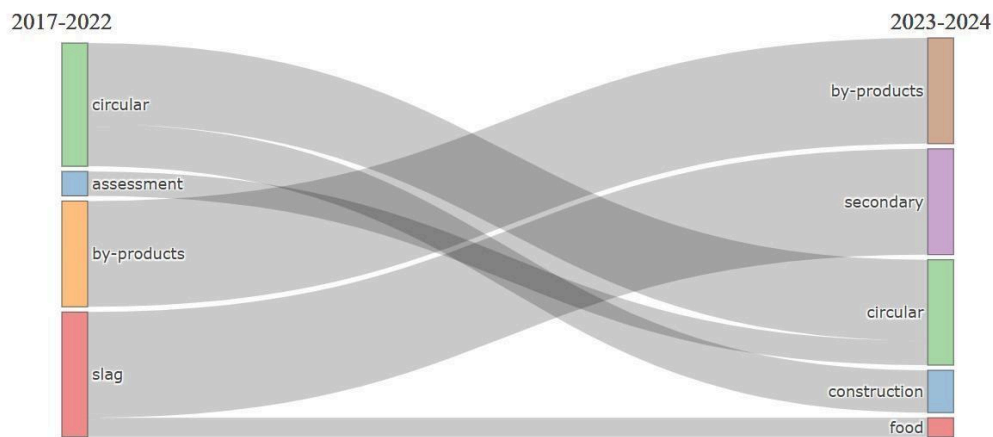


Figure 2. Bibliometric thematic evolution

In figure 2 illustrates the evolution of key research themes or focus areas from 2017–2022 to 2023–2024. The Sankey diagram visualizes the flow and transition of topics, highlighting shifts in emphasis over time. In the earlier period (2017–2022), the primary themes included "circular," "assessment," "by-products," and "slag." These topics evolved into new or refined focus areas in 2023–2024, such as "by-products," "secondary," "circular," "construction," and "food."

The diagram shows that the theme of "circular" remains consistent across both periods, indicating sustained interest in circular economy principles. The topic of "by-products" also persists but gains more prominence, reflecting an increased focus on utilizing industrial by-products. The theme of "slag" transitions into broader applications like "construction" and "food," suggesting diversification in its use. Additionally, new themes like "secondary" emerge, potentially representing a growing interest in secondary materials or processes.

This visualization underscores the dynamic nature of research priorities, with some themes maintaining relevance while others adapt or shift toward emerging applications. It highlights the increasing emphasis on sustainability, resource efficiency, and innovative applications in various sectors.

Conclusion

Based on the results of the analysis conducted on the thematic map and thematic evolution, it can be concluded that these two bibliometric tools provide valuable insights into research trends and developments in sustainability, circular economy, and by-product management. Thematic maps on Biblioshiny effectively group related topics, offering a clear view of central, niche, emerging, and basic themes within the research field. This helps identify the maturity and importance of specific topics, such as the strong focus on circular economy and lifecycle analysis.

Additionally, thematic evolution visualizations illustrate how research priorities shift over time. For instance, the persistence of "circular" themes highlights sustained interest in circular economy principles, while the emergence of "secondary," "construction," and "food" reflects evolving applications of by-product utilization. These tools not only help track changes in focus but also evaluate the success and direction of research strategies, enabling researchers to identify gaps and opportunities for future studies.

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