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Barriers and Enablers of Circular Economy: A Systematic Literature Review

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Abstract: Recent studies have undoubtedly supported the necessity of moving towards a circular economy. To promote this need and identify the most effective and rapid solutions, a deeper understanding of which obstacles restrict and which catalyze the transition of organizations to the circular economy is necessary. With this in consideration, this study examines the drivers, obstacles, and practices that influence the development of the circular economy in emerging economies. through a systematic literature review. were taken in the study from Scopus database. The "Prisma" approach is used to examine the circular economy in terms of its enablers and inhibitors, and VOSviewer is then used to investigate the most investigated terms and their relationships, the most frequently mentioned authors and links between citations, as well as to identify the least explored keywords. Based on a systematic literature review and bibliometric analytical procedures: Top management commitment, consumers lack knowledge and awareness about reused/recycle products, infrastructure and logistics, financial limitation, short-term orientation, the lack of environmental education and the lack of supply chain are the most mentioned barriers by researchers. On the other hand, the main drivers towards circular economy models are innovation, cooperation, waste reduction, industrial symbiosis, etc. This study contributes to an abundance of knowledge on circular business models, the challenges they face, and the drives that move them forward especially in emerging countries. This could aid decision-makers in implementing the proper incentive programs and serve as a roadmap for more research in this field.

Keywords: Circular economy; barriers; enables; bibliometric; literature review; research gap

JEL Classification: M21; M14; M0

1. Introduction

The circular economy (CE) has been proposed as a model to reduce resource consumption and waste generation, and promote sustainable development. However, the implementation of CE principles faces several challenges and barriers that hinder its adoption in practice. This literature review aims to identify and analyze the main barriers to the circular economy and the approaches proposed to overcome them.

Circular economy (CE) is a rather controversial concept (Korhonen et al., 2018). Despite this CE is receiving more and more attention and this is noted by the exponential growth of research in this field (Murray et al., 2017). However, the main principles of the CE concept arose in the 1960s and were further debated throughout the 1970s and beyond (Kirchherr et al., 2018).

Furthermore, the circular economy has been studied by a variety of academic fields, and it has undoubtedly come under the eye of management studies that are conscious of how the external business environment affects the adoption of best practices across the board in management. While

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many businesses and policy circles have expressed support for the CE, its implementation looks to be in its early stages (Ghisellini et al., 2016). Although CE targets have been frequently highlighted and adopted, for example as a part of the EU and China's future strategies, there are still a number of environmental and economic barriers to CE, including a lack of financial capability and support as well as the high costs of novel technologies (Khan et al., 2022). This study aims to answer these research questions:

What are the main barriers and drivers to move towards the circular economy?

What are some differences in emerging economy taking into consideration recent studies?

A bibliographic analysis of 172 articles published in Scopus about the circular economy and barriers or drivers implementing circular economy.

This study contributes to the identification of the main barriers that businesses have to move towards circular models and what drives them, first from the perspective of developing countries.

2. Literature Review

Although the circular economy is still a relatively new concept, it has recently attracted a lot of attention in the literature. In the scientific literature, the circular economy concept has been discussed from a variety of interdisciplinary angles, such as industrial ecology, product design techniques, environmental, political, and social science domains (Ferasso et al., 2020). Of course, several definitions by various authors also take this into account. The circular economy is conceptualized in a variety of ways because it is a multidisciplinary topic, which creates a problematic understanding of its concept (Gladek, 2017).

The Ellen MacArthur Foundation (2013) provided one of the definitions that is often referred to, defining the Circular Economy as: "*an industrial system that is restorative or regenerative by intention and design. It replaces the end-of-life concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse and return to the biosphere, and aims for the elimination of waste through the superior design of materials, products, and systems and business models*" (Ellen MacArthur Foundation, 2013, p. 7).

Prior research has highlighted many barriers to circular economy business models implementation that make organizations hesitant to adopt this new economic model (Hina et al., 2022). Financial uncertainties and more complex business processes, in comparison to the linear business model, are some of the significant barriers mentioned in the earlier literature (Bocken & Geradts, 2020).

Furthermore, consumer preferences, a lack of appropriate infrastructure, and legal constraints all restrict the effective application of circular economy (Guldmann & Huulgaard, 2020).

Kirchherr (2018) conducted a study on barriers to the circular economy in European Union countries with 208 respondents and 47 expert interviews and concluded that cultural barriers, especially a lack of consumer interest and understanding, as well as a hesitant organizational culture, are regarded as the primary circular economy barriers by businesses and policymakers (Kirchherr et al., 2018).

3. Tools and Methodology

To fulfill the research goal, a systematic literature review was chosen as an appropriate approach to a complete literature analysis. The "Prisma" method is used to study the drivers and barriers of the circular economy. The Meta-Analysis (PRISMA), launched in 2009, serves as a tool for all systematic reviewers to transparently report varied studies and findings. It is a process for identifying, selecting, and synthesizing studies (Page et al., 2021).
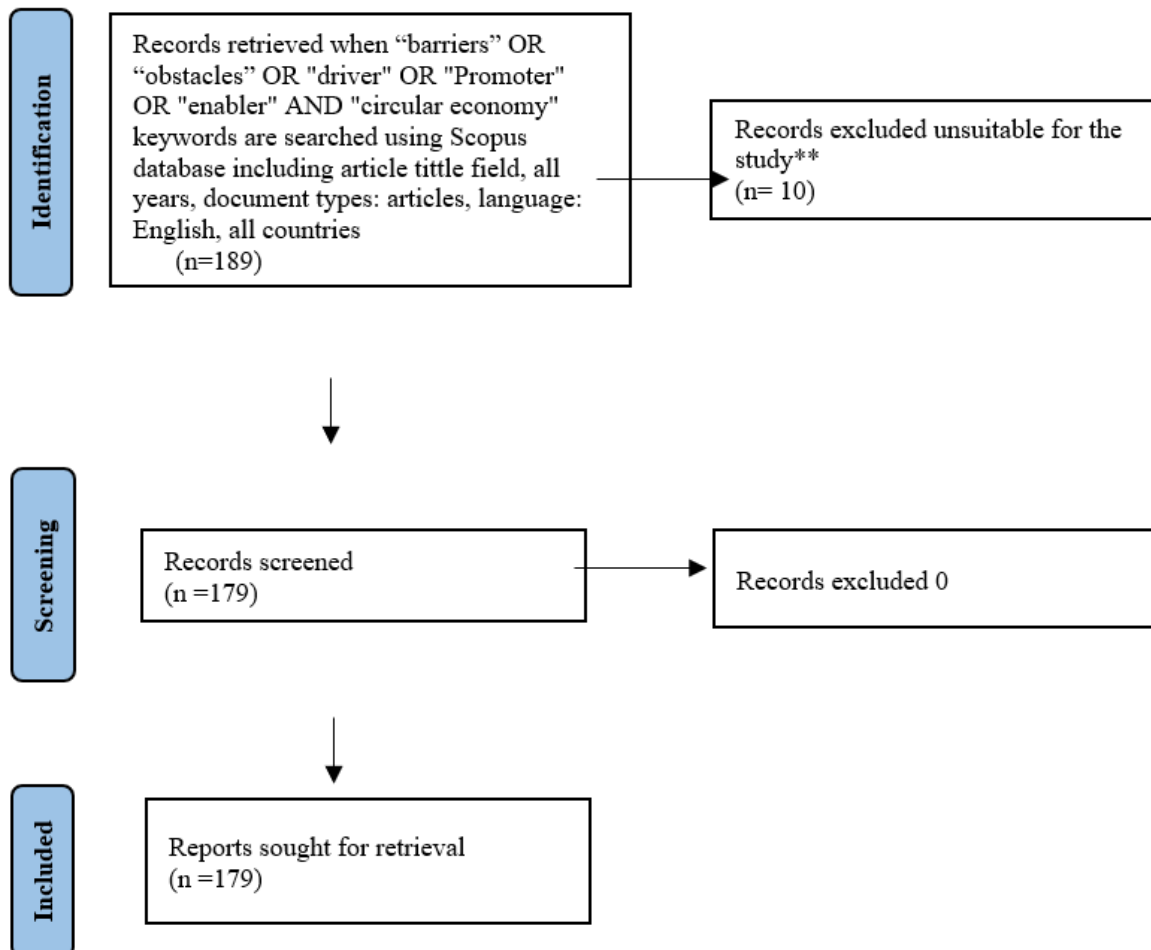

Figure 1. Prisma Flow Map (Data in the Scopus Databases on April 23, 2023)
Source: Page et al. 2020, processed by author

In this paper, the final articles in English published in the Scopus database (https://www.scopus.com) were considered. Initially, the search used the keywords "circular economy" and "enables" OR "drivers" OR "barriers". This resulted in 189 documents. From them, 10 articles were excluded for inappropriateness with the topic. A total of 179 articles were included for further examination as is shown in figure 1. The PRISMA flow map illustrates the distribution of articles by year of publication. Articles were published from 2011 to April 2023.
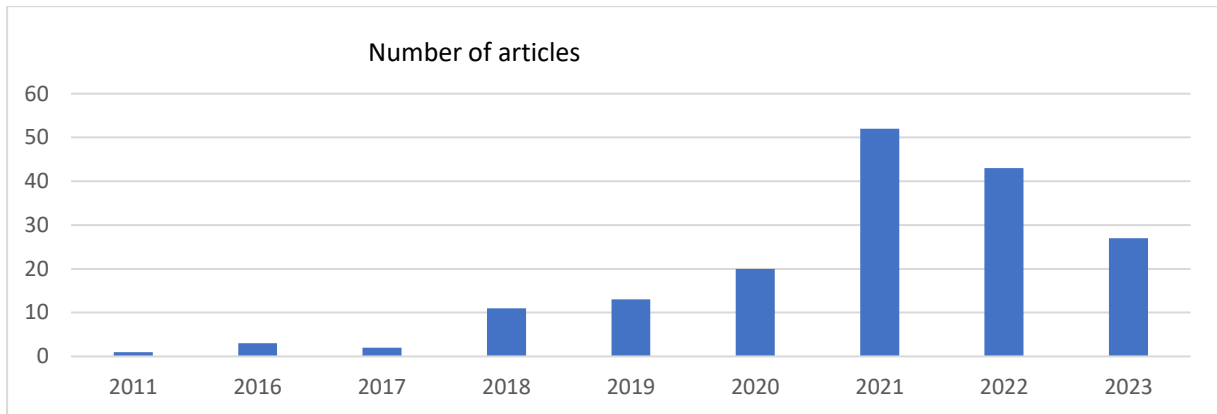
Figure 2. Scientific Articles about "Barriers" OR "Drivers" OR "Enables" AND "Circular Economy" in Scopus (n=179)
Scopus: data processed by the authors

As a first observation, an exponential increase in publications has been seen since 2011. This demonstrates scholars' increased interest in the circular economy and their intention to discover the barriers that prevent firms and economies from transitioning to this new economic model. Recent worldwide happenings may further encourage study efforts on this area.

On the other hand, an assessment of the existing body of knowledge suggests that the majority of publications on drivers and factor enables to CE originate in European and Asian countries as is shown on the figure 3.
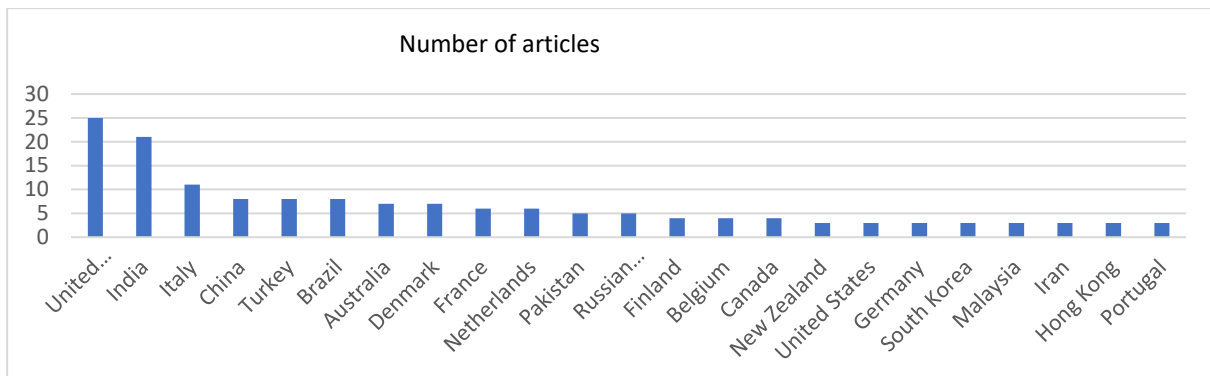
Scopus: data processed by the authors

After sectioning the articles that were analyzed, the Vos Viewer program was used to visualize the focus of the main themes of these studies. For further literature analysis, the procedure recommended by Van Eck and Waltman (2022) was followed. Bibliometric analysis provides results based on quantitative properties and determines the relationships between terms, the best understanding of the studied concept. It also helps identify the most common connections between terms, as well as emerging terms that have not received much attention in previous literature. Focusing on the purpose of this study, exactly how the two concepts, the circular economy and the barriers and drivers, are related to each other and to other terms or even what are some research gaps, the study continues with the bibliometric analysis. This analysis was carried out divided into 2 parts of the articles, separating the barriers and drivers. In the first group where 101 articles are included, were analyzed in a TXT file containing: citation information, bibliographic information, abstract and keywords, funding details and other information. The minimum number of keyword repetitions was set to 5 and this resulted in the maps shown in the figures 4 and 5 below.

Figure 4. **The Map of Key Terms within the Circular Economy and Barriers Literature[1]**
Source: Scopus; data processed in VOSViewer

Figure 5. The Map of Key Terms within Circular Economy and Drivers' Literature2
Source: Scopus; data processed in VOSViewer

Different authors, depending on different countries and different stages of economic development, have identified different barriers, such as the obstacles to moving towards a circular economy.

Market globalization and stronger environmental rules are two examples of social drivers putting pressure on businesses to discover alternatives to existing business models (Zhu et al., 2011). Studies in developing countries highlight that multi-stakeholder collaboration is an important antecedent to CE implementation in developing countries (Mishra et al., 2021).

On the other hand, businesses are worried about technological barriers because they perceive changes in both products and production/take-back processes and are unclear how they will work and how much it will cost (Ritzén & Sandström, 2017). In some cases, infrastructure barriers make sustainable consumer behavior impossible or uncomfortable, necessitating additional time and money (thus sustainable consumer behavior is not completely prevented but practiced less regularly) (Ratner et al., 2020a). Among the articles analyzed, the most evident barrier is the financial and legal or political barrier. Below are 97 barriers grouped in 10 main areas.

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[1] Colour figure can be viewed at https://tinyurl.com/22g6aoaeeenSs.
[2] Colour figure can be viewed at https://tinyurl.com/22g6aoaeeenSs.

Policy & Regulatory	Financial	Knowledge/experience	Technological	Awareness
1- Lack of governmental support and administrative burden; 2- Lack of stringent legislation and policies; 3- Administrative processes and regulations 4- An inadequate legal framework for the management; 5- Lack of effective execution of environmental regulations; 6- Lack of legislation concerning the circular economy. 7- Lack of the environmental laws and regulations; 8- Inadequate incentives from the government sector and supportive policies; 9-ineffective legislation and controls; 10- lack of government support and incentives; 11- protocols limited; 12-use of circularity criteria in public tenders and lack of CE standards; 13- Regulatory challenges and constraints; 14- The absence of state-of-the-art waste disposal facilities such as engineered landfills; 15- incinerators, and anaerobic digestions plants; 16- the complexity of administrative and legal procedures; 17- the lack of regulatory pressures; 18- the regulatory framework and the overall economic viability of the transition; 19- weak enforcement of EU; 23- waste	1- financial constraints and limitations 2- high setup costs; 3- Lack of returns and profits; 4-long-term financial profitability; 5-dependence on high investments in production process 6- technologies and the resulting uncertainties about returns; 7- high costs for production and marketing; 8- cost of delivering high-quality circular products at the firm level; 9- lack of funds for industry 4.0 initiative; 10- insufficient financial resources; 11- lack of financial incentives and a higher cost related to recycled materials in the supply chain; 12- high costs but low economic benefits in short-term; 13-high investment costs and difficulties in finding financing economics challenges; 14- accounting reporting barriers, 15- financial and economic barriers; 16- absence of standard system to evaluate performance; 17- costs of meeting (Paletta et al., 2019), (Takacs et al., 2022), (Zhang et al., 2019), (García-Quevedo et al., 2020) (Hartley et al., 2022), (Govindan	1-Lack of knowledge and expertise; 2-Consumers lack knowledge and awareness about reused/recycle; 3- Insufficient publicity and education on the recycling of construction and demolition waste; 4-Lack of adequate information at the design stage; 5- Lack of effective guidance and standards for the proper collection methods; 6- Lack of expert knowledge; 7- Lack of successful circular business model measures; 8- Misconception of the refurbishment concept; 9-Limited knowledge; 10- lack of an information exchange system between different stakeholders (Dieckmann et al., 2020), (Chen et al., 2021), (Takacs et al., 2022), (Zhang et al., 2019), (Hartley et al., 2022),	1-Lack of processing technologies; 2- Technological limitations and lack of eco-innovation; 3- Availability of suitable processing technology; 4- infrastructure barriers make sustainable consumer behavior impossible or uncomfortable, necessitating additional time and money (Ratner et al., 2020). 5- Infrastructural aspects and logistics; 6- Lack of adequate technology and innovation 7- Lack of adequate technology and innovation 8- Lack of long-term support for the implementation of recovery technologies 9- Lack of technology and innovation; 10- Limited technology 11- reluctance to change and technological immaturity technological challenges; 12- immaturity and obsolescence; 13- the lack of appropriate infrastructure. (Dieckmann et al., 2020), (Ratner et al., 2020b), (Takacs et al., 2022), (Huang et al., 2021),	1-Public perception; 2- Absence of standard system to evaluate performance; 3- The consumers lack awareness about reused/recycle. 4- Lack of awareness and customer acceptance; 5- Low awareness of customers regarding sustainability; 6-educational initiatives will be required; 7- The lack of environmental education and culture of environmental protection; 8- unaware/limited knowledge cultural barriers, particularly a lack of consumer interest and awareness as well as a hesitant 9- company culture. (Liu et al., 2021), (Kirchherr et al., 2018). (Hartley et al., 2022), Govindan et al., 2022)

legislation rules (Dieckmann et al., 2020), (Paletta et al., 2019), (Zhang et al., 2019), (Liu et al., 2021), (García-Quevedo et al., 2020), (Rizos & Bryhn, 2022)	et al., 2022), (Huang et al., 2021),	(Huang et al., 2021),		

Market	Supply chain	Human resources	Management issues	Product & Material
1-Lack of large enough market for recovered components; 2- Lack of industrial support 3-lack of robust estimate about food waste; 3- insufficient market demand 4- lack of consumer interest; 5- lack of market pressures and demands; 6-lack of standards for designing recycled products; 7- low customer demand for recycled textile products; 8- the lack of a second-hand market; 9- unwillingness to engage in trade-offs; (Takacs et al., 2022), (Zhang et al., 2019), Huang et al., 2021)	1-challenging business-to-business (B2B) cooperation; 2- complex supply chains; 3- lack of rules for transparency across supply chains; 4- lack of sufficiently developed industrial symbiosis (IS); 5- lack of supply chain (SC) design and optimization; 6- lack of supply chain integration and effects of supply chain complexity; 7-limited availability of circular supply streams combined with the orientation of existing production systems toward linear supply chains; 8- constrain CE transition at the industry level 9- The challenge of collaborative innovation among supply chain partners; (Huang et al., 2021), (Rizos & Bryhn, 2022)	1-a lack of human resources to perform these practices; 2-the organizational context; 3- lack of a skilled workforce that understands Industry 4.0, (García-Quevedo et al., 2020)	1-agency and ownership issues in C&D waste 2-management short-term corporate goals. 3- short-term orientation 3- economically dominated thinking; 4-Top management commitment and poor corporate social responsibility. (Sonar et al., 2023), (Mahpour, 2018),	1-basic material properties and product characteristics 2-lack of high-quality recycling materials 3- difficulty in developing a business case for DfD (design for deconstruction)', and 'lack of effective DfD tools'; 4- shortage of high-quality recycling materials and shortage of resources. (Dieckmann et al., 2020), (Paletta et al., 2019), (Takacs et al., 2022), Govindan et al., 2022) (Huang et al., 2021),

4. Conclusions and Recommendation

Some of the drivers for a circular economy include the growing awareness of environmental issues, the need to reduce resource depletion and the potential economic benefits of circular approach.

The authors have mentioned a large number of barriers which in this study are grouped into: policy and regulatory, financial, knowledge/experience, technological, awareness, market, supply chain, human resources, management issues and Product and material.

Overall, while there are significant drivers for a circular economy, addressing the barriers will be crucial to its successful implementation and mainstream adoption.

5. Limitation

First, because of the importance of Scopus and the presence of numerous indexed studies, this analysis focused solely on it. Second, while recent research patterns have been thought to anticipate future research directions, those propositions have not been empirically verified. Third, keyword frequencies are used in this analysis. It is suggested that such assessments be accompanied by concrete case studies.

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