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Review

Circular Economy: Approaches and Perspectives of a Variable with a Growing Trend in the Scientific World—A Systematic Review of the Last 5 Years

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Abstract: The circular economy has become a topic of increasing relevance in the scientific field, and the literature on it has developed considerably in recent years. Therefore, a review is needed to contribute to the understanding of this term, which is under constant debate. This article aims to analyze scientific articles from qualitative and quantitative research approaches on the circular economy. The methodology used was a systematic review of scientific literature from Scopus and Web of Science; 67 scientific articles were systematized under inclusion and exclusion criteria related to the specific objectives sought. The results showed that there is still a long way to go in developing a theoretical framework that can be put into practice due to the divergence of existing perspectives or approaches, although its application to different fields of study is being considered. Likewise, its complex character is highlighted, while driving or limiting factors are observed. This research provides a theoretical contribution aimed at elucidating which implications of the circular economy need to be addressed in order to build a universal or flexible theory to understand what it means to plan for the implementation of the circular economy. In this way, it hopes to strengthen its practical application, which implies the need to create an overarching framework that can be adapted to different contexts and provide clear guidance on how to be part of the circular economy.

Keywords: circular economy; approaches; trends; complexity; enablers; barriers; systematic review

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1. Introduction

Over time, concepts such as greening or green economy have been gaining relevance due to the environmental situation of the planet [1]. From the extensive literature on systems ecology, developed in the 1960s and 1970s, various disciplines and concepts emerged to reduce the extraction of natural resources and the generation of waste, aspects that would later be combined in what we know today as the "circular economy" [2].

In recent years, the circular economy (CE) has become the focus of discussions aimed at a guided transition toward environmental sustainability [3]. While there are various definitions of CE [4], there is no definite concept that is widely accepted; still, it can be said to be an umbrella term for the pursuit of sustainability [5,6], waste and resource management [7], eco-innovation [8], human development [9] and consumer behavior [10]. In concrete terms, the concept of the circular economy could be understood as being based on the minimization of productive defects, in order to extend the shelf life of resources and products, while ensuring the regeneration of natural systems [11].

Likewise, the difficulty in finding a consensus on the theory of the circular economy [12–15], the need to understand its implicit factors [16], its practical implementation in initial stages [17,18] and its complex direct relationship with the business section [19],

highlight the need to contribute to a comprehensive understanding of the circular economy. Therefore, it is necessary to synthesize information that facilitates both knowledge development and possible fields of study of circular economy, hence the development of a systematic review is advised [20].

In addition, this paper is motivated by: the theoretical complexity of the circular economy inherent in its diverse multidisciplinary and practical perspectives [21], the lack of formal theoretical consolidation [22] and the long literature gap due to its novelty [23,24]. It also considers the overexploitation of the term by various social actors, which weakens or underestimates its understanding [22]; the lack of theoretical clarity on the boundaries of the circular economy and sustainability [6] or sustainable development [25]; the need to identify which aspects favor (enablers) or hinder (barriers) the circular economy [26,27]; the lack of understanding of the social dimension in the circular economy [6,28–31]; the need to facilitate knowledge in research linked to the implementation of the circular economy [24,32,33] and the need to update or reaffirm literature on the topic in question, thinking about the possible changes as a result of contemplating various technologies [24,30,34–37] and the COVID-19 pandemic [24,38–40].

Given the above, this review is developed under the following premise:

- What is known about the circular economy, considering its approaches and perspectives in the last 5 years?

In order to answer this question, this paper aimed to analyze scientific articles on qualitative and quantitative paradigms of the circular economy, considering their approaches and perspectives. To achieve this macro-objective, the understanding of the circular economy in the year 2022, the understanding of its main difficulties and complexities, as well as the factors acting as enablers, barriers, or limitations, were investigated.

This article is structured as follows: Section 2 describes the methodology used, Section 3 presents the results through descriptive graphs, and develops the discussion, where the information collected is analyzed and synthesized. Finally, Section 4 presents the conclusions of the study, which includes providing new research perspectives and explaining the limitations of this study.

2. Materials and Methods

To achieve the objective of this document, a systematic literature review was conducted. According to Mallet et al. [41], systematic reviews are a structured analysis of documents, where qualitative and quantitative scientific evidence is identified, synthesized, and evaluated to coherently and concisely answer the research question. This methodology is used for its ability to: consolidate results from different studies on a given topic, provide a better understanding of the variable, foster conceptual or theoretical development [42], synthesize a wealth of scientific literature [43], and suggest or provide methods or new areas of research [44]. Following the recommendations of [45], the study is developed in 3 stages: (1) planning the research, (2) conducting it, and (3) discussing and presenting the findings, as well as making transparent the search methods and providing a guide for readers to ensure replicability and scientific rigor. As can be seen in Figure 1, initially, a general search for the keyword "Circular Economy" was carried out in Scopus (15,172) and Web of Science (11,653). These scientific databases were considered because of their breadth and prestige [46].

Selection of Articles

In the last 5 years, the keyword “Circular Economy” recognizes more than 14,000 scientific articles in SCOPUS (See Figure 2) and about 12100 of them in Web of Science (See Figure 3), both with an increasing trend. In the previous years, the mentioned scientific databases recognized about 2100 articles (2001–2017) and more than 800 (2010–2017), respectively. Therefore, following a preliminary investigation [45], we chose to focus on the last 5 years (2018–2022) due to the need to cover the largest amount of current or updated

scientific literature, also considering previously mentioned aspects such as technological changes and the pandemic.

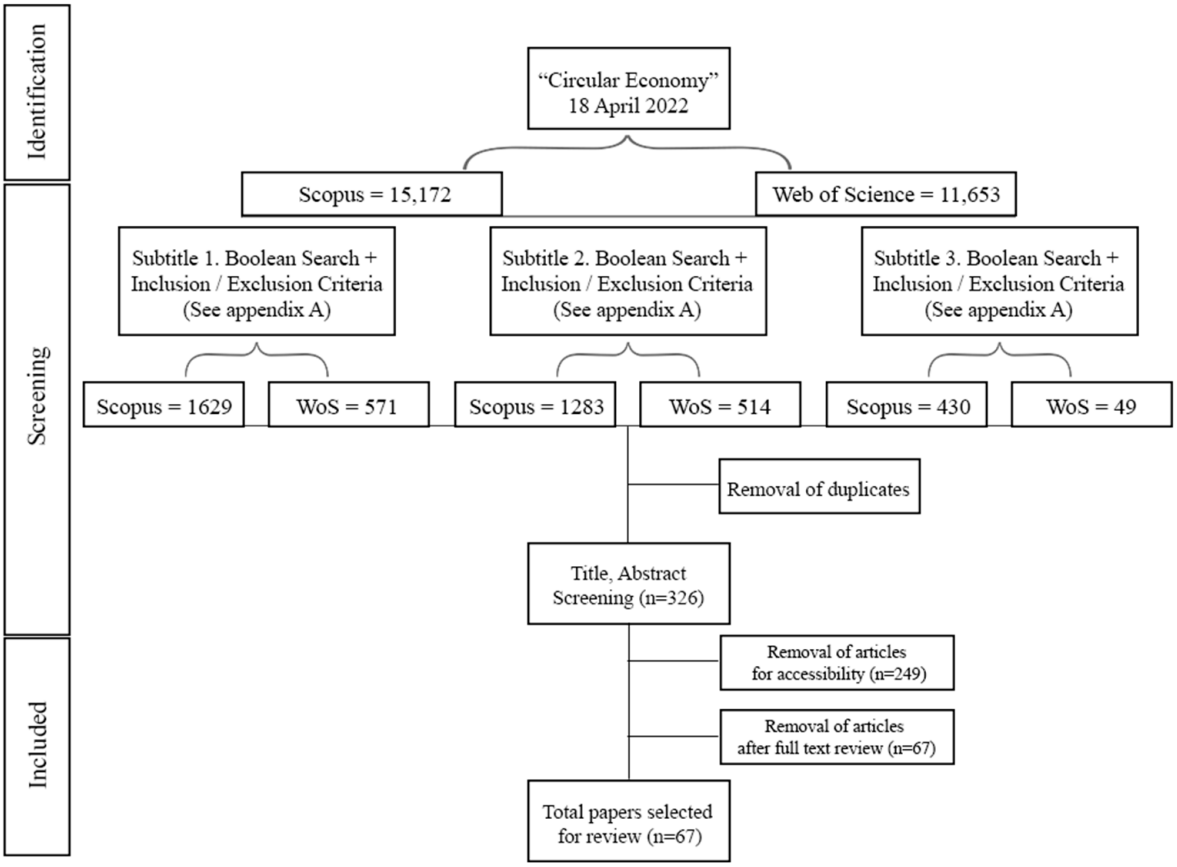

Figure 1. Research procedure.

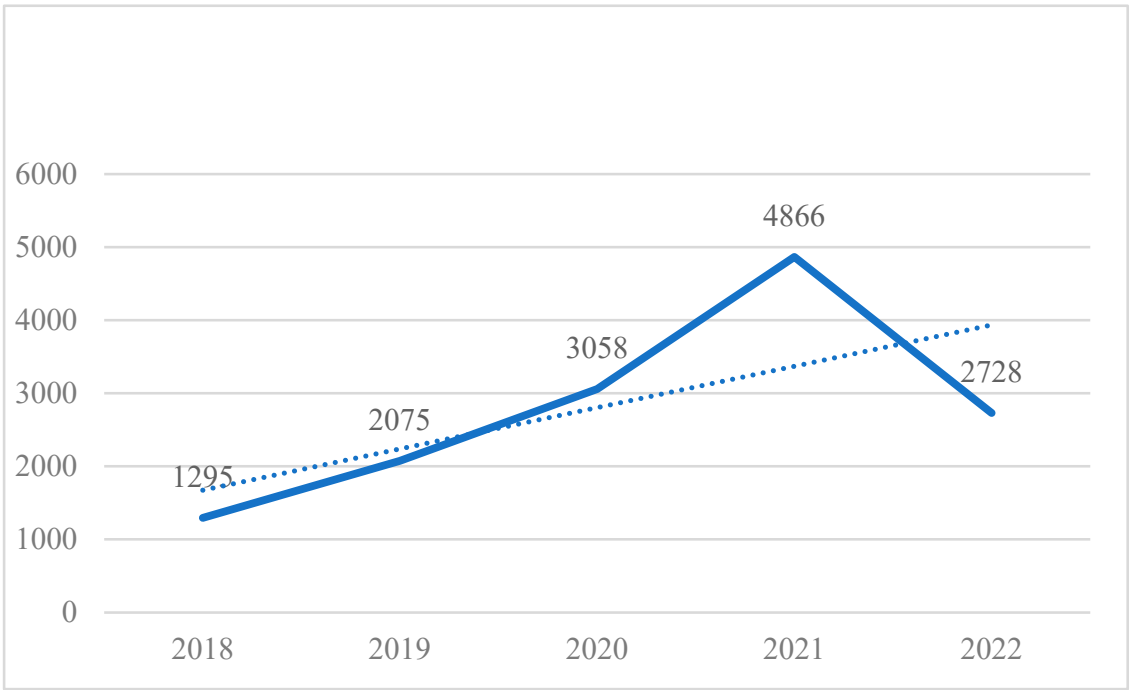

Figure 2. Scopus Scientific Production until June 2022.

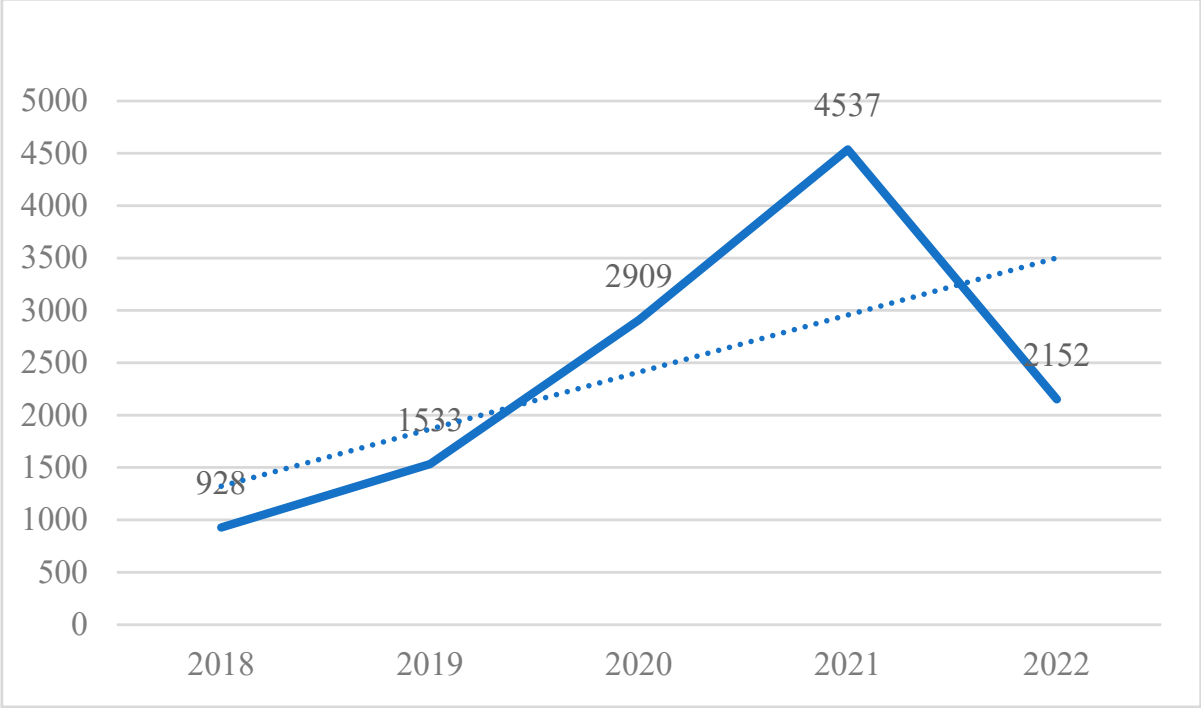

Figure 3. WoS Scientific Production until June 2022.

To address the different perspectives to be developed in the subtitles of this research, various inclusion and exclusion criteria were used in each subtitle (See Appendix A) to delimit which types of articles favor the achievement of this research [45]. The main search strategies were: "Circular Economy"; "Circular Economy" AND "goal" OR "dimension" OR "concept" OR "principle" OR "design" OR "framework" OR "theory"; "Circular Economy" AND "limitation" OR "enabler" OR "driver" OR "barrier". Subsequently, a title & abstract screening (326) was performed to determine relevant articles for the research [47], after which a complete review of the scientific papers was carried out, prioritizing articles from indexed journals belonging to the best quartiles, to ensure the quality of the publications. When selecting the final articles, aspects such as redundancy and suitability regarding the research objectives were evaluated [48], resulting in 67 scientific articles.

3. Results

3.1. Descriptive Results

The research covered the period 2018–2022 (See Appendix A), due to the growing trend of the topic studied. It is noteworthy that from 2020 to 2022, there has been a massive growth of scientific articles related to CE, specifically the keyword "Circular Economy", showing the need to compile, contrast and classify such scientific production.

To review the current knowledge, priority was given to the inclusion of articles reflecting the current, newest (See Figure 4), state of CE, i.e., articles showing the theoretical and practical shortcomings of CE in its current conception, as well as how the concept is being developed in different disciplines, were considered.

Table 1 shows that the United Kingdom is the country that has contributed the largest number of articles to this review with 14, followed by Italy with 10, India with 7, Denmark with 6, Spain and Portugal with 5, as well as China, France, Brazil, and Australia with 4.

As it can be seen in Table 2, the 5 scientific journals that contributed the most to the development of this review were: the Journal of Cleaner of Production (27), Business Strategy and the Environment (8), Sustainability (6), Journal of Business Research (4), and Corporate Social Responsibility and Environmental Management (2). The SJR (Scimago Journal Rank) and JIF (Journal Impact Factor) of SCOPUS and Web of Science, respectively,

are also shown, both of which are indicators that show the prestige and/or impact of a scientific journal.

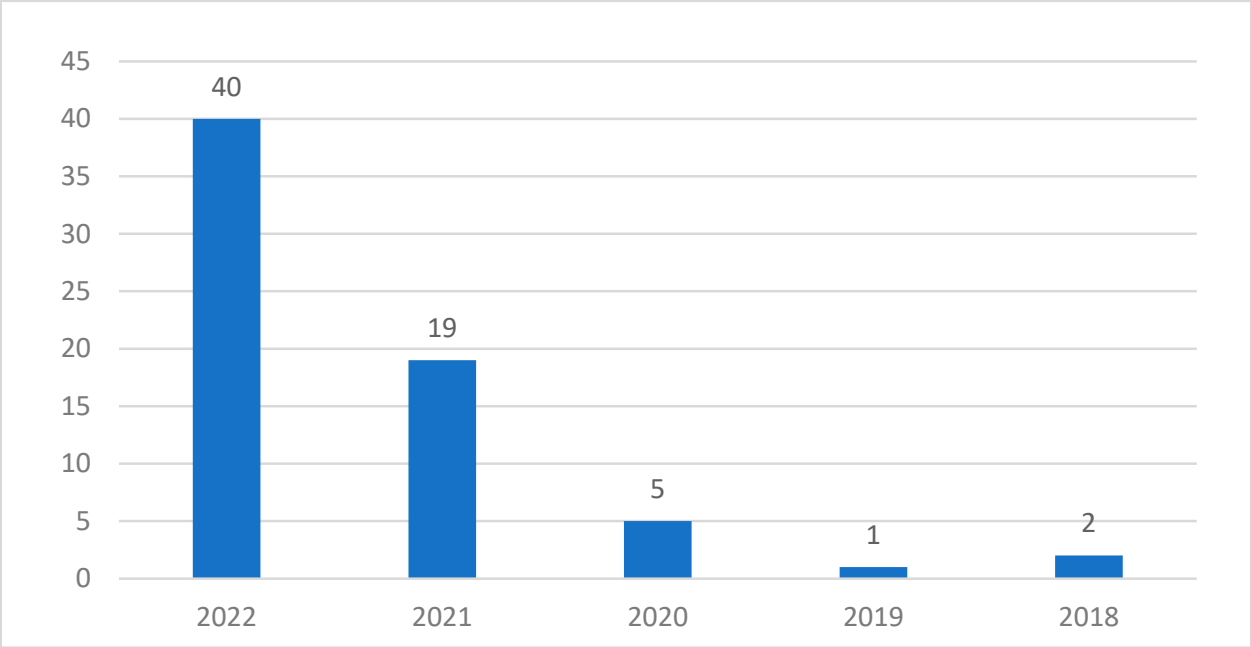

Figure 4. Distribution of systematized scientific articles by year.

Table 1. Distribution of articles by country.

Country	Articles
UK	14
Italy	10
India	7
Denmark	6
Spain	5
Portugal	5
China	4
France	4
Brazil	4
Australia	4
Other	53

Table 2. Distribution of articles by scientific journals.

Scientific Journal	Number of Articles	SJR (2021)	JIF (2021)
Journal of Cleaner Production	27	1.92	11.072
Business Strategy and the Environment	8	2.24	10.801
Sustainability	6	0.66	3.889
Journal of Business Research	4	2.32	10.969
Corporate Social Responsibility and Environmental Management	2	1.95	8.464
Others	20		

Figure 5 shows 67 scientific articles were selected through 3 main searches (See Appendix A). Out of these, 17 were included in the first subtitle, 27 in the second subtitle, and 23 in the last one.

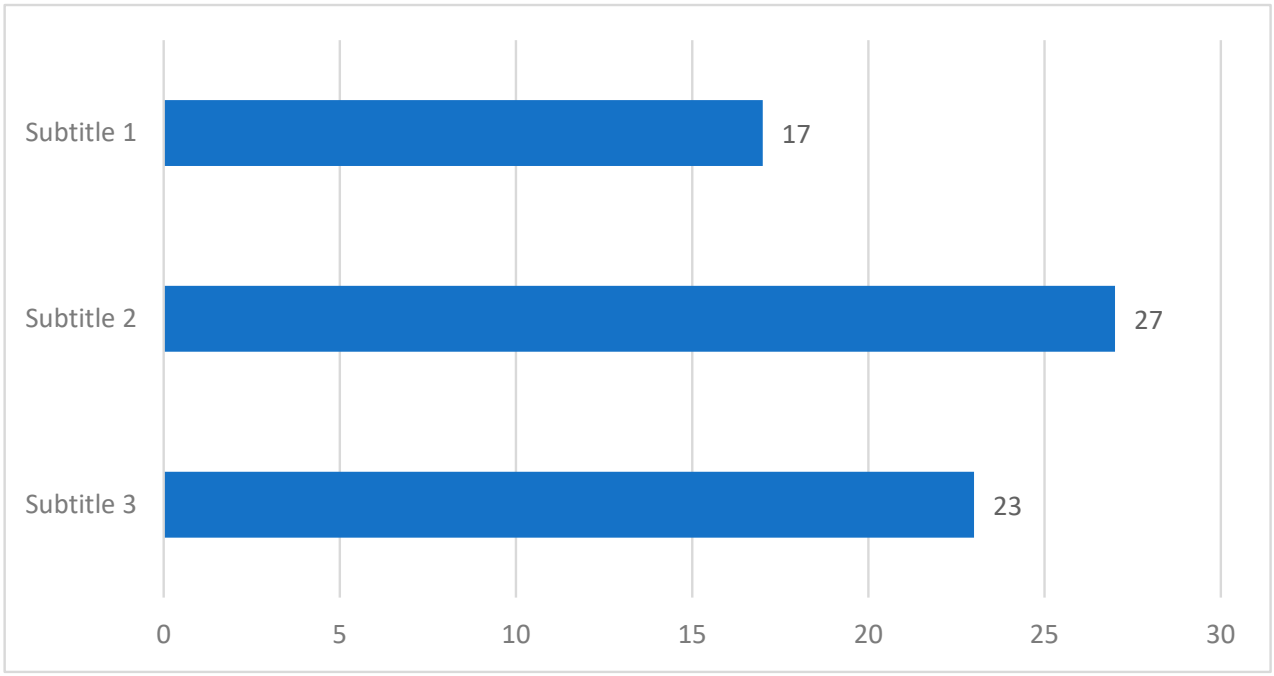

Figure 5. Distribution of scientific articles by subtitles.

As it can be seen in Table 3, the predominant methodology in the articles cited is qualitative, with 43 of the 67 articles collected belonging to this category. It should be noted that case studies, semi-structured interviews, and document reviews are the most commonly used methodologies.

Table 3. Distribution of articles by approach.

Articles	Methodology	Common Techniques/Instrument
43	Qualitative	systematic literature review, semi-structured interview, case study, in-depth interview, Delphi Method, expert interviews, and surveys
17	Quantitative	exploratory/confirmatory factor analysis-structural equation model, Quantile regressions, Pearson correlation coefficient, surveys
7	Mixed	

3.2. Circular Economy: State of the Art

The increase in the world population and its subsequent consumption has increased various types of waste and the depletion of natural resources. This scenario has caused a concept such as sustainability, a complex term susceptible to cultural and environmental variations, to gain greater relevance in recent decades, even though it does not cover how to achieve a development that goes hand-in-hand with nature [49].

In 2020, the European Union established the Circular Economy Action Plan (CEAP) as the healthiest way to outline sustainability through respect and responsibility within the environment and society [5]. This indicates the possibility of inferring that the circular economy emerges as an economic model which can generate value at different stages of production and consumption [17,50], developing principles of redesign, remanufacturing, valorizing natural waste, reuse, and policies that encourage its implementation to stakeholders. In addition, there are environmental benefits, and the fact that the circular economy enables the creation of business opportunities, benefiting the economy as a whole highlighting the fact that the circular economy is a real means for companies to operationally implement sustainable development [6].

Similarly, [48], citing [17], mentions that the core idea of the circular economy envisages a shift from economic systems that are based on linear processes from resources to goods and waste, to systems that reuse, remanufacture and recycle materials. It is possible to develop this concept at different levels, i.e., at the micro level, it comprises products, companies, and consumers; at the meso level, eco-industrial parks; and at the macro level, a city, region, nation, or more [51]. The development of this economy makes it possible to contribute to the achievement of sustainable development, which implies creating environmental quality, economic prosperity, and social equity for current and future generations.

Despite such benefits, the successful implementation of the circular economy represents a comprehensive challenge that cannot yet be achieved, as it requires systemic and radical changes in production and consumption systems [48], in particular, it requires products that are made to be recycled and reused from their birth. Technology is also a vital requirement, and although it may currently represent a major investment, and thus a barrier, it is expected to be the key building block towards the circular economy in the future [5,48]. Suchek et al. [52] add that such systemic change needed to implement the circular economy should aim to reduce the impact of the linear economy, as well as allow the establishment of economic and business opportunities, while providing social and environmental benefits.

While the growing importance of the circular economy is visualized by knowing its potential practical application, the term under discussion has been consistently addressed by the scientific community [39]. As the concept of the circular economy does not have a unique definition, it is based on a collection of biases from different areas of study, such as environmental engineering, business, and environmental sciences, among others [23,31].

Since 2016, there have been several systematic research studies focused on the analysis of different definitions of the circular economy [53–55], referring to [4], express how more than 110 definitions of the circular economy have been identified through scientific articles, reports and governmental documents. In this study, it is possible to identify that the most used definition visualizes the circular economy as an industrial system focused on restoration and regeneration from its conception, replacing the classic "end-of-life" vision with a position linked to renewable energies. To be precise, based on the aforementioned authors, the circular economy is conceptualized as a system that encompasses the change of business models, leaving aside the concept of linear economy through recycling, reuse and renewal.

The concept of circular economy has been considered in different fields for its capacity to promote sustainable and efficient policies in terms of resource management, which support the achievement of environmental and socioeconomic welfare [56]. Among these fields may be found the eventual creation and implementation of a circular model comprising the repair, reuse and renewal of electric vehicles [57]; the management of plastic waste, understanding that 79% of the plastics produced are found in landfills or in the environment, and barely 9% are recycled [58]; the impact of the circular economy on the food supply chain, considering the importance of reducing such waste due to the need to contribute to the elimination of world hunger and the efficient management of wasted resources in the food industry 56; the recycling of organic waste, integrating biomass as a circular energy source that can replace fossil energy [59]; the recycling of rare earths, elements whose importance lies in the fact of being the raw material for a wide variety of technological instruments [60]; or the implementation of a waste management program, both in the construction sector [61] and in the electronics sector [62].

3.3. Complexity of the Circular Economy Variable: Conceptualizations and Implications with the SDGs

The multi-focused concept of CE [63], is divided into 3 basic dimensions that may be benefited: social, economic, and environmental. In other words, it inherently involves organizations in the desired achievement of the triple bottom line and supports the 3 pillars of

sustainability [21,25,64–67]. Due to the exploratory factor analysis conducted by Lehmann et al. [63], 2 underlying independent dimensions of CE were identified: resource efficiency and environmental degradation. It can be said that CE is the key in decoupling economic growth from the excessive use of natural resources [48,68]; being applicable across micro (companies), meso (industrial parks), and macro (city/region/nation) levels [64,69,70].

CE essentially seeks to provide useful actions and practices for the preservation of resources, such as recycling, reconditioning, repair, and eco-design [70,71], creating and developing an industrial scheme focused on restoration since its conception [72]. This would necessarily involve economic reasoning focused on both unlimited economic growth and the reduction of resource consumption and social welfare [73], fully considering a holistic vision that allows the development of its maximum potential [74]. At the business level, the aim is to develop a circular business comprising the maximization of raw materials, production loops, stakeholder organization and collaboration, and circular profit viability [68]. It is estimated that the shift toward the circular paradigm may generate large economic benefits for organizations [75], although in the case of SMEs, it is likely that there will be an adverse effect in the short term [76]. Bibliometric research by Lozano et al. [74] supports this by stating that CE should comprise a holistic collaborative framework, integrating the main dimensions (economic and environmental) of CE.

The CE vision is usually deconstructed through three widely cited and increasingly important principles: to reduce, reuse, and recycle [22,68,69], although there are also postulates that develop 6 R's, adding Reproduce/Remodel (R4), Redesign (R5), and Recover (R6) to the three previously mentioned, and even more [77]. According to Geisendorf & Pietrulla [26], such principles should be understood as a comprehensive framework and not be seen as a waste management process. Moreover, their application requires such understanding since it is linked to the sector in which it is implemented [78].

The recent events triggered by the COVID-19 pandemic have only reinforced the sustainability and CE outlook [79]. The importance of this concept lies in the fact that, in its implementation, it should contribute to the achievement of sustainable development, taking into account the dimensions previously mentioned [64], being considered, in some cases, as vital to the achievement of the SDGs. [79]. Despite these assertions, CE's implication for sustainable development is still under debate [80], because there may be a rebound effect when assuming new production technologies [81,82]. Some also allege its apparent bias toward the economic dimension and neglect, to a lesser extent, of the environmental one, and, to a greater extent, of the social one [67]. Others, such [1], referring to [31], consider the circular economy to have virtually no social dimension, as it focuses on redesigning manufacturing systems and services for the benefit of the biosphere (See Figure 6). While improving the management of natural resources represents a good towards humanity, there is no explicit recognition of the social aspects present in sustainable development. In other words, it is not clear how the circular economy leads to greater social equity.

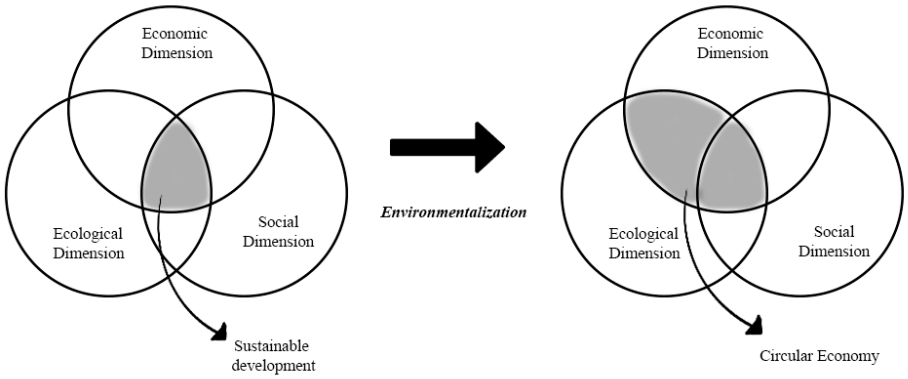

Figure 6. Relationship between concepts of sustainable development and circular economy. Taken from Gureva & Deviatkova [1], citing [31]).

There are certain discrepancies regarding sustainability and CE concepts, highlighting how the social dimension is neglected in CE [25,67]; several scholars consider that the social impact of CE is not fully defined [28], as the implications of implementing the CE in solving social problems such as gender equity, social justice [83] or social inclusion [28], just to mention a few, are not yet known. It should be mentioned that job creation is usually considered a social impact of CE; however, no differences have been pointed out between a CE job and one from the linear economy [28].

3.4. Circular Economy: Limitations or Barriers and Enablers

In recent years, the exploration of existing drivers of and barriers to CE implementation has become increasingly relevant [84]. Migrating toward a sustainable economy inherently requires good environmental management and innovation that facilitates the development of systems thinking which can integrate the benefits of a circular economy into the current outlook [85]. In this regard, it should be mentioned that the literature related to the implementation of the circular economy is very limited [86], as it is not clear which factors contribute to the transition of the CE [87], while there is a lack of standardized metrics in its implementation [88,89], although it is possible to visualize and identify aspects that hinder its application [90,91].

In order to clarify aspects of CE that facilitate its practical application, various authors have identified facilitating and limiting agents of CE, although some are developed in specific contexts [92]. For example, senior management commitment in manufacturing organizations is believed to be the cornerstone of any sustainable migration [93]. The research by Jaeger & Upadhyay [94] points out that in that sector, 7 barriers impede CE: high initial costs, the complexity of supply chains, business cooperation, lack of information in production processes, lack of technical knowledge, quality barriers, and the development of a product disassembly program. It is appropriate to note that some of these difficulties can be easily extrapolated to various fields [95], as in the case of the food, automotive, or agri-food industry, where high initial costs, the complexity of the supply chain, and lack of technical knowledge also represent significant challenges [86,96,97].

In general terms, various drivers could be visualized from different research studies, such as: politics and economy; financial, environmental, health, and social dimensions; and innovation [86]. Similarly, Govindan & Hasanagic [98] point out that politics, economics, health, environmental protection, society, and product development can be drivers of CE. On the other hand, Hina et al. [99] consider that there are internal and external drivers. The former are those at the organizational level and the latter are comprised in the legal framework, public policies, and stakeholders. Chowdhury et al. [100], through their structural equation model, reveal that organizational leadership can be a key factor for CE adoption in emerging economies.

In contrast, there are considerable barriers in CE, such as institutional, economic, regulatory, logistical, infrastructure, operational, and technological risks, knowledge, and skills barriers [86,98,101]. In the research by Mishra [102], seven dimensions were identified: knowledge and skills barriers, technological barriers, cultural barriers, financial barriers, strategic barriers, governmental and regulatory barriers, and market barriers. In the perspective of Münster et al. [103], barriers and drivers have an ambivalent nature, where the cultural aspect (society and attitudes), the market (customers and economy), regulations (legislation), technical knowledge, and the system (the holistic view of the process) can both favor and hinder CE implementation attempts.

In the approach of Hina et al. [99], barriers may be internal or external, where the former are limited to financial, human, or technical resources and characteristics of the organizations themselves; the latter involve agents external to the firm, such as governments or consumers. According to the research by Wang et al. [104], external agents, such as those previously mentioned, and industry leaders are stakeholders that can help to overcome barriers.

Similarly, Neves & Marques [27] emphasize the importance of consumers, especially the younger ones, who, according to their research, are more predisposed to eco-friendly practices. Ali et al. [87] add that women and knowledge of the environment can also contribute to overcoming barriers. Fachbach et al. [105] seem to support this by demonstrating that women are more environmentally aware and more predisposed to use a key factor of the circular economy, i.e., repairing broken or decayed products.

4. Discussion and Conclusions

In order to achieve the objective of this paper, the literature was analyzed under 3 perspectives that were categorized in the sub-themes (See Figure 7): to know the actuality of the broad vision of the circular economy, its conceptual complexity and interaction with sustainability, and which factors could allow or impede its implementation. Initially, the implications of COVID-19 on the implementation of the circular economy are understood. While it is believed that the pandemic has generated a paradigm shift and even, the World Economic Forum proposes, "The Great Reset" as the need to shift towards a sustainable economic vision, it may still be too early to ensure the impact of the pandemic on the formation of new public policies or social change linked to sustainability [38,106].

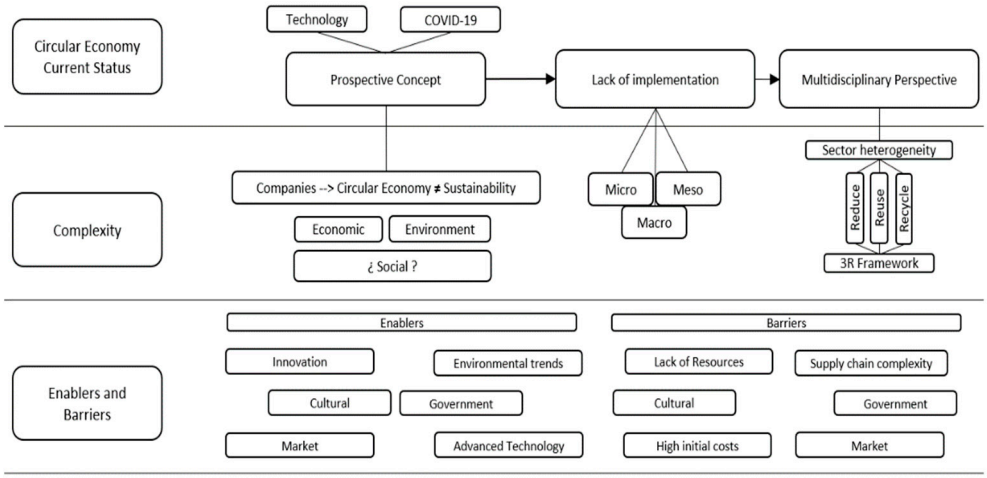

Figure 7. Circular Economy theoretical framework.

On the other hand, considering that technology is a requirement to improve the circular economy [48], technological implications were detected in this, where extended reality technologies, blockchain, the internet of things, artificial intelligence or 3D printing [5,48,70] are visualized as possible technological agents of favorable change towards the adoption of the circular economy. For example, artificial intelligence creates algorithms capable of generating systems and models with cognitive learning and development capabilities [51,62], leading to improved design processes for circular products, components and materials. In another example, 3D printing has the capacity to alter the current economy through the value chain [37,48], favoring small-scale local production; similarly, this technology has the means to collect and process plastic waste, so that it is converted into recycled raw material for 3D printing. A final example of technological contribution is seen in extended reality technologies, which offer a glimpse into the future, allowing the implications of a circular system, reducing the use of paper, or, in combination with 3D printing, the possibility to customize products in real time.

At the same time, there is a lack of practical implementation of the circular economy, due to the need for a radical change in production and consumption systems, which is difficult to achieve in the short term. Despite this, the existence of prospective projects that simulate its application is highlighted, as well as its capacity to effectively integrate the operations of companies into the sustainability paradigm. It is theorized that while the multidisciplinary approach to the circular economy demonstrates its relevance, it

represents a major challenge in terms of formally creating a universal theoretical framework. This currently leads to conceiving the circular economy as a prospective concept under construction, implying the need to delimit a theoretical starting point that serves as a flexible axis applicable to different fields.

The complex aspect of the circular economy is outlined below. Previously, it was mentioned that this concept has a multidisciplinary nature, which adds a significant difficulty when implementing it at micro, meso or macro level. This is because the circular economy occurs in different industries, each with their respective characteristics, which entails the need to study the heterogeneity of each sector and how each circular construct must be adapted to it. Added to this, the characteristics of organizations also represent a key factor when implementing the circular economy, as it is believed that small and medium-sized enterprises, representing more than 90% of companies around the globe are more likely to fail when migrating to the circular economy. Considering their global representativeness, it is necessary to investigate which aspects can favor the inclusion of these entities into the circular paradigm.

The circular economy contemplates the triple bottom line, encompassing the economic, environmental and social dimension; in this way, it is directly linked to achieving sustainability. It is clear that the circular economy seeks growth without compromising resources, which encompasses the first 2 dimensions; however, there is a clear deficiency in how it encompasses the social dimension. Through the 3Rs or 6Rs, a resource optimization model is generated that implies higher performance and lower environmental impact, but the social spectrum is neglected. Achieving sustainable development also implies reducing social gaps, which generally means providing social development opportunities to every human being, regardless of their demographic characteristics. The circular economy can address the social dimension through its economic nature, creating jobs and providing greater opportunities for development through work; however, this does not necessarily represent an advantage or difference compared to the linear economy, so it is debatable whether this social approach is representative or not.

There are several aspects that favour or limit the implementation of the circular economy, although this area requires more emphasis from the scientific community, and it is possible to categorize these as aspects that have an ambivalent nature, for example. These are aspects that can be both drivers and barriers, such as the government, the cultural dimension, the market, or technology [103]. As previously mentioned, the inclusion of new technologies represents a new opportunity for the circular economy; however, the necessary acquisition costs simultaneously represent a barrier that needs to be explored in order to clarify the cost-benefit ratio, also considering the internal characteristics of each organisation. Again, the breadth of the circular economy is an aspect that needs to be addressed when determining drivers and barriers, meaning that a good identification of barriers and enablers will be strongly linked to a good situational analysis, regardless of the industry in which it is implemented.

This research provides a theoretical contribution aimed at elucidating what implications of the circular economy need to be addressed in order to build a universal or flexible theory to understand what it means to plan for the implementation of the circular economy. In this way, it hopes to strengthen its practical application, in particular. This research implies the need to create a general framework that can be adapted to different contexts and provides clear guidance on how to be part of the circular economy. At the same time, it provides study perspectives linked to the prospective vision of the circular economy, highlighting the overall impact of COVID-19 on the circular economy, the inclusion of advanced technologies, enablers and barriers, implementation, heterogeneity between industries, the adaptability of the circular economy, its link to sustainable development, as well as its social nature.

The main limitations of this document should be mentioned, starting with the fact that it is a systematic review, that, despite searching the largest possible amount of literature, could not fully access some databases (i.e., Wiley, New York, NY, USA). It can also be said

that it is limited as it does not include conference papers, field reports, or company reports. Although an attempt has been made to reduce the subjectivity of the authors, it is possible to assume that literature relevant to the objective of the research may have been ignored when selecting journals of high scientific impact.

Despite the limitations, this research is expected to provide relevant knowledge that will enable the formulation of new research, be it new literature reviews that specifically address the topics reviewed in this paper (e.g., theoretical limitations of the circular economy, circular economy in industries, constraints and enablers of the circular economy, among others) or empirical research of a multivariate nature, mainly focused on a tentative vision of circular economy implementation, that will consistently contribute to the formulation of an established theory of the circular economy.

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Data Availability Statement: Not applicable.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Subtitle		Database	Search Strategy	Inclusion/Exclusion Criteria	Results	Date
Subtitle 1	CE State of Art	Scopus	TITLE-ABS-KEY (“circular economy”) AND (LIMIT-TO (PUBYEAR, 2022)) AND (LIMIT-TO (DOCTYPE, “ar”) OR LIMIT-TO (DOCTYPE, “re”))	2022; non-redundant Articles and Reviews about the subject	1629	18 April 2022
		Web of Science	(ALL = (“circular economy”)) AND (PY = (“2022”) AND DT = (“ARTICLE” OR “REVIEW” OR “EARLY ACCESS”) AND OA = (“OPEN ACCESS”))	2022; non-redundant Articles and Reviews about the subject	571	18 April 2022
Subtitle 2	CE Complexity	Scopus	TITLE-ABS-KEY (“circular economy” AND “goal” OR “dimension” OR “concept” OR “principle” OR “design” OR “framework” OR “theory”) AND (LIMIT-TO (DOCTYPE, “ar”) OR LIMIT-TO (DOCTYPE, “re”)) AND (LIMIT-TO (SUBJAREA, “BUSI”)) AND (LIMIT-TO (PUBYEAR, 2022) OR LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018))	2022–2018; Business and Management; non-redundant Articles and Reviews about the subject	1283	1 June 2022
		Web of Science	(ALL = (“circular economy” AND (“goal” OR “dimension” OR “concept” OR “principle” OR “design” OR “framework” OR “theory”))) AND (DT = (“ARTICLE” OR “REVIEW”) AND PY = =(“2022” OR “2021” OR “2020” OR “2019” OR “2018”) AND DT = =(“ARTICLE” OR “REVIEW”) AND TASCA = (“BUSINESS” OR “MANAGEMENT”))	2022–2018; Business and Management; non-redundant Articles and Reviews about the subject	514	1 June 2022
Subtitle 3	Drivers and Barriers	Scopus	TITLE-ABS-KEY (“circular economy” AND “limitation” OR “barrier” OR “driver” OR “enabler”) AND (LIMIT-TO (DOCTYPE,”ar”) OR LIMIT-TO (DOCTYPE,”re”)) AND (LIMIT-TO (SUBJAREA,”BUSI”)) AND (LIMIT-TO (PUBYEAR,2022) OR LIMIT-TO (PUBYEAR,2021) OR LIMIT-TO (PUBYEAR,2020) OR LIMIT-TO (PUBYEAR,2019) OR LIMIT-TO (PUBYEAR,2018))	2022–2018; Business and Management; non-redundant Articles and Reviews about the subject	430	14 June 2022
		Web of Science	(ALL = (“circular economy” AND (“limitation” OR “enabler” OR “driver” OR “barrier”))) AND (DT = (“ARTICLE” OR “REVIEW”) AND PY = (“2022” OR “2021” OR “2020” OR “2019” OR “2018”) AND DT = (“ARTICLE” OR “REVIEW”) AND TASCA = (“BUSINESS” OR “MANAGEMENT”))	2022–2018; Business and Management; non-redundant Articles and Reviews about the subject	49	14 June 2022

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