

Article

Exploring the Intersection Where Business Models, a Circular Economy and Sustainability Meet in the Waste Economy: A Scoping Review

Marlin Hoffman ^{1,*} , Catherina J. Schenck ²  and Frederick Herbst ³

¹ Office of the DVC: Academic and DSI/NRF/CSIR Chair in Waste and Society, University of the Western Cape, Bellville, Cape Town 7535, South Africa

² Department of Social Work DSI/NRF/CSIR Chair in Waste and Society, University of the Western Cape, Bellville, Cape Town 7535, South Africa; cschenck@uwc.ac.za

³ Business School, Milpark Business School, Observatory, Cape Town 7925, South Africa; frederick.herbst@milpark.ac.za

* Correspondence: mjhoffman@uwc.ac.za

Abstract: The authors endeavor to investigate the intersection and relationship between sustainability, business models and a circular economy. These three concepts are believed to be at the heart of finding a solution to creating and implementing a circular economy. The three pillars of sustainability (society, environment and economics) have been identified as the golden thread when applied to developing circular economies and the business models used in these circular economies. These three pillars highlighted the areas of intersection and engagement between the circular economy and business models. The three pillars, or stakeholders, need to be considered equally and, where there is sacrifice and benefits, they need to be balanced. A scoping review was chosen, as the starting point, to ascertain the literature in the field. The results of the scoping review showed a lack of research conducted at the point of intersection between these three fields. Finding a solution by creating and implementing a circular economy will have positive effects on the economy, environment and society, as there is, proverbially, “not much time left” and everyone in the process will sacrifice and benefit. The research has highlighted the need to explore the intersection and relationship between sustainability, business models and the circular economy as a concept, and future research should develop frameworks to guide the development and implementation of this intersection to include all relevant stakeholders.

Keywords: sustainability; business models; circular economy; environment; waste economy



Citation: Hoffman, M.; Schenck, C.J.; Herbst, F. Exploring the Intersection Where Business Models, a Circular Economy and Sustainability Meet in the Waste Economy: A Scoping Review. *Sustainability* **2022**, *14*, 3687. <https://doi.org/10.3390/su14063687>

Academic Editor: Chia-Hsing Huang

Received: 8 February 2022

Accepted: 24 February 2022

Published: 21 March 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

As the world population continues to grow steadily and consumption increases exponentially, the pressures on limited natural resources are ever increasing. The increase in consumption by people resulted in an increase in waste, which affects every aspect of the planet from global warming to pollution on land and in oceans and rivers. Boulding [1] describes it eloquently when he refers to planet earth as a single spaceship with limited resources that, once depleted, can no longer be replaced unless alternatives be considered and implemented, such as the finished products (outputs) of certain entities serving as raw material (inputs) for other entities. Many researchers [2–6] consider Kenneth Boulding, an ecological economist, to be the forerunner of what we today know as the concept of the circular economy, as it is based on his analogy of the Earth spaceship.

Currently, businesses within the waste value chain participate in a linear economy which starts at production and ends at the landfill, with a small percentage ending up being recycled. As these companies exist for economic benefit and gain, Teece [7] mentioned that their business models are the “design and architecture of value creation, delivery

and capture mechanisms” of a business. Therefore, business models’ construction has come under the spotlight as an instrument to integrate circular economy principles into business [8,9]. A spotlight which has become more intense when considering the impact on the environment and the effects on society.

Korhonen and colleagues [10] introduce us to the three pillars of sustainability to define a circular economy. These three pillars are society, the environment and the economy. Interaction between these three pillars would allow us to find a solution to moving towards a circular economy. There are instances when only one or two of the pillars are catered for; however, a balance needs to be struck among all three pillars within the concepts of circular economy and business models.

The dilemma currently being faced is finding a solution to ending the linear economy and evolving it into a circular economy seamlessly. The linear economy was dominated by the make–use–dispose philosophy. The linear economy has been around for decades and has been driven by economic benefit only. There was no real consideration for the environment or society, or the impacts on either. The need to minimize or even stop the exploitation of natural resources and rethink the disposal of materials brought about the philosophy of a circular economy which is driven by the 3R principle. The 3R principle refers to reduce, reuse and recycling [2] of materials and products in the waste economy.

When considering sustainability, as introduced earlier, the three pillars should be used as a guide when designing circular economies and business models operating within these economies. According to Ranta and colleagues [11], the circular economy provides an alternative model for analyzing and understanding consumption and circular economies circulate products and materials in “loops,” as long as they can yield value. Ghisellini et al. [2] mentioned that circular economy-oriented studies outside of business model research have been focused on the circularity of material flows and advancing the 3R principles. Therefore, the importance of business models in the circular economy is not a desire but, rather, a need, and using the pillars of sustainability and circular economy is important to circular economy realization.

In this study, the authors recognize the importance of using the three pillars of sustainability consistently when dealing with circular economy and business models which is vital to attaining circularity. Thus, the intersection, where sustainability, circular economy and business models meet, is vital to developing a circular economy.

As a first step of the research process, a scan was carried out of the available literature. The search of literature yielded no articles within the field of interest where all three components (business models, circular economy and sustainability) are discussed or were the subject of investigation. It was then decided that the best place to start with the research was the development of a scoping review. It is the hope of the researchers that the scoping review will give insight into areas of future research in developing this field of interest.

The scoping review focused on the following question:

- What are the characteristics of business models, the circular economy and sustainability that enable a circular economy in the waste sector?

1.1. Concepts

The scoping review investigates the combination of three core concepts within the waste economy: sustainability, circular economy and business models. According to Sehnem et al. [12], sustainability is a driver of a circular economy which is mediated by innovation, and EMF [13] noted that the circular economy is an economic model that is based on restoration and regeneration. The pillars of sustainability used to define a circular economy constitute the interrelationship between the environmental, economic and social components that are prevalent within the context of waste value chains [14]. Therefore, the circularity of an economic model is dependent on sustainability, and vice versa. To ensure that the process of circularity is embedded into the various waste value chains and, ultimately, the economy, at large, business models have become the focus, as they create value, capture value, and deliver value for businesses and, in this research context,

businesses within a closed loop system (the circular economy). As many countries are at various stages of circular economy realization and implementation, a scoping review was considered to be the best format to determine what has been carried out within the area of research and to identify the gaps in literature to further develop and implement the concept of circularity in a third world setting.

1.2. Context

This review includes research conducted on business models, circular economy and sustainability within the waste economy of various countries where there has been a drive toward circularity.

1.3. Types of Study

The scoping review consists of empirical studies that were conducted on the elements of sustainability, business models and circular economies and how they propose to implement a circular economy. There were six articles that met the criteria that were stipulated at the beginning of the process, of which three articles were systematic reviews and one was a literature review; all focused on the business models required for a circular economy and circular economy principles. One article focused on the development of indicators linking circular economy principles, circular business models and the pillars of sustainability. The last article researched and developed a single tool, backed by methodology, for the enabling of businesses to formulate circular value propositions.

2. Sustainability

Geissdoerfer et al. [14] defines sustainability as the balanced integration of economic performance, social inclusiveness and environmental resilience to the benefit of future and current generations. According to Pieroni et al. [15] sustainability is described as a balanced integration of economic performance, social inclusiveness, and environmental resilience that will benefit the current and future generations. Sustainability is a driver of a circular economy (CE), which is mediated by innovation [12], and CE is a stepping stone towards sustainability [16], which is an economic model based on restoration and regeneration [13]. Natural resources, in a linear economy, are turned into products with leftover value that is discarded rather than being reduced, reused or recycled [17]. Linear economy conventions can no longer continue to supply the growing demand for natural resources, as nature approaches its tipping point where it becomes impossible to sustain the biosphere called Earth [17]. The circular economy has emerged, as a conceptual instrument, from the sustainability movement, to better control resource extraction, moderate scarcity, and price volatility, while responding to future demands [18–20]. Therefore, based on the principle of closing the life cycles of products by a reduction in consumption of resources, the circular economy belongs to the sustainable development framework [21].

3. Circular Economy

The paradigm of the circular economy was inspired by the concept of a closed loop economy, which was introduced at the end of the 1980s [22,23]. The overarching concept of the circular economy emerged in the 2010s [24], as interest in sustainability found traction with governments, investors, companies and civil society [25]. A linear (open ended economy) was the only existing paradigm that treated the environment as a waste reservoir [6]. Geissdoerfer et al. [26] characterizes the current open system as erosive to the interacting ecosystems of Earth, which has caused and continues to cause irreversible changes in the essential life-support function of nature. A body of literature has arisen, over the last few decades, from various research disciplines and practices that have contributed to the understanding and interpretation of the circular economy concept [2,4,5,27,28]. Lahti et al. [29] noted that scientific literature on the circular economy was developed through research conducted outside of managerial and organizational theories; however,

the topic has been receiving increased attention from different research domains, including strategic, operational, and technological management [30].

The theoretical roots of circular economy conceptualization have been inspired by important conceptual approaches such as “cradle-to-cradle” [31], “industrial ecology” [32], “industrial metabolism” [33], “biomimicry” [34], “blue economy” [35], and “natural capitalism” [3,36]. According to Geissdoerfer et al. [26] and Rizos et al. [5], the most used definition of a circular economy was formulated by the Ellen McArthur Foundation [18], which emphasizes that the circular economy as “an industrial economy that is restorative by intention and design”.

Murray, Skenne and Heynes [4] suggested that the main aim of circular economies is to achieve the uncoupling of economic growth from natural resources depletion and environmental degradation. Therefore, keeping extracted natural resources in use as long as possible and extending the value of products through reuse and recovery strategies is the aim of circular economies [37]. Merli, Preziosi, and Acampora [38] and Pearce and Turner [22] commented that there is consensus that the circular economy can help restructure the current “take–make–dispose” economic system. The circular economy, as a concept, emerges with the objectives of enhancing product, component, and material usability and usefulness by return them through cycles, as it is an economy based on the principle of minimizing waste and pollution, maintaining possession of products and materials in use and regenerating natural systems [39]. Korhonen et al. [10] uses the pillars of sustainability (environmental, economic and social) to define the circular economy, namely:

- 1 The environmental goal of the circular economy is to reduce raw material and energy inputs and minimize waste generation and emissions.
- 2 The economic goal of the circular economy is to reduce costs, risks and taxation, including new product innovation designs and market opportunities for businesses.
- 3 The social goal comes by sharing the economy, creating employment, and creating a collaborative culture through a participative democratic decision-making process.

Contrary to Korhonen and colleagues [10], Lierder and Rashid [27] noted the circular economy as an active area of research on waste management, resource use, and environmental impact, yet it neglects the business and economics perspectives. A circular economy can be defined as a global economic model that minimizes the negative effects of limited resource consumption by concentrating on the intelligent design of materials, products, and systems [40]. According to Geissdoerfer et al. [26], the circular economy is often seen as a means of achieving sustainability; however, with a narrower focus on the economic and environmental dimensions.

National governments (for example, Holland, Japan, Germany), economic thinkers and the European Commission assume that the impetus to shift from a linear economy towards a circular economy lay within the innovations of incumbent companies and entrepreneurship [4,6,18,41–44]. Moreau et al. [8] and Zink and Geyer [9] note that the change to a resource efficient society will be driven by the innovative abilities of companies in setting economic goals, such as recovery targets, providing economic incentives and assistance, such as governmental procurement programs, and performing research to experiment and integrate circular economy logic into daily routines. Hoffmann [36] considers that, rather than the business driven transition approach and the logic of economic value only creation, there is a need for reflection on the desirable future conditions and how this future will be reached. Hoffmann [37] asks, where does value end; where does waste emerge? To determine whether an observed system is linear or not is heavily dependent on the scope, the predefined system boundaries and time scales [37]. Therefore, a strict distinction between linearity and circularity can only, as a theoretical abstraction for the purposes of sensitizing and addressing a more significant problem, lean towards the kind of economic activities that build on a massive degradation of nature [37].

Interaction within the ecosystem is a vital prerequisite for companies to move from a firmcentric to a networkcentric operational logic [15] and this transition requires rethinking

their business models in order to enable the decoupling of value creation and resource consumption [45]. Therefore, developing and implementing business models that encourage and achieve sustainability and circularity is a fundamental capacity for companies.

4. Business Models

The business model construct emerged in the 1970s and it was originally associated with system modelling in information technology [15]. The concept has been maturing and since the 1990s, with contributions from many disciplines, including technology and organizational strategy theories [46]. In the circular economy literature, scholars and practitioners from politics, business, and consultancies have emphasized the importance of business models for achieving systematic change to a circular economy [37]. A few researchers have noted that the business model concept research within the realm of sustainability and the circular economy is still young, with 10 years and 5 years of activities, respectively [47–49].

Business models are considered to be simplified descriptions of mechanisms of how organizations create value, capture value, and deliver value to stakeholders through the conversion of scarce resources [7,46,50–53]. Magretta [54] observed and commented that the business model represents a new form of narrative in management theory, as business models are the fundamental stories that explain how businesses work. Business models enunciate how the value proposition, the value creation infrastructure, and value capture will be fulfilled [52,55–58]. The business model canvas, through visualization, allows its users to align profit with purposes such as environmental and societal aspects [52,59]; however, the environmental and societal value is hidden behind the economic oriented canvas [59] even though some of its limitations are the practical aspects of integrating environmental and social purposes. Therefore, Rodrigues and Lopes [60] acknowledged that it is necessary to integrate additional tools, methodologies and techniques in order to make the business model canvas more dynamic by adding social and ecological aspects to the existing canvas to realize these aspects [61]. As a result of its comprehensiveness of scope of modern interpretations and elusive nature, linking two “differing” domains of knowledge (technical/physical), which are based on hard facts, and the economic (based on uncertain assumptions), the business model construct definition remains inexact and has been interpreted in various ways [62]. Antikannen and Vlakokari [63] mentioned that most business model tools were criticized for their lack of integration of the elements for innovating and transforming business models in the circular economy.

4.1. Business Model Development

Ludeke-Freund and Dembeck [49] noted that evolution in the general business model related research might create confusion regarding the interpretation of the business model construct. The business model canvas was introduced by its creators, Oosterwalder and Pigneur [52], and described the business model canvas as “the rationale how organisations create, delivers and captures value”. The business model canvas, one of the most preferred representations, consists of nine building blocks of value creation, organized into four pillars, namely, product/value generation, financial aspects, customer interface and infrastructure management [64]. Richardson [65] further refines the four pillars into three main forms of managing value: value proposition, value creation and delivery, and value capture, which represents a static view of a business model. Wirtz et al. [46] commented that business model frameworks meet at the concept of a value creation logic of a reference system such as, for example, organization, value chain, and industry sector, which can be presented by various elements. The British Standards Institute (BSI) [66] reported that there are six types of business models that have the potential to fit within a circular economy and that this is based on demand, dematerialisation, product life-cycle, extension/reuse, recovery of secondary raw materials/byproducts, products as service/product–service system (PSS) and the sharing economy and collaborative consumption.

4.2. Business Model Innovation

As researchers are grappling with understanding the field and adding description to the field, practitioners are already being “pushed” for the transformation of their business models as a means of embedding circular and sustainability thinking [66]. Hence, the sustainable and circular business model innovation (BMI) approaches have been proposed in the grey literature by companies, governments and NGOs [15]. These bodies of knowledge or potential emerging research fields are still in a conceptualization phase, with fragmented literature [38,49,67]. Similarly, according to Geissdoerfer et al. [26], the boundaries and synergies are not clearly explored. It is also worth noting that not all systems (businesses and value chains) incorporating circular principles are intrinsically more sustainable [68]. Ghezzi and Cavallo [69] commented that innovative business models and industrial strategies, in this new context, are still in the implementation or development phase. Many authors agree that there is a lack of clarification of where existing tools for conventional business models are sufficient and where new tools are needed for embedding circularity or sustainability in BMI [49,67]. There are a number of approaches that have been proposed for either BMI and circularity; however, few approaches consider the integration of both concepts [63,70,71]. Schaltegger and colleagues’ [72] typology suggests three strategies for embedding sustainability into BMI: defensiveness (focuses on reducing risk/cost to maintain business as usual), accommodative (focuses on enriching the business model to reduce impact) and proactive (focuses on completely new designs of value logic). Bocken et al. [45] and Wells [73] noted that proactive strategies are often more impactful, as they are linked to sustainability principles at the core of business by rethinking the value proposition, delivery/creation, and capture systems to maximize societal and environmental benefits, and not only economic benefits. Parallel to these studies, there is a notion of business model innovation that consists of changing (through creation diversification, acquisition and transformation) the business model as a response to internal and external incentives [48,67].

Holistic approaches for sustainability orientated BMI, from design to implementation, are still in a development stage [74] and a sustainable business model (SBM) has been broadly defined by Geissdoerfer et al. [68] to integrate multi-stakeholder management, the creation of value (monetary and nonmonetary) for a plethora of stakeholders, and have a long term view. Stubbs and Coebelin [75] and Ludeke-Freund [76] mentioned that sustainability oriented BMI incorporates the sustainability principles of business model design which adds complexity to the conventional BMI process, on top of generating superior customer value to achieve competitive advantage, and capture economic value as it also seeks to include environmental and societal factors. Wells [76] argues that SBM is both profitable and will affect relative or absolute reductions in the environmental and socioeconomic dilemma through the delivery of socially relevant products and services. Linder and Williander [77] commented that CBM is a new kind of business model, as value creation is focused on keeping economic value embedded in the products after their use and exploit it for new types of market offerings; however, this requires a mechanic of return flow (from end users to producers) through intermediaries. Rosa et al. [78] argued that the economic value of a product can be maintained by lowering the dependence on virgin materials, shifting from nonrenewable energy systems, adopting more sustainable production practices and greening the entire value chain.

4.3. Circular Business Models (CBMs)

Comparing the linear business model and circular business model (CBM), the linear business model’s value is associated with the product/service, which is lost after usage by the customer, whereas a CBM represents a set of strategic decisions designed to preserve the environmental and economic value of a product/service within the system [70,79]. A CBM is defined as a simplified representation of a complex organizational system and relationship aimed to slow, narrow and close resource loops [68]. Circular economy oriented (CE-oriented) BMI integrates practices and principles from the circular economy as guidelines for business model design; however, these principles and practices that are

integrated into the business model can occur at different levels depending on the strategies being adopted [14]. Bocken et al. [45] added that CE-oriented BMI adds uncertainty and complexity to conventional BMI, as new variables must be considered, for example, customer perception and the quality and timing of returns of resources. To overcome these complexities and uncertainty, a transdisciplinary view is required [80], coupled with exploring the interfaces of CE-oriented BMI with other innovative perspectives, for example, product design, value chain and digital technology [45,73]. There has been an increase in academic research that focuses on CBMs, in addition to closed loop supply chains and circular product design [38,74].

There are some authors that affirm CBM to be a type of sustainable business model [45], yet there are those who believe that not all CBM consider the dimensions of sustainability (environmental, economic, social) [81]. Mentik [81] defined CBM as the logic of how a business creates, delivers and captures value within closed circuits, and Frischhammer and Parida [82] adds to create, capture and deliver value to increase resource efficiency through innovation. In the dimension of CBM, it is considered that there are three main conceptual areas that emerge in literature: value creation, value transfer and value capture [11,30]. It is possible to use these dimensions as locations from which to make decisions and act, as implemented by the company in its definition and execution of its CBM [11,68,70,83]. The identification of these dimensions has become a requirement for the debate on a company's adoption of the circular economy [84], as the economic sustainability of a circular business model is not secondary to the environmental one [11], even though companies are called to satisfy the expected value of all their stakeholders [18]. Secundo et al. [85] and Wamba et al. [86] points to the fact that the dimension of value is not only economic but also intangible and nonmonetary. Lewandowski [84] and Ranta et al. [11] noted that value creation in CBMs is associated with the "maintenance of products and processes, the combination of resources and materials and purchasing upcycled waste, the total recycling of resources, the dematerialisation of products and on-demand production processes".

The National Confederation of Industry [87] argued that innovation in CBM may facilitate the transition to CE; however, the use of indicators to measure circularity performance is not part of common practice in companies [88]. Rossi et al. [39] mentioned that the majority of studies involving specific circular economy indicators focused on end of life strategies [89–91] and eco-efficiency [92], instead of economic [93,94], environmental [95] and social indicators [96]. Pieroni et al. [15] proposed that there is a need for indicators to assess different business models economically, environmentally and socially in a way that will fill the gaps.

Most of the literature, particularly in managerial journals, has focused on CE in firms' business models and on definition and taxonomies aimed at understanding the dynamics of value creation and capture in CBMs [45,63,85]. Regarding the competitiveness of firms and everchanging scenarios, the focus on business models, inspired by sustainability, which includes environmental and social responsibility [26], requires these firms to alter their value network. These value networks include organizational structure, relationship with supply chain partners, and the value proposition focused on the customer to design business models that put the circular economy into practice [97]; however, the current literature fails to explain in depth how companies can design their business models according to circular economy principles [98].

5. Methodology

Scoping reviews are used to map key concepts that underpin a field of research, as well as clarify working definitions, and/or the conceptual boundaries of a topic [99]. In the case of this study, a scoping review was conducted to ascertain the literature available at the intersection of business models, circular economies and sustainability, to be able to determine the characteristics a BM should embrace to facilitate the circular waste economy.

It was found that the three most common reasons for conducting a scoping review were to explore the breadth and content of literature, map and summarize the evidence, and

inform future research [100]. According to Munn et al. [101], the indications of a scoping review are as follows:

- As a precursor to a systematic review;
- To identify the types of available evidence given in a field;
- To identify and analyze knowledge gaps;
- To clarify key concepts/definitions in the literature;
- To examine how research is conducted on a certain topic/field;
- To identify key characteristics or factors related to the concept.

Tricco et al. [100] noted that scoping reviews are useful for examining evidence when it is still unclear what other, more specific, questions can be posed for evidence synthesis and to be valuably addressed. This scoping review was conducted with the objectives, inclusion criteria, and methods of analysis that were specified and documented in advance of the study guide of the project. According to Peters et al. [102], a search needs to be conducted on at least two online databases, on the relevant topic or topics of research, and include an analysis of the text words of the titles and abstracts of the retrieved papers. Once the research questions were formulated and the criteria decided on, a research protocol was formulated.

Search Strategy

The three databases that yielded results, based on the search criteria, were the EbscoHost, Web of Science and Scopus search engines where the fifty-six (56) articles were retrieved. The search criteria used was as follows:

- 1 EbscoHost, Emerald (eJournals Premier), Scopus and Web of Science search engines
- 2 Search engine criteria: Circular economy AND Sustainability AND Business models within the title.
- 3 Year: 2015–2020

The result of the initial search was fifty-six (56) articles and all the abstracts were read and checked for the key words of sustainability, business models and circular economy. After the exercise was completed, there were three (3) articles remaining that fulfilled the criteria and research protocol established at the beginning of the process. The final articles used in the research were three (3) articles that all met the criteria of BMs, CE, and Sustainability in the: (1) titles and (2) abstracts. Five out of the six articles retrieved were from Elsevier Publishing House, with only one article from Wiley.

6. Results

6.1. Characteristics of Included Studies

Of the six papers that were used in this scoping review, which fulfilled the search criteria, five articles were in the northern hemisphere with four of the five in mainland Europe, one from the Middle East and the sixth article from Brazil.

6.2. Review Findings

Based on the indication of a scoping review given by Munn et al. [101], mentioned earlier, the researchers' findings are within the themes: (1) the types of available evidence given in a field and (2) to examine how research is conducted on a certain field or topic.

Theme 1: Limited empirical research.

From the scoping review it is clear that there is limited literature available that considers the intersection between business models, circular economy and sustainability, and that most (2 out of the 3) of the literature found were systematic reviews. Therefore, the research conducted was based on systematic reviews, with only one (1) article documenting evidence of empirical research, mixed methods designs, being conducted. Refer to Table 1 which gives a summary of the finding of the scoping review search criteria.

Table 1. Search Criteria Results.

Author/Year	Title	Country	Aims	Design
Pieroni, M., McAloone, T., Pigosso, D. (2019)	Business model innovation for circular economy and sustainability: A review approach.	Denmark	The paper aimed to review business model innovation for a circular economy and/or sustainable principles.	A systematic review
Rossi, E., Bertassini, A., dos Santos Ferreira, C., Neves do Amaral, W., Ometto, A. (2020)	Circular economy indicators for organisations considering sustainability and business models: Plastic, textile and electro-electric.	Brazil	The authors developed a set of indicators linking circular economy principles, circular business models and the pillars of sustainability which were tested at three Brazilian companies each with different circular business models.	An empirical research article (mixed methods)
Hoffmann, F. (2019)	Circular business models: Business approach as a driver or obstructor of sustainability transition?	Germany	Understanding the concept of circular business models and whether it can contribute to economic transition toward sustainability.	A systematic review

The scoping review found the lack of empirical research being conducted on the interaction/intersection using the pillars of sustainability, as mentioned by Korhonen et al. [10]. It can, then, be said that two of the concepts (business models, circular economy) require the elements of sustainability. As part of the transition to embed this relationship, sustainable products, services, business models and organizations emerge, partly complementing and partly substituting existing ones [103]. Ghisellini et al. [2] emphasizes that the circular economy, in its holistic approach, accelerates deep social change and argues that it has the potential to understand and implement a radical new pattern and social reach, which increases sustainability and wellbeing at low, or no, material, energy and environmental costs.

To further support the lack of evidence at the intersection of business models, circular economy, and sustainability, it was found that the topic is conceptual and in its infancy stage, as it finds itself in many articles, rather than being researched within the same article(s). For example, the extension of the literature on BMs through conceptual methodological frameworks have aimed to overcome the limitations linked to the design of business models of multiple cycles [84]; integration of 3R (reduce, reuse and recycle) into the BM [11]; to define drivers of sustainable value by leveraging value networks and organizational perspectives [68]; to identify new key performance indicators and two additional blocks (take back system and adoption factors) into the classical representation of a BM canvas [52,85]; and to access and explain the different degrees of circularity in BMs [30].

The focus of business models was based on businesses outside of the waste economy; however, there has been little or no focus on the business models for the waste value chain that impact the waste economy. Hoffmann [37] iterates that the scope, predefined system boundaries and time scales determine whether an observed BM is linear or not. Therefore, there needs to be a consideration for the inclusion of businesses and companies impacting the waste economy, not necessarily part of the waste economy, as part of the system that will provide answers to achieving circularity.

7. Discussion

As the world's population is growing steadily and the dependency on natural resources is increasing, governments, environmentalists, and businesses are becoming aware of the need to preserve these limited natural resources. Sustainability transitions are multidimensional, long term, and fundamental change processes through which established

societal cultures, structures and practices shift to more sustainable ones that arise from the co-evolution between an economy, society and the environment [104,105]. The need to ensure sustainability and to ensure a better life for future generations have become the focus. The linear economy, designed to gain the most economic benefit, is no longer viable to ensure sustainability for future generations [15]. More is required than just economic gain. The preservation of “spaceship Earth,” as introduced by Boulding [1], has taken center stage. To increase the lifecycle of products has become paramount, which will have a benefit not only economically but also socially and environmentally. Therefore, to ensure sustainability, researchers, governments, and many others have looked toward what are considered to be the building blocks of our existence, a balancing act between economic, society and the environment [37]. From the economic perspective, business models are considered to be the driver behind how value is created, delivered and captured, in order to enjoy economic benefit [12].

The environmental perspective considers not only the depletion of natural resources but also the managing of waste after use, which is also detrimental to our planet, the effects of which we have been experiencing over the last few decades. Pearce and Turner [22] emphasize that nature functions as a resource supplier for production and consumption (inputs), as a sink for anthropogenic emissions, as well as a source of deeper feelings “to be in the world” in the form of aesthetic enjoyment and spiritual comfort. Society finds itself at the center of it all, as it is society that benefits economically; however, it will also experience the brunt of behavior that leads to environmental degradation [17].

The articles found as a result of the search criteria include a majority that is based in first world, northern hemisphere, countries where a sophisticated waste economy is in place and the further development or enhancement of a circular economy is not far off in the future, which is not the case in many third world countries. The participation of society in the waste economy is more advanced than what is found in third world countries, which poses the problem of the inclusion of society as a major factor in the success of working towards circularity. The integration of labor, generally large amounts within third world countries, needs to be considered instead of the implementation of technology *en masse*. Third world countries are struggling with high unemployment rates and small business development more than first world countries, therefore, consideration needs to be made for these factors too.

8. Conclusions and Recommendations of Study

Environmental degradation due to waste has reached critical levels and will continue to increase if nothing is being done about it. As mentioned earlier, this will have an impact on society that, in turn, will affect businesses; therefore, it cannot be solved by a conceptual or paper exercise but, rather, be driven by concrete solutions and the implementation of tangibles that need to be monitored.

To find the “sweet spot” and balance between economic, societal and environmental pillars within business models will result in and give impetus to circularity; there is a need to consider the context within which it will operate. Thus, the process towards circularity should occur at three levels, namely, societal, economic and environmental (role players and stakeholders).

Based on the findings of the scoping review, it is recommended for future research, as a first step, to depict the various value chains within a specific waste economy. Once the value chains are depicted, the next step in the process is to unpack the business models being employed by businesses in those (depicted) value chains by using, for example, the business model canvas [52]. The business model canvas allows the researcher to understand the value creation, value capture and delivery of value of the businesses. This would yield results that will identify and highlight the gaps within the business and value chain itself. It will also highlight employment and business creation opportunities, and shed light on the types of business models in use. Using the models and frameworks of circularity guided

by the pillars of sustainability, the business models will organically fit into the value chain, thus allowing for circularity within the waste economy.

When these exercises are completed, the researcher(s) will have a clear understanding of what needs to happen for the waste economy to become circular. With this in mind the researcher(s) will need to keep Korhonen et al. [12]’s sustainability pillars (social, economic and environmental factors) at the forefront of their minds when dealing with business models and the circular economy. Success in moving towards or creating a circular economy is to build the pillars of sustainability into the elements of circular economy and business models. As mentioned, this is the first step in a series of planned research based on the findings of this scoping review.

Author Contributions: Conceptualization, M.H. and C.J.S.; Methodology, M.H. and C.J.S.; Investigation, M.H.; Writing original draft preparation, M.H.; Writing—review and editing, M.H., C.J.S. and F.H.; Supervision, C.J.S. and F.H.; Funding acquisition, C.J.S. All authors have read and agreed to the published version of the manuscript.

Funding: The research was funded by the South African Department of Science and Innovation (DSI), through the Waste RDI Roadmap, managed by the Council for Scientific and Industrial Research (CSIR) and the National Research Foundation (SA).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

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

References

1. Boulding, K.E. The Economics of the Coming Spaceship Earth. In *Environmental Quality in a Growing Economy, Resources for the Future*; Johns Hopkins University Press: Washington, DC, USA, 1966.
2. Ghisellini, P.; Cialani, C.; Ulgiati, S. A Review on Circular Economy: The Expected Transition to a Balanced Interplay of Environmental and Economic Systems. *J. Clean. Prod.* **2016**, *114*, 11–32. [CrossRef]
3. Homrich, A.S.; Galvão, G.; Abadia, L.G.; Carvalho, M.M. The circular economy umbrella: Trends and gaps on integrating pathways. *J. Clean. Prod.* **2018**, *175*, 525–543. [CrossRef]
4. Murray, A.; Skene, K.; Haynes, K. The circular economy: An interdisciplinary exploration of the concept and application in a global context. *J. Bus. Ethics* **2017**, *140*, 369. Available online: <https://link.springer.com/article/10.1007%2Fs10551-015-2693-2> (accessed on 29 January 2021). [CrossRef]
5. Rizos, V.; Tuokko, K.; Behrens, A. The Circular Economy: A Review of Definitions, Processes and Impacts. Available online: <https://www.ceps.eu/publications/circular-economy-review-definitions-processes-and-impacts> (accessed on 4 March 2021).
6. Su, B.; Heshmati, A.; Geng, Y.; Yu, X. A review of the circular economy in China: Moving from rhetoric to implementation. *J. Clean. Prod.* **2013**, *42*, 215–227. [CrossRef]
7. Teece, D.J. Business Models, Business Strategy and Innovation. *Long Range Plan.* **2010**, *43*, 172–194. [CrossRef]
8. Moreau, V.; Sahakian, M.; Van Griethuysen, P.; Vuille, F. Coming Full Circle: Why Social and Institutional Dimensions Matter for the Circular Economy. *J. Ind. Ecol.* **2017**, *21*, 497–506. [CrossRef]
9. Zink, T.; Geyer, R. Circular Economy Rebound. *J. Ind. Ecol.* **2017**, *21*, 593–602. [CrossRef]
10. Korhonen, J.; Honkasalo, A.; Seppälä, J. Circular Economy: The Concept and its Limitations. *Ecol. Econ.* **2018**, *143*, 37–46. [CrossRef]
11. Ranta, V.; Aarikka-Stenroos, L.; Mäkinen, S.J. Creating value in the circular economy: A structured multiple-case analysis of business models. *J. Clean. Prod.* **2018**, *201*, 988–1000. [CrossRef]
12. Sehnem, S.; Pandolfi, A.; Gomes, C. Is sustainability a driver of the circular economy? *Soc. Responsib. J.* **2019**, *16*, 329–347. [CrossRef]
13. Ellen Macarthur Foundation, Building Blocks of a Circular Economy. Available online: <https://www.ellenmacarthurfoundation.org/circular-economy/building-blocks%20> (accessed on 14 March 2021).
14. Geissdoerfer, M.; Bocken, N.M.P.; Hultink, E.J. Design thinking to enhance the sustainable business modelling process—A workshop based on a value mapping process. *J. Clean. Prod.* **2016**, *135*, 1218–1232. [CrossRef]
15. Pieroni, M.P.P.; McAloone, T.C.; Pigosso, D.C.A. Business model innovation for circular economy and sustainability: A review of approaches. *J. Clean. Prod.* **2019**, *215*, 198–216. [CrossRef]

16. Kravchenko, M.; McAloone, T.C.; Pigosso, D.C.A. Implications of developing a tool for sustainability screening of circular economy initiatives. In Proceedings of the 26th CIRP Life Cycle Engineering (LCE) Conference, West Lafayette, IN, USA, 7–9 May 2019; Volume 80, pp. 625–630. [CrossRef]
17. Sariatli, F. Linear Economy Versus Circular Economy: A Comparative and Analyzer Study for Optimization of Economy for Sustainability. *Visegr. J. Bioeconomy Sustain. Dev.* **2017**, *6*, 31–34. [CrossRef]
18. EMF (Ellen MacArthur Foundation). Towards the Circular Economy: Economic and Business Rationale for an Accelerated Transition. Available online: <https://ellenmacarthurfoundation.org/assets/downloads/publications/Ellen-MacArthur-Foundation-Towards-the-Circular-Economy-vol.1.pdf> (accessed on 20 February 2021).
19. Pla-Julián, I.; Guevara, S. Is circular economy the key to transitioning towards sustainable development? Challenges from the perspective of care ethics. *Futures* **2019**, *105*, 67–77. [CrossRef]
20. Witjes, S.; Lozano, R. Towards a more Circular Economy: Proposing a framework linking sustainable public procurement and sustainable business models. *Resour. Conserv. Recycl.* **2016**, *112*, 37–44. [CrossRef]
21. Lopes de Sousa Jabbour, A.B.; Rojas Luiz, J.V.; Rojas Luiz, O.; Jabbour, C.J.C.; Ndubisi, N.O.; Caldeira de Oliveira, J.H.; Junior, F.H. Circular economy business models and operations management. *J. Clean. Prod.* **2019**, *235*, 1525–1539. [CrossRef]
22. Pearce, D.W.; Turner, R. Economics of natural resources and the environment. *Agric. Syst.* **1991**, *37*, 100–101. [CrossRef]
23. Stahel, W.R.; Reday-Mulvey, G. *Jobs for Tomorrow: The Potential for Substituting Manpower for Energy*, 1st ed.; Vantage Press: New York, NY, USA, 1981.
24. Blomsma, F.; Brennan, G. The Emergence of Circular Economy: A New Framing Around Prolonging Resource Productivity. *J. Ind. Ecol.* **2017**, *21*, 603–614. [CrossRef]
25. Hestad, D. The Evolution of Private Sector Action in Sustainable Development. IISD Earth Negotiations Bulletin. February 2021. Available online: <https://www.iisd.org/system/files/2021-02/still-one-earth-private-sector.pdf> (accessed on 28 August 2021).
26. Geissdoerfer, M.; Savaget, P.; Bocken, N.M.P.; Hultink, E.J. The Circular Economy—A new sustainability paradigm? *J. Clean. Prod.* **2017**, *143*, 757–768. [CrossRef]
27. Lieder, M.; Rashid, A. Towards circular economy implementation: A comprehensive review in context of manufacturing industry. *J. Clean. Prod.* **2016**, *115*, 36–51. [CrossRef]
28. Sauvé, S.; Bernard, S.; Sloan, P. Environmental sciences, sustainable development and circular economy: Alternative concepts for trans-disciplinary research. *Environ. Dev.* **2016**, *17*, 48–56. [CrossRef]
29. Lahti, T.; Wincent, J.; Parida, V. A definition and theoretical review of the circular economy, value creation, and Sustainability business models: Where we are now and where should research move in the future? *Sustainability* **2018**, *10*, 2799. [CrossRef]
30. Urbinati, A.; Chiaroni, D.; Chiesa, V. Towards a new taxonomy of circular economy business models. *J. Clean. Prod.* **2017**, *168*, 487–498. [CrossRef]
31. McDonough, W.; Braungart, M. *Cradle to Cradle: Remaking the Way We Make Things*, 1st ed.; North Point Press: New York, NY, USA, 2002.
32. Graedel, T.E.; Allenby, B.R. *Industrial Ecology*, 1st ed.; Prentice Hall: Englewood Cliffs, NJ, USA, 2015.
33. Ayres, R.U. *Industrial Metabolism: Theory and Policy*; Allenby, B.R., Richards, D.J., Eds.; The Greening of Industrial Ecosystems; National Academy Press: Washington, DC, USA, 1994; pp. 23–37.
34. Benyus, J. *Biomimicry: Innovation Inspired by Design*, 1st ed.; Harper Perennial: New York, NY, USA, 2002.
35. Pauli, G.A. *The Blue Economy: 10 Years, 100 Innovations, 100 Million Jobs*, 1st ed.; Paradigm Publications: Taos, NM, USA, 2010.
36. Lovins, A.B.; Lovins, L.H.; Hawken, P. *Natural Capitalism: The Next Industrial Revolution*, 1st ed.; Earthscan: London, UK, 2000.
37. Hoffmann, F. Circular business models: Business approach as a driver and obstructer of sustainability transitions. *J. Clean. Prod.* **2019**, *224*, 361–374. [CrossRef]
38. Merli, R.; Preziosi, M.; Acampora, A. How do scholars approach the circular economy? A systematic literature review. *J. Clean. Prod.* **2018**, *178*, 703–722. [CrossRef]
39. Rossi, E.; Bertassini, A.N.; dos Santos Ferreira Ometto, A.R. Circular economy indicators for organisation considering sustainability and business models: Plastics, textile, and electro-electronic cases. *J. Clean. Prod.* **2020**, *247*, 119–137. [CrossRef]
40. (EMF) Ellen MacArthur Foundation. Circularity indicators: An approach to measuring circularity. *Methodology* **2015**, *23*. Available online: <https://emf.thirdlight.com/link/3jtevhkbuks-9of4s4/@/preview/1?o> (accessed on 30 March 2021).
41. Bastein, T.; Roelofs, E.; Rietveld, E.; Hoogendoorn, A. Opportunities for a Circular Economy in the Netherlands. Available online: <https://www.government.nl/documents/reports/2013/10/04/opportunities-for-a-circular-economy-in-the-Netherlands> (accessed on 8 March 2021).
42. BMUB (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety). Deutsches Ressourceneffizienzprogramm II: Programm zur nachhaltigen Nutzung und zum Schutz der natürlichen Ressourcen. 2016. Available online: http://www.bmu.de/fileadmin/Daten_BMU/Pool/Broschueren/progress_ii_broschuere_bf.pdf (accessed on 8 April 2021).
43. EAJ (Environmental Agency of Japan). Fundamental Plan for Establishing a Sound Material-Cycle Society. 2013. Available online: <http://www.env.go.jp/en/focus/docs/files/20131018-79.pdf> (accessed on 12 April 2021).
44. EIP-AGRI Focus Group. Profitability of Permanent Grassland. How to Manage Permanent Grassland in a Way That Combines Profitability, Carbon Sequestration and Biodiversity. Available online: http://ec.europa.eu/eip/agriculture/sites/agrieip/files/f9_permanent_grassland_profitability_starting_paper_2014_en.pdf (accessed on 8 December 2021).

45. Bocken, N.M.P.; de Pauw, I.; Bakker, C.; van der Grinten, B. Product design and business model strategies for a circular economy. *J. Ind. Prod. Eng.* **2016**, *33*, 308–320. [[CrossRef](#)]
46. Wirtz, B.W.; Pistoia, A.; Ullrich, S.; Göttel, V. Business Models: Origin, Development and Future Research Perspectives. *Long Range Plan.* **2016**, *49*, 36–54. [[CrossRef](#)]
47. Diaz Lopez, F.J.; Bastein, T.; Tukker, A. Business Model Innovation for Resource-efficiency, Circularity and Cleaner Production: What 143 Cases Tell Us. *Ecol. Econ.* **2019**, *155*, 20–35. [[CrossRef](#)]
48. Foss, N.J.; Saebi, T. Fifteen Years of Research on Business Model Innovation. *J. Manag.* **2016**, *43*, 200–227. [[CrossRef](#)]
49. Lüdeke-Freund, F.; Dembek, K. Sustainable business model research and practice: Emerging field or passing fancy? *J. Clean. Prod.* **2017**, *168*, 1668–1678. [[CrossRef](#)]
50. Chesbrough, H. Business Model Innovation: Opportunities and Barriers. *Long Range Plan.* **2010**, *43*, 354–363. [[CrossRef](#)]
51. Amit, R.; Zott, C. Value creation in E-business. *Strat. Manag. J.* **2001**, *22*, 493–520. [[CrossRef](#)]
52. Osterwalder, A.; Pigneur, Y. *Business Model Generation*, 1st ed.; Wiley: Hoboken, NJ, USA, 2010.
53. Zott, C.; Amit, R.; Massa, L. The Business Model: Recent Developments and Future Research. *J. Manag.* **2011**, *37*, 1019–1042. [[CrossRef](#)]
54. Magretta, J. Why business models matter. *Harv. Bus. Rev.* **2002**, *80*, 86. Available online: <https://hbr.org/2002/05/why-business-models-matter> (accessed on 13 June 2021).
55. Osterwalder, A.; Pigneur, Y. Aligning Profit and Purpose through Business Model Innovation. In *Responsible Management Practices for the 21st Century*; Pearson: London, UK, 2011; pp. 61–76.
56. Johnson, M.W.; Christensen, C.M.; Kagermann, H. Reinventing your business model. *Harv. Bus. Rev.* **2008**, *86*, 50–59.
57. Massa, L.; Tucci, C.L.; Afuah, A. A Critical Assessment of Business Model Research. *Acad. Manag. Ann.* **2017**, *11*, 73–104. [[CrossRef](#)]
58. Zott, C.; Amit, R. Business Model Design: An Activity System Perspective. *Long Range Plan.* **2010**, *43*, 216–226. [[CrossRef](#)]
59. Joyce, A.; Paquin, R.L. The triple layered business model canvas: A tool to design more sustainable business models. *J. Clean. Prod.* **2016**, *135*, 1474–1486. [[CrossRef](#)]
60. Rodrigues, V.; Lopes, H.E. The Limits of the Business Model Canvas as a Dynamic Framework. In Proceedings of the SMS Sao Paulo Conference, Sao Paulo, Brazil, 15–17 March 2018.
61. Breuer, H.; Fichter, K.; Lüdeke-Freund, F.; Tiemann, I. Sustainability-oriented business model development: Principles, criteria, and tools. *Int. J. Entrep. Ventur.* **2018**, *10*, 256–286. [[CrossRef](#)]
62. Gassmann, O.; Frankenberger, K.; Sauer, R. *Exploring the Field of Business Model Innovation*; Springer International Publishing: Berlin/Heidelberg, Germany, 2016.
63. Antikainen, M.; Valkokari, K. A framework for sustainable circular business model innovation. *Technol. Innov. Manag. Rev.* **2016**, *6*, 5–12. [[CrossRef](#)]
64. Osterwalder, A.; Pigneur, Y.; Tucci, C. Clarify Business Models: Origin, Present and Future of the Concept. *Commun. Assoc. Inf. Syst.* **2005**, *16*, 1.
65. Richardson, J. The business model: An integrative framework for strategy execution. *Strat. Chang.* **2008**, *17*, 133–144. [[CrossRef](#)]
66. BSI. *BS 8001: Framework for Implementing the Principles of the Circular Economy in Organizations E Guide*; The British Standards Institution: London, UK, 2017.
67. Nußholz, J.L.K. Circular Business Models: Defining a Concept and Framing an Emerging Research Field. *Sustainability* **2017**, *9*, 1810. [[CrossRef](#)]
68. Geissdoerfer, M.; Morioka, S.; de Carvalho, M.M.; Evans, S. Business models and supply chains for the circular economy. *J. Clean. Prod.* **2018**, *190*, 712–721. [[CrossRef](#)]
69. Ghezzi, A.; Cavallo, A. Agile Business Model Innovation in Digital Entrepreneurship: Lean Startup Approaches. *J. Bus. Res.* **2020**, *110*, 519–537. [[CrossRef](#)]
70. Geissdoerfer, M.; Vladimirova, D.; Evans, S. Sustainable business model innovation: A review. *J. Clean. Prod.* **2018**, *198*, 401–416. [[CrossRef](#)]
71. Vogtlander, J.G.; Scheepens, A.E.; Bocken, N.M.P.; Peck, D. Combined analyses of costs, market value and eco-costs in circular business models: Eco-efficient value creation in remanufacturing. *J. Remanufacturing* **2017**, *7*, 1–17. [[CrossRef](#)]
72. Schaltegger, S.; Lüdeke-Freund, F.; Hansen, E.G. Business cases for sustainability: The role of business model innovation for corporate sustainability. *Int. J. Innov. Sustain. Dev.* **2012**, *6*, 95. [[CrossRef](#)]
73. Wells, P. Economies of Scale Versus Small Is Beautiful. *Organ. Environ.* **2015**, *29*, 36–52. [[CrossRef](#)]
74. Geissdoerfer, M.; Savaget, P.; Evans, S. The Cambridge Business Model Innovation Process. *Procedia Manuf.* **2017**, *8*, 262–269. [[CrossRef](#)]
75. Stubbs, W.; Cocklin, C. Conceptualizing a “Sustainability Business Model”. *Organ. Environ.* **2008**, *21*, 103–127. [[CrossRef](#)]
76. Lüdeke-Freund, F. Towards a Conceptual Framework of ‘Business Models for Sustainability’. In Proceedings of the Knowledge Collaboration & Learning for Sustainable Innovation ERSCP-EMSU Conference, Delft, The Netherlands, 25–29 October 2010; pp. 1–28. [[CrossRef](#)]
77. Linder, M.; Williander, M. Circular Business Model Innovation: Inherent Uncertainties. *Bus. Strat. Environ.* **2017**, *26*, 182–196. [[CrossRef](#)]

78. Rosa, P.; Sassanelli, C.; Terzi, S. Towards Circular Business Models: A systematic review on classification frame-works and archetypes. *J. Clean. Prod.* **2019**, *236*, 117696. [[CrossRef](#)]
79. Clift, R.; Druckman, A. *Taking Stock of Industrial Ecology*; Springer Nature: Berlin/Heidelberg, Germany, 2019.
80. Sakao, T.; Brambila-Macias, S.A. Do we share an understanding of transdisciplinarity in environmental sustainability research? *J. Clean. Prod.* **2018**, *170*, 1399–1403. [[CrossRef](#)]
81. Mentik, B. *Circular Business Model Innovation: A Process Framework and a Tool for Business Model Innovation in a Circular Economy (Tese (Doutorado Em Ecologia Industrial))*; Delft University of Technology & Leiden University: Delft, The Netherlands, 2014.
82. Frishammar, J.; Parida, V. Circular Business Model Transformation: A Roadmap for Incumbent Firms. *Calif. Manag. Rev.* **2018**, *61*, 5–29. [[CrossRef](#)]
83. Nußholz, J. A circular business model mapping tool for creating value from prolonged product lifetime and closed material loops. *J. Clean. Prod.* **2018**, *197*, 185–194. [[CrossRef](#)]
84. Lewandowski, M. Designing the business models for circular economy—Towards the conceptual framework. *Sustainability* **2016**, *8*, 43. [[CrossRef](#)]
85. Secundo, G.; Del Vecchio, P.; Dumay, J.; Passiante, G. Intellectual capital in the age of big data: Establishing a research agenda. *J. Intellect. Cap.* **2017**, *18*, 242–261. [[CrossRef](#)]
86. Wamba, S.F.; Akter, S.; Edwards, A.; Chopin, G.; Gnanzou, D. How ‘big data’ can make big impact: Findings from a systematic review and a longitudinal case study. *Int. J. Prod. Econ.* **2015**, *165*, 234–246. [[CrossRef](#)]
87. *National Confederation of Industry, Circular Economy: Opportunities and Challenges for the Brazilian Industry*; CNI: Brasilia, Brazil, 2018; p. 68. Available online: https://static.portaldaindustria.com.br/media/filer_public/70/ef/70efcf44-703c-4ce3-bbe6-63647b66e491/circular_economy_opportunities_and_challenges_for_the_brazilian_industry.pdf (accessed on 18 May 2021).
88. Sassanelli, C.; Rosa, P.; Rocca, R.; Terzi, S. Circular economy performance assessment methods: A systematic literature review. *J. Clean. Prod.* **2019**, *229*, 440–453. [[CrossRef](#)]
89. Di Maio, F.; Rem, P.C. A Robust Indicator for Promoting Circular Economy through Recycling. *J. Environ. Prot.* **2015**, *6*, 1095–1104. [[CrossRef](#)]
90. Figge, F.; Thorpe, A.S.; Givry, P.; Canning, L.; Franklin-Johnson, E. Longevity and Circularity as Indicators of Eco-Efficient Resource Use in the Circular Economy. *Ecol. Econ.* **2018**, *150*, 297–306. [[CrossRef](#)]
91. Jensen, J.P.; Prendeville, S.M.; Bocken, N.M.P.; Peck, D. Creating sustainable value through remanufacturing: Three industry cases. *J. Clean. Prod.* **2019**, *218*, 304–314. [[CrossRef](#)]
92. Zhou, C.; Shi, C.; Wang, S.; Zhang, G. Estimation of eco-efficiency and its influencing factors in Guangdong province based on Super-SBM and panel regression models. *Ecol. Indic.* **2018**, *86*, 67–80. [[CrossRef](#)]
93. Di Maio, F.; Rem, P.C.; Baldé, K.; Polder, M. Measuring resource efficiency and circular economy: A market value approach. *Resour. Conserv. Recycl.* **2017**, *122*, 163–171. [[CrossRef](#)]
94. Scheepens, A.E.; Vogtländer, J.G.; Brezet, J.C. Two life cycle assessment (LCA) based methods to analyse and design complex (regional) circular economy systems. *Case Mak. Water Tour. More Sustain. J. Clean. Prod.* **2016**, *114*, 257–268. [[CrossRef](#)]
95. Huysman, S.; De Schaepmeester, J.; Ragaert, K.; Dewulf, J.; De Meester, S. Performance indicators for a circular economy: A case study on post-industrial plastic waste. *Resour. Conserv. Recycl.* **2017**, *120*, 46–54. [[CrossRef](#)]
96. Geng, Y.; Sarkis, J.; Ulgiati, S.; Zhang, P. Measuring China’s Circular Economy. *Science* **2013**, *339*, 1526–1527. [[CrossRef](#)]
97. Lüdeke-Freund, F.; Gold, S.; Bocken, N.M.P. A Review and Typology of Circular Economy Business Model Patterns. *J. Ind. Ecol.* **2018**, *23*, 36–61. [[CrossRef](#)]
98. Centobelli, P.; Cerchione, R.; Chiaroni, D.; Del Vecchio, P.; Urbinati, A. Designing business models in circular economy: A systematic literature review and research agenda. *Bus. Strat. Environ.* **2020**, *29*, 1734–1749. [[CrossRef](#)]
99. Arksey, H.; O’Malley, L. Scoping studies: Towards a methodological framework. *Int. J. Soc. Res. Methodol.* **2005**, *8*, 19–32. [[CrossRef](#)]
100. Tricco, A.C.; Lillie, E.; Zarin, W.; O’Brien, K.K.; Colquhoun, H.; Levac, D.; Straus, S.E. PRISMA Extension for Scoping Reviews (PRIS-MA-ScR): Checklist and Explanation. *Ann. Intern. Med.* **2018**, *169*, 467–473. [[CrossRef](#)]
101. Munn, Z.; Peters, M.D.J.; Stern, C.; Tufanaru, C.; McArthur, A.; Aromataris, E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Med. Res. Methodol.* **2018**, *18*, 143. [[CrossRef](#)]
102. Peters, M.D.J.; Godfrey, C.; McInerney, P.; Munn, Z.; Tricco, A.C.; Khalil, H. Chapter 11: Scoping Reviews (2020 version). In *JBI Manual for Evidence Synthesis*; Aromataris, E., Munn, Z., Eds.; JBI: Adelaide, Australia, 2020. Available online: <https://synthesismanual.jbi.global> (accessed on 25 September 2021). [[CrossRef](#)]
103. Markard, J.; Raven, R.; Truffer, B. Sustainability transitions: An emerging field of research and its prospects. *Res. Policy* **2012**, *41*, 955–967. [[CrossRef](#)]
104. Grin, J.; Rotmans, J.; Schot, J. *Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change*, 1st ed.; Routledge: London, UK, 2010.
105. Loorbach, D.; Wijsman, K. Business transition management: Exploring a new role for business in sustainability transitions. *J. Clean. Prod.* **2013**, *45*, 20–28. [[CrossRef](#)]