Research Article

Circular Value: A Scoping Review of the Circular Economy's Effects on Value-Creation

Anthony Larsson*

Stockholm Chamber of Commerce, Stockholm, Sweden

Abstract

The current environmental- and resource management problems will force companies to look for solutions that proffer more sustainable improvements in resource productivity, eco-efficiency, and cleaner production. A response to this is the circular economy (CE), which seeks to surpass the current production and consumption model. The aim of this scoping review was to identify what themes are recurrent in the current debate on CE and value-creation, while also identifying in which geographic region these discourses are the most frequent and what types of funding these studies acquired. The study investigated the available CE and value-creation literature in the context of business models. Initially, a total of 5751 research articles were reviewed, but merely 26 articles passed the exclusion criteria. Of these, 11 articles discussed the most recurrent theme, "Optimising models" (i.e., the need to improve routines, business plans etc.). There was a consensus that there is a lack of adequate CE standards and generalizability as many CE frameworks are specific to the industry researched. In conclusion, there is need for a deeper academic discussion on how to measure economic value in a CE and on finding ways of analysing and comparing short- and long-term benefits.

Keywords: Circular Economy, Value-creation, Scoping review, PRISMA

Introduction

Circular economy (CE) was developed to solve the problems of the current industrial setting while disrupting the dominant linear economic model, for environmental and economic sustainability [1]. Based on extracting, producing and disposing, the consequences of the linear model is large amounts of waste and resource scarcity [2]. In contrast, CE seeks to extend the lifespan of products and reduce waste and the need for new resources [3]. The anticipated value derived from CE is sustained economic growth, reduced negative environmental impact, industrial renewal, a more innovative economy, production cost savings, net material savings, increased wealth and employment, risk mitigation, enhanced soil health and land productivity, and sustained economic resilience [4,5]. Also, in pandemic context, COVID-19 demonstrates the potential of circular practices, particularly in regards to the shortage of various resources such as the 2020-2021 global semiconductor chip shortage [6,7].

For the purposes of this study, value-creation may refer to either "hard" concepts, e.g. profitability, or "soft" concepts, e.g. customer/employer satisfaction etc., [8]. CE literature has had a tendency to look at environmental implications or political incentives, rather than discuss CE's impact on creating business sustainability from a value-creation perspective [9,10]. In recent years, the proposed CE indices have veered more towards discussing the preservation of materials, while largely omitting functions that would affect preservation of material [11]. Still, the general familiarity with CE and its value-creating capabilities remains limited at best, considering that a mere 8.6% of the world is currently circular, a number that has decreased in the past couple of years due to increased extraction, build-up of material stocks, and low levels of end-of-use processing and cycling [6,12]. Moreover, previous research on CE has indicated that there is a knowledge gap in terms of the scientific communities' comprehension of the value

of implementing a CE business model [13,14]. Hence, the aim of this scoping review is to identify what themes are recurrent in the current debate on CE and value-creation, while also identifying in which geographic region these discourses are the most frequent and what types of funding these studies acquired [15,16].

Materials and Methods

This review has conducted a scoping review to discern patterns across the available CE research papers [17]. This review was devised and conducted solely by the author. The literature was sought out using the Web of Science (WOS) database. A supplementary, identical, search was conducted in the SCOPUS database to provide full coverage of the area. This study aimed to identify all modern English-language studies pertinent to the field of CE in a value-creating context. Although a scoping review, this study has opted to use the guidelines presented by the PRISMA statement for Systematic Reviews and Meta-Analyses Guidelines and its four-phase flow diagram (Identification, Screening, Eligibility and Included) when processing the articles [18,19].

The following inclusion criteria were selected throughout the identification process:

a)   Journals from the business management, economics, social studies, natural sciences, environmental studies, or related disciplines (i.e., non-quantitative sciences)

b)   Published during the 2010s (i.e., between 2010–2019)

c)   Full-length article (i.e., no reviews, meeting abstracts or proceeding papers etc.)

d)   Articles had to have received at least 10 citations if published between 2010–2016 and at least one citation if published between 2017–2019 (i.e., within the past two calendar years from the point in time this review was conducted).

The inclusion criteria for the screening process were:

a)   No duplicates

b)   Published in an indexed journal containing a "DOI-number"

c)   Published in the English language.

The inclusion criteria for eligibility were that the articles would in some way concern the following topic:

a)   Article mentioned circular economy in its abstract

b)   Subject matter concerned circular economy and value-creation in a business context, or equivalent.

Entries mentioning more than one of the search terms (such as "circular economy", "sustainability" and "value-creation") in a way that did not link the terms in any context were excluded. Likewise, articles that made mere passing/peripheral mention of circular economy and value-creation in irrelevant contexts were also excluded. The articles were selected using a pre-defined search string. The identification stage involved selecting qualitative studies written in scientific fields such as business management, social studies, economics, environmental studies, natural sciences, or similarly relevant disciplines. Quantitative studies were not considered since there are too many possible variables to account for in the given context to accurately attempt to quantify them. Due technological advancement, only articles published in the 2010s have been considered to ensure that the research is still relevant to the academic discourse. Only full-length articles were included for comparability. This meant excluding reviews, meeting abstracts, proceeding papers etc.

The screening stage excluded duplicates and articles written in any non-English language. All included articles published prior to August 2017 (two years prior to the date of the literature search) had to have had received at least one citation to ensure the included articles had achieved some form of circulation in the academic community. Only indexed articles (i.e., containing a "DOI-number") were included in order to ensure full traceability.

The eligibility stage postulated that all included articles mentioned "circular economy" in its abstract and that the article's subject matter concerned CE as well as value-creation in a business context, or something corresponding to one. These steps were secured by reading the abstract and keywords for each respective article. For the included studies, the full-length articles were reviewed. The main messages of each article were then summarised, along with number of citations in WOS in Table 1.

The search strategy used a combination of the search terms "circular econom*" AND sustainab* AND environment* AND "business model*" OR value-creat* AND "value creat*". The search terms were selected, after minor modifications, in consultation with a senior researcher at an academic institution specialising at creating relevant academic search strings. The search was conducted on August 9, 2019 and included a search period of all articles released in the 2010s. The data extraction included all retrieved articles from the selected databases by importing them into EndNote X9. The findings were then controlled for possible duplicate entries. Studies failing to meet the inclusion criteria (along with ostensibly irrelevant studies), were subsequently removed. The final sets of articles were then tabulated into an Excel table with full bibliographic references for each article (date of publication, journal, issue, page number etc.). The data variables were type of journal; number of citations; country of journal origin; country of first author origin; type of funding body (if any).

Results

The procedure for selecting the articles has been presented in Figure 1:

All the returned articles were published within the span ranging from 2010 to 2019. The initial search in WOS yielded 5751 cited articles. After filtering the articles according to PRISMA, the

end number of included articles were 26. Table 1 summarises the main particulars about each article.

The first column identifies the article. The second column lists the number of citations each article has received in WOS. The third column designates an overarching theme to each of the articles. The fourth column identifies what country each first author is affiliated with (in cases of multiple listings, the first one has been chosen). The fifth and final column identifies what source of funding (if any) has been used to carry out the research described in each article. With 136 citations, Lewandowski (20), was the most cited article.

Table 1: Synopsis and themes of retrieved articles.

Article	No. of Citations (according to WOS – Aug 2019)	Main Recurring Theme	First Author Country of Affiliation	Funding
Lewandowski [20]	136	Optimising models	Poland	None stated
Park, Sarkis, and Wu [21]	103	Matching CE with enterprise	USA	None stated
Moreno et al. [22]	55	Optimising models	UK	Grant
Scheepens, Vogtländer, and Brezet [23]	51	Optimising models	The Netherlands	EU-programme
Manninen et al. [13]	35	Optimising models	Finland	Grant
Niero and Olsen [24]	33	Conserving environment/resources	Denmark	Grant
Ranta, Aarikka-Stenroos, Ritala, and Mäkinen [25]	20	Policy framing	Finland	Governmental agency
Heyes, Sharmina, Mendoza, Gallego-Schmid, and Azapagic [26]	18	Matching CE with enterprise	UK	University research project
Niero, Hauschild, Hoffmeyer, and Olsen [27]	10	Optimising models	Denmark	None stated
Leipold and Petit-Boix [28]	9	Optimising models	Germany	Grant
Goyal, Esposito, and Kapoor [29]	6	Conserving environment/resources	India	None stated
Veleva and Bodkin [30]	6	Matching CE with enterprise	USA	None stated
Ünal, Urbinati, and Chiaroni [31]	5	Policy framing	Italy	EU-programme
Yang, Smart, Kumar, Jolly, and Evan [32]	5	Optimising models	UK	Grant
Mishra, Hopkinson, and Tidridge [33]	4	Matching CE with enterprise	UK	None stated
Ranta, Aarikka-Stenroos, and Mäkinen [34]	4	Optimising models	Finland	Governmental agency
Sumter et al. [35]	4	Optimising models	The Netherlands	Grant
Aboulamer [36]	3	Matching CE with enterprise	United Arab Emirates	None stated
Barbu, Florea, Ogarca, and Barbu [37]	2	Policy framing	Romania	None stated
Ceptureanu, Ceptureanu, and Murswieck [38]	2	Policy framing	Romania	None stated
Frishammar and Parida [39]	2	Matching CE with enterprise	Sweden	Governmental agency
Horvath, Khazami, Ymeri, and Fogarassy [40]	2	Matching CE with enterprise	Hungary	None stated
Hussain and Jahanzaib [41]	2	Conserving environment/resources	Pakistan	None stated
Larsen, Masi, Jacobsen, and Godsell [42]	2	Optimising models	Denmark	None stated
Ünal, Urbinati, Chiaroni, and Manzini [43]	2	Optimising models	Italy	None stated
Jensen, Prendeville, Bocken, and Peck [45]	1	Matching CE with enterprise	Denmark	EU-programme

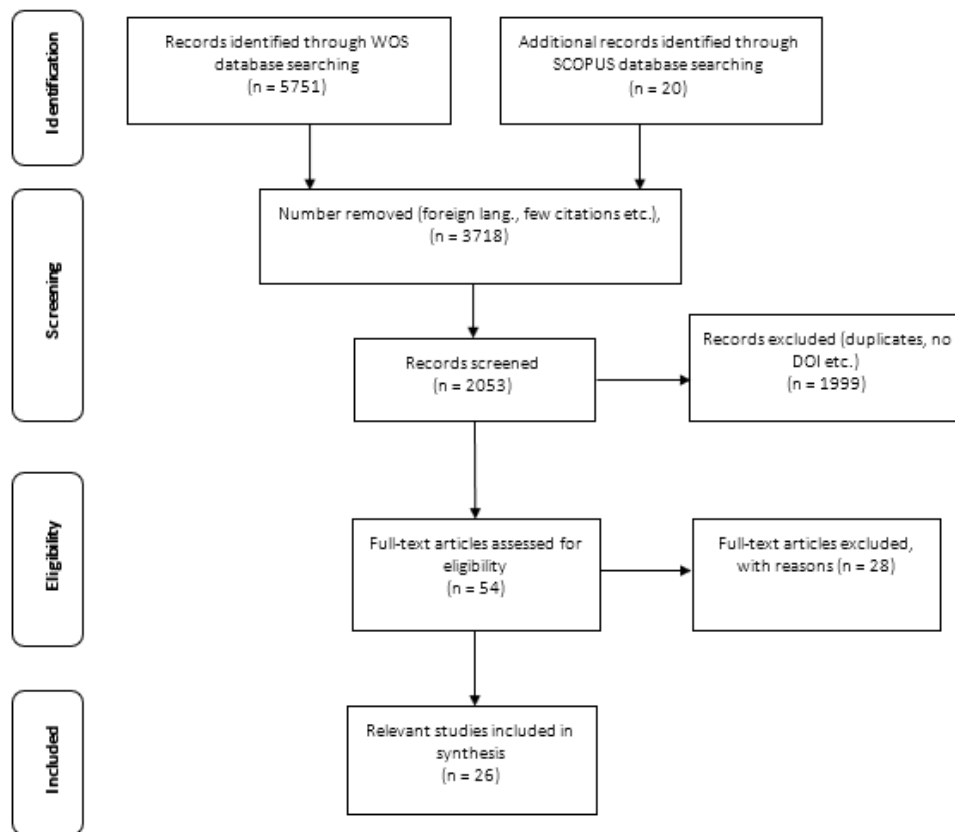*Listed in order of citations given (according to WOS).

Figure 1: Flowchart according to the PRISMA guidelines, using the search string: "circular econom*" AND sustainab* AND environment* AND "business model*" OR value-creat* AND "value creat*". Adapted from Moher et al., [19].

Four recurring themes were discerned:

I. Conserving environment/resources (i.e., the need/ability to use resources more efficiently and/or leaving less impact on the environment),

II. Optimising models (i.e., the need to improve routines, business plans etc.),

III. Matching CE with enterprise (i.e. finding ways in which businesses can make use of CE) and

IV. Policy framing (i.e. the need to change/revise policies or undertake political action).

The articles belonging to the first theme category emphasised the need/use/advantage of CE in a context of conserving the environment or resources. The articles in the second category discussed the need to improve/refine existing models, routines and/or processes in a way that would allow for a more favorable

precondition for CE implementation. The third theme category entailed the need of connecting CE with the most favourable enterprise in order to succeed. The fourth and final category discussed the need of framing the policy narrative in such a way that it would ensure maximal impact for CE

Findings

As demonstrated in Table 2, the highest-ranking journal, Resources Conservation and Recycling, only accounted for three publications. The second-highest ranked journal, Journal of Cleaner Production, on the other hand, accounted for eight publications, more than any other journal in the study. Three of the articles were published in a Dutch-based journal, with an additional three published at a Swiss journal, two articles published at a Romanian journal, and one article each published at journals based in Slovenia and Lithuania respectively. Four articles were published in US-journals, while most articles, 12, were published at UK-based journals (Table 2).

Table 2: The journals included in this study, the country in which they are based, and their respective Impact Factor (IF) score (as provided via WOS).

Rank (per 2020 IF Score)	Journal	Country Where the Journal is Based	No. of Articles (N=26)
1 (10.204)	Resources Conservation and Recycling	The Netherlands	3
2 (9.297)	Journal of Cleaner Production	UK	8
3 (8.836)	California Management Review	USA	1

4 (7.547)	Journal of Manufacturing Technology Management	UK	1
5 (7.044)	Production Planning & Control	UK	3
6 (6.946)	Journal of Industrial Ecology	USA	1
7 (3.251)	Sustainability	Switzerland	3
8 (2.347*)	Advances in Production Engineering & Management	Slovenia	1
9 (2.028)	Journal of Business Economics and Management	Lithuania	1
10 (1.983*)	Amfiteatru Economic	Romania	2
11 (-)	Thunderbird International Business Review	USA	2

* Denotes 2019 IF Score.

As was illustrated in Table 1, 21 of the first authors were European-based, with the greatest number of representation found in the UK and Denmark, with four authors each. The remaining European-based authors were located in Finland (three authors), Italy, the Netherlands followed by Romania, with two authors in each respective country, and Germany, Hungary, Poland and Sweden with one first author based in each country. USA had the greatest non-European representation, with two authors, followed by India, Pakistan and the United Arab Emirates, with one first author based in each respective country. Also, as seen in Table 1, 13 of the articles did not state what type of funding (if any) they had received, whereas six of the articles were funded by various grants. Three studies were funded by various government agencies, with another three funded by various EU-programmes. Finally, one study was funded via a university research project.

The results, as per Table 1, indicate that the 26 articles discussed different aspects of CE, with the most common one concerning the need of optimising extant models, or developing new optimised equivalents. Other themes covered also included how CE could be suited to conserve the environment and/or resources for the companies, or how policy could/ought to be changed to facilitate a better CE transition. Also discussed was how CE would be connected to certain enterprises in which it was more likely to generate a greater impact, or how to create a narrative that would steer its efforts better. The commissioned funding of CE research appears ambiguous to some extent, given that 50% of the included articles did not declare how their studies had been financed. 23% of the funded articles had been financed by grants, while other forms of funding (or non-funding) appeared throughout the other articles.

In 81% of the cases, the first author representation stemmed from Europe (especially the UK and the Scandinavian countries), while 84.6% of these were published in journals based in Europe. This indicates the topic of CE and value-creation in a business context is of greatest relevance to British and Scandinavian readers following European-based academic journals. As illustrated in Table 3, the most recurring themes (and the number of articles covering them) were as follows: "Optimising models" [11]; "Matching CE with enterprise" [8]; "Policy framing" [4]; and "Conserving environment/resources" [3] (Table 3).

Table 3: An overview of the most recurrent themes throughout the retrieved articles.

Central themes	Articles supporting the theme	Total no. of articles supporting the theme
Optimising models	Lewandowski [20]; Moreno et al. [22]; Scheepens, Vogtländer, and Brezet [23]; Manninen et al. [13]; Niero, Hauschild, Hoffmeyer, and Olsen [27]; Leipold and Petit-Boix [28]; Yang, Smart, Kumar, Jolly, and Evan [32]; Ranta, Aarikka-Stenroos, and Mäkinen [34]; Sumter et al. [35]; Larsen, Masi, Jacobsen, and Godsell [42]; Ünal, Urbinati, Chiaroni, and Manzini [43].	11
Matching CE with enterprise	Park, Sarkis, and Wu [21]; Heyes, Sharmina, Mendoza, Gallego-Schmid, and Azapagic [26]; Veleva and Bodkin [30]; Mishra, Hopkinson, and Tidridge [33]; Aboulamer [36]; Frishammar and Parida [39]; Horvath, Khazami, Ymeri, and Fogarassy [40]; Jensen, Prendeville, Bocken, and Peck [44].	8
Policy framing	Ranta, Aarikka-Stenroos, Ritala, and Mäkinen [25]; Ünal, Urbinati, and Chiaroni [31]; Barbu, Florea, Ogarca, and Barbu [37]; Ceptureanu, Ceptureanu, and Murswieck [38].	4
Conserving environment/resources	Niero and Olsen [24]; Goyal, Esposito, and Kapoor [29]; Hussain and Jahanzaib [41].	3

Concluding Discussion

The aim of this scoping review was to identify what themes are recurrent in the current debate on CE and value-creation, while also identifying in which geographic region these discourses are the most frequent and what types of funding these studies acquired. The included articles discussed the value creating capabilities of CE in a business context focusing on circular business models. All articles concur that there is a lack of frameworks and tools that could aid in

identifying and analysing the value created and captured in circular business models. Therefore, all investigated articles except Yang [32] and Leipold and Petit-Boix [28], introduced and analysed new frameworks either through combining existing ones or through creating their own.

A consequence of establishing new frameworks in the academic world, however, is the salient risk of a plethora of different business models cropping up that each profess to adhere to CE, but are in reality very niched and exclusive to the particular area being researched. This problem highlighted in some of the studies [20,28,43]. As indicated by Lewandowski [20], there is a need for a more comprehensive framework that accounts for standards that are (more or less) universally applicable to any and all kinds of different companies. A positive aspect raised by Leipold and Petit-Boix [28] in regards to not having a strict framework and/or standardised models, is that this leaves room for additional innovation.

One reason for the lack of frameworks could be found in the articles to be due to the high complexity of circular business models. A majority of the studies explained that the system level of CE implies that the business models, and the value brought forth, are highly complex. Several of the studies agreed that circularity means combined and co-evolving values, as well as holistic systems, something that differs vastly from linear economies. Manninen et al., (2018) explicitly stated that evaluating the environmental value proposition is difficult to do on a system level. Also, Leipold and Petit-Boix [28] enforced that to date, we do not know which cycles in CE that contribute most to a sustainable future economy, because there are no tools for measuring such complex parameters.

The complexity of the circular systems is further discussed by Leipold and Petit-Boix [28], since they mean that the high level strategies formed on a political level lacks in understanding the complexity of circular business models on business level. In addition, all the included articles show that the complexity results in unclear directives, uncertainties and difficulties in implementation, lack of frameworks and standards as well as different perceptions of value-creation in a CE. In addition, it is evident that these problems occur in, and have effect on, both macro and micro levels. All investigated articles concur that the current situation is sub-optimised for CE and is preventing CE from either being implemented at all, or from achieving the sustainability and value that it ought to.

As mentioned in the introduction, the concept of "value-creation" is particularly ambiguous in the context of CE given the lack of established measurements and/or KPIs [45-47]. Since the extant measurements are adapted to fit the mainstream linear model, it is difficult to quantify and communicate the value derived from circular processes [48]. This would in turn account for much of the difficulty for present-day literature in describing the value-creation abilities of CE, as depicted in the studies mentioned in this review.

The importance of investigating value-creation in a CE cannot be overstated, since this literature review clearly shows that switching to a circular business model does not necessarily mean that the value that is promised from that business model will be achieved. Scheepens et al., [23] explain this fact in their study when they highlight the pitfalls of CE in terms of losing out on one value because of insufficient understanding of how to capture it. As an example, the authors mention that a circular business model can have positive impact on the environment but on the other hand does not provide enough customer value. This could have devastating consequences for the success of the business model and could be the reason to why it fails. Thus, a CE business model is not always in and of itself both sustainable and profitable. If the business cannot understand how to create and capture all the combined values, it will most likely fail in some regard.

The profitability and economic value of CE are explicitly investigated in some of the articles. Moreno et al. [22] discuss how circular business models can generate revenues over the entire life span and categorise the sources of revenue in each circular business model. Although the categorisation of circular business model archetypes and their primary source of revenue made in the study shows that it is indeed possible to measure value in a CE in monetary terms, it is necessary to investigate what that potential theoretic revenue will translate into, in practice. To exemplify, when leasing products, the product becomes an asset on the balance sheet rather than direct revenue to the business. A consequence of this is that there are difficulties in financing the business model.

Ranta, Aarikka-Stenroos and Mäkinen [34] complement the research of Moreno et al., [22] in this regard, since they provide an analysis of generated revenue from circular business models in practice. In all of the analysed cases, the main economic value was generated from switching from virgin materials to more cost-efficient recycled alternatives. CE prioritises reuse over recycling due to an increased value-preservation and decreased environmental impact from reuse. This shows that the most environmentally sound option is not the most cost-effective alternative in a CE. Although, as highlighted in the study, the reason for this result is most likely because reuse entails extensive transformational changes for the business venture beyond merely adding more recycling. The findings uncovered by Ranta, Aarikka-Stenroos, and Mäkinen [34] illustrate the importance of enabling reuse to generate economic value for businesses for CE to be economically viable. One key aspect to enable such business models is to adapt laws and regulations to foster transitions from linear to circular. For instance, this could entail a tax reduction on labour and a tax increase on resources [49].

The academic discourse highlighted in this study illustrates one of the chief drawbacks with disruptive transitions such as CE, namely the exorbitant costs for enterprises operating on a traditional business plan to switch to a circular model. The problem is compounded by the fact that various external factors, i.e., laws

and regulations, still favour the traditional business models. Therefore it is essential to consider the long-term economic value of transition along with the expected future external changes such as the increase of resource prices and the increased demand for commodities. Moreover, one also needs to account for the possibility of increased regulatory pressure in the future. If it were possible to run simulations of the economic value created from linear businesses operating in a long-term scenario and compare it to the economic value generated from circular businesses in the same setting, the results would in all likelihood show an increased economic value for the circular businesses.

The overall findings from the reviewed papers serve to emphasise the need for a deeper academic discussion on how to measure economic value regarding time efficiency. The opportunity cost of not making the transition would entail substantially larger expenditures.

A troubling development is that much of the literature has obfuscated the source of research funding (if any) and this needs to be improved in forthcoming research in the area. The European overrepresentation among the extant CE literature indicates a growing interest for CE in this region. This leads to two conclusions. Regarding non-European countries, there is an ostensible need for research in regard to the value creating and sustainability capabilities of CE. As for European counties, there is a need for further research that focusses specifically on how to implement CE in companies, municipalities, and communities within and across the nations. Moreover, there is a need for developing new tools for analytics and discerning new metrics and touch points.

To this end, future researchers will need to direct more effort into this space to provide proper guidance and knowledge of how industrialised countries can overcome existing barriers in their home countries to implement CE-conformant processes. Moreover, there is a need for increased awareness of CE in less-industrialised countries. This will not only help the corporations secure combined value-creation but will also help serve the scientific community.

Overall, the articles discussing the most recurring theme, "optimising models", all suffer from a predisposition towards the same problem, namely a lack of generalizability. While the articles generally agree on the sense of urgency as well as that there is a need to find sustainable solutions, they do not provide a clear consensus regarding the link between CE and traditional value-creation, beyond highlighting that the focus of models seen in extant studies often rely on particularly case-specific frameworks. Since there is a pressing need of revamping the status quo of sustainable economic models on a global level, research also must address this area rather than just focus on specific business settings or components within the value-chain. Hence, the need for additional research in this space still stands. Moreover, CE is inherently disruptive in its nature, meaning that it seeks to replace existing models and present itself as a more viable, and value-creating, alternative.

The disruptive nature means that many factors are affected by the transition. To this extent, a disruptive model that seeks to change the status quo structure will find itself taking on a compound model with intricate complexities on so many different levels. Hence, solid and rigorous research is needed in order to bring a paradigmatic shift to fruition [50,51].

This also means that research needs to be more centralised and synergised. A transformation is needed on a global level with global standards, which is why it is important that researchers do not work in silos. When frameworks and measurements are produced and tested on a select few cases, e.g., the cases identified in this study, much valuable time and momentum is lost. Already now, there is a need to identify the synergies between extant research to expand this work. In this, it would be possible to achieve a commonality in the measurements and KPIs used, as well as in the frameworks and business models, while also using a standardised set of terminology. Should such standards be successfully implemented, it would be possible for new groups of businesses and organisations to be formed on a global scale with the tools and routines to adopt a joint focus on CE [52].

At the end of the day, it is only possible to capture the value of CE-transition by understanding it in its fullest essence. As evidenced by this study, current efforts are stymied by the fact that the current scientific understanding of CE is sub-optimised all the while as CE has become something of a "buzzword" for an increasing number of business enterprises. While several businesses will readily make claims of wanting to incorporate it in their long-term strategies, it effectively risks becoming nothing short of a hollow "token-promise" to claim a false sense of short-term goodwill instead of establishing a model seeking to secure a sustainable mean of value-creation. While true that CE indeed concerns sustainability and viable business models, it is imperative that the concept and practices of CE are clear and understandable by those that aim to implement it. Given that the transition to CE relies heavily on evidence of the value it brings forth, it may be possible to ultimately develop frameworks and/or metrics for CE upon the availability of more rigid research.

Acknowledgement

Conflict of Interest

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