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Mapping circular economy principles and servitisation approach in business model canvas: an integrated literature review

Sehrish Atif¹

Abstract

It is a common perception that circular economy (CE) principles positively influence the servitisation strategy. The firms improve their productivity and resource/energy efficiency by engineering functional efficacy in a sustainable product. However, the managerial practices that support this distinctive business model (BM) are relatively sparse despite their liaisons. Therefore, this paper is focused on addressing this gap by investigating the managerial practices that firms can implement to explore the downstream opportunities of CE and servitisation BM. This paper uses a systematic literature review (SLR) approach to frame a theoretical model. The findings were improved by cross-validation using a text mining technique, demonstrating how organisations may co-create and extract value through CE and servitisation to develop a flexible management system. This study used the business model canvas antecedents to map a set of managerial practices to understand the mythography of the servitisation approach with CE principles. The findings show that identifying key stakeholders assists a firm in selecting an appropriate strategy based on sustainable value propositions that include cost structure and revenue streams to close the resource loop. Managerial commitment is critical in achieving the maximum economic, environmental, and societal potential. A few research agendas with distinct research orientations are proposed to mitigate the significant research gaps in CE and servitisation literature. This study provides managers and practitioners with some intriguing insights as it emphasises the need to select a suitable strategy to utilise a firm's resources successfully.

Keywords Servitisation, Circular economy, Business model, Business model canvas, Value chain

Introduction

Since the industrial revolution, businesses have evolved better business models (BMs), strategies comprising efficient supply chain activities competing for priority, and scrutinising fast-changing technical processes [97]. Therefore, this study explores the managerial practices that a firm can implement. Furthermore, the increased dissipation of an enormous cycle of waste production and extreme shortages of resources has led the world to

adopt circular economy (CE) paradigm within their BM to create and capture value [18, 93, 120, 134]. Evidence suggests that value capture has been considered the primary challenge of CE [96, 103, 132] that can be overcome by shaping servitisation strategies [87] with stakeholder's engagement/collaboration [87, 126], despite several publications supporting that the CE paradigm is vital in enabling servitisation that eventually creates new employment and other growth prospects. Little attention has been devoted to investigating the specific role of responsible management in a flexible management system [133].

Ellen MacArthur Foundation [39] advocates that firms are required to make alterations in their BMs as it is the framework by which they create and capture

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value through renting, leasing, and/or sharing circular products [28, 60, 70, 136]. This transition leads the world towards sustainability principles, and managers and executives are responsible for aligning a firm's objectives with practical implications. The infusion of the CE principle holds critical importance as it proves that economic developments can be derived in conjunction with environmental robustness [96]. Eventually, this will lead to a flexible and sustainable management system that will help firms adjust their resources (material, capital, and human) [36].

At the same time, the value of products/services is maintained in the economy for as long as possible through functional/resource efficiency and improved productivity. CE aims at regenerating and restoring the discarded or used products and retrieving the useful waste flows through prolonged life cycles [63, 78, 119, 124] that calls for profound changes in managerial practices of a firm. At the same time, servitisation inspires firms to boost their resource utilisation by offering shared platforms at different levels [1, 70, 87, 111, 115]. Product ownership is retained, and the responsibility is left with the manufacturer/provider for the product over its life cycle [24, 69]. Thus, the current study will identify the components of business model canvas (BMS) to visually represent implementation of CE and servitisation elements into the BM considering the impact on the wider ecosystem.

Little attention has been given to managerial implications when a firm adopts this hybrid business model (CE and servitisation) [10, 85, 137]. There is a growing need to adopt sustainable practices in supply chain to reduce the environmental impact of production and consumption. Thus, the motivation and justification for this study are that the current study is among few studies that highlight the extent CE and servitisation can provide solution to achieve the sustainability goals. The consumers are becoming more environmentally conscious and demanding sustainable products and services. Thus, it needs to be clarified how circular product captures value while generating revenues by designing a feasible servitisation package [46] and how companies should manage this interface [64] And finally, what would this be a suitable typology to implement this combination (CE and servitisation) in their BM [70]. Which two research questions have been formulated:

RQ1

What is the relationship between CE and servitisation?

RQ2

Is it feasible and profitable for businesses to implement CE principles and a servitisation approach within their business model to co-create value?

Therefore, to address these research questions, this study emphasises assessing the affiliation of CE principles and servitisation approach by critically reviewing previous research conducted to understand their typology and synthesise this hybrid archetypal to shape future research agenda. The base for this study lies in examining the interrelationship between the two constituents to understand the value for multiple stakeholders [69]. Where the flexibility element in the CE principle emphasises improved corporate social responsibility, the servitisation approach helps improve a firm's management performance [36].

Moreover, this study analysed the journal articles to identify the configurations and designs in the CE-based industrial system and servitisation literature by mapping their specific constituents in BMC, displaying how managerial practices span firm boundaries. Thus, this study provides theoretical and managerial implications supporting the CE and the servitisation literature. This paper conducts a systematic literature review (SLR) using 152 scientific articles to better identify the CE and servitisation/PSS field. The current study's substantial, practical, and theoretical contribution includes identifying innovative ways of designing and managing the supply chain of a circular product and servitisation in the context of supply chain sustainability. The researcher develops a framework and circular model to enhance understanding of the linkages between CE and servitisation from a sustainable supply chain context.

This paper is organised as follows: The next section (second section) presents a summary of the methodology used to conduct this SLR and the use of the data mining approach; the third section presents the literature review about CE principles and servitisation approach; the fourth section displays the mapping of relevant managerial practices that a firm set out to design unique activities by coordinating forward and reverse logistics to get added competitive advantage in the market, design of insinuating revenue models, and innovative customer value propositions; while the final section (fifth section) presents the conclusion of the analysis along with future research directions for researchers is presented and advances avenues for theoretical and practical implications from a managers perspective.

Methodology

This study adopts the SLR method presented by Denyer and Transfield [34]. It is an evidence-based approach that identifies the current and progressing knowledge using secondary data from a relevant field of interest. Knowing how the relationship among key constituents (CE and servitisation) occurs is viable, especially the related circumstances to conclude their harmony. Moreover,

SLR aids in providing a deeper understanding of the key variables in a structured way to unfold research gaps and identify the future research agenda in an organised manner [125]. The key principles for validating the quality of evidence depend on its transparency, inclusivity, explanatory, and heuristic nature. The author attempted to synthesise the SLR in a systematic, transparent, and repeatable method to achieve objective and unbiased observation that improves the knowledge base of the main variables (CE and servitisation [70, 82, 83, 97, 135]). The SLR process, however, has been made simple, rapid, and evidence-based with the use of new knowledge management tools (data mining). In addition to the manual data discovery method, text mining is employed in this study to enable a rapid and evidence-based data discovery procedure. This method is also known as data discovery or knowledge since it helps turn unstructured data into a structured format [51]. Two main steps have been adopted in the SLR process. A descriptive analysis is the first step, giving a set of classifications for various data attributes, while thematic analysis, which can be reported utilising aggregative and interpretative approaches, is the focus of the second phase. The results are then disseminated through study research findings, gaps, and future scope.

Application of CIMO logic

The data sources utilised for analysis influence the quality of SLR. Therefore, the preliminary stage of the SLR process is mostly database segmentation, where the data is segmented into different meaningful groups, sections, or classes. During this phase, the author chose the keywords and used manually written terms to search them in various databases. While conducting SLR, it is critical to analyse the literature's relevance by considering cross-disciplinary perspectives. Consequently, this study used only scientific peer-reviewed papers, specifically from business management-related fields. After careful consideration, the author focused on titles, abstracts, and keywords relevant to the topic and downloaded the finalised papers for analysis. The databases used are Wiley, Emerald insight, Scopus, and Taylor and Francis. Initially, a structured keyword search was conducted. Subsequently, the author decided to limit the time, i.e. 2013–2022 and the chosen language was English. In the first phase of question formation for SLR, the author used Denyer and Transfield's [34] CIMO criteria (context, intervention, mechanism, outcome) to understand the link between CE and servitisation such as:

Context

This research used the text mining technique to synthesise the effect/relationship among the selected keywords

from the research papers selected during the screening process. Text cleaning was used during the text mining operation to remove unnecessary material for SLR. According to Denyer and Transfield [34], "context" refers to the personnel, relationships, and arrangements that comprise the organisational setting or conditions previously investigated. According to CIMO logic, the main emergent themes from CE and servitisation literature perceive the CE principle as an enabler for servitisation through increased product longevity [24], Kühl [70], closed-loop supply chain [79, 136], and resource/functional efficiency [17, 54, 71].

Intervention

In the second phase, the author applied data analysis and synthesising to discover a correlation among the key variables (CE and servitisation). Text mining was utilised to help with data analysis by estimating the frequency of words and phrases. It has been discovered that there is a high correlation between word frequency and critical description in the selected research documents. This element of CIMO logic determines or infers the effect of an event by comparing interventions in different contexts. As a result, the flaring of operations through multi-stakeholders [1, 69], value creation and capturing [82, 83, 135], competitive advantage [58], and reconfiguration of BM [1], Chiappetta Jabbour et al., [25, 44], Jabbour et al., [57] while redefining the supply chain management [8, 72] has been widely investigated to produce a desirable result. However, it has been noted that only a few authors have presented the adoption of CE principles in the servitisation approach using BMC. Therefore, this study used the BMC antecedents to analyse an insight into the customer value proposition offered through various channels and the revenue stream in a structured way.

Mechanisms

The database of 152 publications was extensively examined, and text mining was used to uncover a mechanism among the important factors. The keywords were selected as "circular economy", "servitisation", "product-service system", "business model", and "value creation and capturing" to identify the constellation between different interventions that bring a particular type of outcome and their settings of the management and operations field. Examining the context from the CE and servitisation literature led the author to identify the level of partnership among the CE principles and servitisation approach. This helped the author to understand complex interventions by identifying various theories/mechanisms that underpin an intervention, such as supply chain management [8, 72], cost management [59], and change management [134].

new, as it has been a prevalent theme for a decade. For the development of the classification family, data synthesis was performed using multiple preset criteria. From several operations and management aspects, predetermined criteria were identified. The author used the clustering technique, a text mining approach for uncovering relevant data distribution and patterns in disorganised data. The cluster diagram in Fig. 1 presents a close holistic approach between CE and servitisation. A close relation and interdependence among the key variables, as well as their components, is evident from the text mining analysis. That is why a majority of the clusters show various strategic management terms used by different authors to examine the CE and servitisation concept in business management disciplines such as industrial strategy towards CE [79, 87, 116, 140], sustainable development [44, 49, 72, 78, 113], business model [4, 44, 45, 46, 87, 112], decision-making [23, 75, 110, 139], eco-innovation [28, 33, 45], stakeholders [87, 128, 139], and revenue-sharing contracts [77]. Hence, a strong association among each cluster is clear that links within the broad domain of CE and servitisation literature. Each cluster grows into a larger idea map that provides more specific information. The text mining-identified keywords, phrases, frequencies, classifications, and clusters offer the necessary assistance for SLR data extraction and synthesis stages. As a result, this study uses BMC to demonstrate the business model components to present a comprehensive view of a circular business model based on the servitisation method.

Data extraction and evaluation

The main aim of this study is to investigate the intervention or the relationship among the key variables (CE and servitisation). The researcher has conducted a systematic literature review (SLR) because it provides a comprehensive understanding of the current state of

CE and servitisation knowledge, identifying research gaps for future researchers and providing insights into best practices for implementing CE practices with servitisation. Thus, the third phase involves downloading the finalised articles published in pre-decided time (2013–2022) from the databases. The author used text mining techniques in this phase of identifying data sources to break large volumes of accumulated data into smaller chunks and analyse their connection with each other. The four databases used in the current review are Wiley, Emerald Insight, Scopus, and Taylor and Francis. These databases are the most influential and credible data storage systems as they store high-quality, peer-reviewed papers. The researchers decided to stick with the four databases because using multiple databases can lead to duplication of data, which may have impacted the accuracy and comprehensiveness of the current review. Therefore, Table 1 presents the search strings and the outcome.

Table 1 shows the search strings for CE and servitisation relation search string along with the interchange terms used (PSS). It is evident that recently CE literature has gained anonymous attention from researchers and practitioners, whereas servitisation is still an under-researched study area. The biggest cluster is seen for business model research. After finalisation, the author downloaded the relevant peer-reviewed journals, excluding the conference papers, thesis/dissertations, duplicated articles, and book chapters. The researchers took a systematic and rigorous approach to evaluate the research papers for the final sample to ensure the research outcome will be comprehensive, accurate, and relevant to the research question. Therefore, after careful consideration, 152 journal papers provided an overview of existing knowledge about the combinative theme of the CE principle and servitisation approach in the business management.

Table 1 Search string and the outcome

Keywords and combinations	Wiley	Emerald Insight	Scopus	Taylor and Francis	Total
Circular economy (CE)	3463	1103	2198	1893	8657
Servitisation/servitization	44	817	4	204	1069
Product-service system	206	862	28,367	332	29,767
Business model (BM)	19,022	25,000	1851	16,590	62,463
Business model canvas (BMC)	102	525	1812	206	2645
CE and servitisation	7	127	2198	16	2348
CE and BMC	13	41	1957	13	2024
Servitisation and BMC	54	379	156	243	832
CE, servitisation and BMC	82	107	66	132	387
Finalised papers	33	28	39	52	152

Validating the quality and reliability

The fourth step was validating the data's quality and reliability in accordance with the research protocol. Thus, the author followed Newbert's inclusive and exclusive criteria to shortlist the scientific papers:

- Empirical papers from business and management subject area.
- CE and servitisation literature from multidisciplinary disciplines such as supply chain management, accountancy, and marketing.
- Papers are written using the English language only.
- Scientific papers from peer-reviewed journals only.
- Papers with at least one keyword (CE, servitisation, PSS, BM, and BMC) were selected in the title or abstract.
- Non-academic documents/papers were excluded.
- Duplicate papers were excluded.
- Papers out of the pre-selected time (2013–2022) were excluded.

CE and servitisation literature present extensive research already done in the related fields that have emerged independently. Therefore, this study analysed the scientific paper from CE and servitisation literature closely revolving around BM or BMC strategic tools.

Table 2 presents the key journals in the research domain within the pre-decided timespan (2013–2022), highlighting the most relevant papers based on CE and servitisation. It is evident from the table that CE and servitization are two topics that have gained increasing attention in recent years. For circular economy literature, some key journals include *Ecological Economics*, *Journal of Cleaner Production*, *Journal of Industrial Ecology*, and *Resources, Conservation and Recycling*. These journals focus on sustainable production and consumption, environmental management, waste reduction and recycling, and industrial symbiosis.

Regarding servitisation literature, some key journals are the *Business Process Management Journal*, *Electronics*, and *International Journal of Operations & Production Management*. Most of these journals cover service-oriented business models, customer satisfaction, digital transformation, and supply chain management.

One important point is that some of the journals in the list are interdisciplinary, as they often publish research from various fields and viewpoints, such as engineering, economics, management, and environmental science. Thus, the researcher selected 152 research papers published in reputed journals that are highly regarded in the academic community and essential resources for scholars and practitioners interested in CE and servitisation research.

Moreover, this rigorous process aided the author in finalising 152 relevant papers to conduct the critical analysis review for this study. Hence, Figs. 2, 3, 4 show the yearly number of publications related to CE and servitisation:

Figure 2 displays an increasing trend of CE and servitisation research during 2013–2022. The content of Fig. 2 and the description provided suggest that CE and servitisation are established concepts that have been researched extensively in recent years. The figure shows the yearly publication of articles related to CE and servitisation, and it is evident that both topics have gained significant attention from researchers over the last decade. The concentration of articles during 2019–2020 suggests that there was a particular focus on these topics during that time period. This information indicates that there is a growing awareness of the importance of CE and servitisation, and that research in these areas is likely to continue to expand in the future.

Figure 3 presents the yearly number of publications on CE. It suggests that the number of papers related to CE has been increasing steadily over the past few years, with a peak in 2019 with 19 papers published. The absence of papers related to the CE literature in 2022 is because the research sample was finalised in January 2022, so all the papers published after that were excluded from the sample. Overall, Fig. 3 highlights the increasing interest and importance of the circular economy as a research topic.

Figure 4 presents the yearly number of published papers on servitisation used as a sample in the current study. It is seen that from 2018 there has been a prominent increase in research servitisation. The reason might be related to the Ellen MacArthur Foundation as they have been promoting the idea of servitisation as a circular economy strategy. The Foundation's report, "Towards the Circular Economy", highlighted the potential for servitisation to contribute to a more circular economy by decoupling economic growth from resource consumption. The report discusses how companies can shift from selling products to selling services and highlight the benefits of doing so, such as increased resource efficiency and reduced waste. The Foundation has continued to promote servitisation as a key strategy for the circular economy in subsequent reports and initiatives.

The authors that researched the main variables of this study were from different parts of the world. Therefore, Fig. 5 will present various author collaborations for CE and servitisation research, either discussing the BM perspective or using BMC strategic tool.

This study analysed 152 scientific journals to map the CE principle and servitisation approach on BMC. It is evident from Table 1 that numerous studies have researched these topics from various perspectives.

Table 2 Key journals in the CE and servitisation research domain

Key variables	Journal names	References
Circular economy	Applied sciences	[9]
	Cogent business and management	[37]
	Computers in industry	[82]
	Ecological economics	[60, 62]
	Energies	[97]
	Forest policy and economics	[31]
	J. of manufacturing tech. management	[22, 28, 132, 41]
	J. of business research	[6]
	J. of evolutionary economics	[45]
	Int. J. of Adv. Manufacturing Techn	[26, 79, 92]
	Int. J. of Information Management	[109, 71]
	Int. J. of Entrepreneurial Knowledge	[55]
	Int. J. of Op. & Production Management	[80, 7, 110]
	Int. J. of Retail and Distribution Manag	[104]
	Int. J. of Simulation Modelling	[20]
	Global J. of Flexible Systems Manag	[36, 38, 122, 133]
	J. of Business Strategy and the Environment	[33, 116, 49, 140]
	J. of Cleaner Production	[13, 23, 44, 54, 69, 72, 77, 78, 93, 113, 130, 134]
	J. of Industrial Ecology	[63, 81, 84, 119]
	Procedia Manufacturing	[8]
	Management Research Review	[3, 88, 108]
	Management Decision	[2, 102]
	Manag. of Environ. Quality: An Int. J	[19, 21]
	Procedia CIRP, Procedia Manufacturing	[58]
	CSR and the Environment	[103]
	Resources, Conservation and Recycling	[35, 50, 118, 126]
	Robotics and Computer-Integrated Manufacturing	[86]
	Sensors	[59]
	Social Enterprise J	[131]
	Smart and Sustainable Built Environment	[127]
	Sustainable Production and Consumption	[30]
	Sustainability	[4, 10, 11, 18, 37, 48, 51, 96, 101, 106, 112, 114, 117],
	Servitisation	Business Process Management Journal
Electronics		[100]
Int. J. of Op. & Production Management		[12, 85, 90]
Int. J. of Production Research		[138]
Future Business Journal		[56, 61, 98]
Int. J. of Production Economics		[5, 14, 47, 115, 123]
J. of Business Research		[6, 15, 32, 29, 52, 64, 66, 100, 105, 111, 125, 135]
J. of Management and Governance		[129]
J. of Operations Management		[1, 27, 94, 128]
J. of Services Marketing		[43]
J. of Service Theory and Practice		[95, 139]
Modern Supply Chain Research and Applications		[82, 83]
Procedia CIRP, Procedia Manufacturing		[8, 10, 11, 71, 76, 89, 91, 107, 124]
IEEE		[137]
Industrial marketing management		[67, 68, 75]
Production planning and control	[136],	
Technological forecasting and social change	[41, 46, 57, 65]	

Table 2 (continued)

Key variables	Journal names	References
	R and D management	[15]
	Research Policy	[17]
	Resources Policy	[25]
	Supply Chain Management	[73, 120],
	Sustainability	[24, 42, 53, 99]

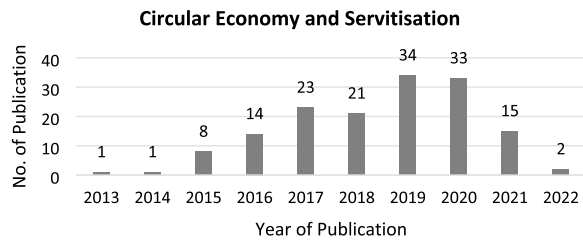


Fig. 2 Yearly number of 152 articles used for analysis

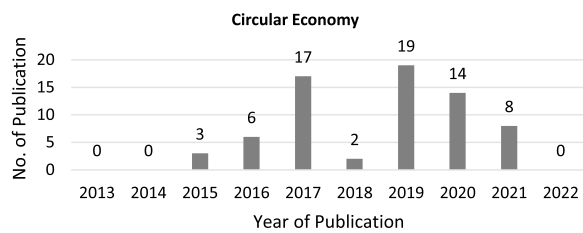


Fig. 3 Yearly number of published papers on circular economy

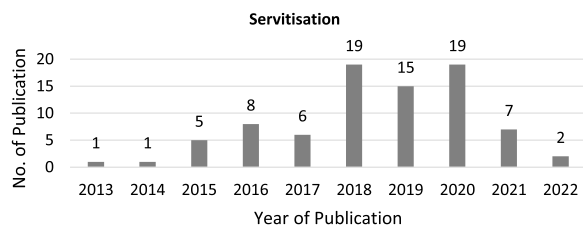


Fig. 4 Yearly number of published papers on Servitisation

However, the red cluster shows the papers that specifically used the CE paradigm. In contrast, the blue cluster represents the papers that involved PSS/servitisation research. At the same time, all the other discusses one or another feature of BM or BMC in CE or/and servitisation/PSS literature.

Figure 6 shows the country-wise distribution of the 152 articles presenting the location of the author’s affiliation. Among 152 journal articles, it was discovered that there had been a significant increase in the number of research publications published in the UK or other European

countries. According to preliminary research, the traditional focus of CE literature was on reintroducing used and discarded materials/products into the market, which was later shifted to a focus on studying tactical and strategic approaches to extend the life of used/discarded products using a shared platform that serves as the foundation of servitisation. It is noted that most of the CE literature is conducted in nations such as the USA, the UK, and other European countries since they are more capable in the research and development (R&D) sector. It is believed that innovation has piqued the interest of practitioners and researchers in these countries. However, developing countries have presented some useful research for the CE and servitisation study fields in recent times.

Literature review

Circular economy

The notion of circular economy (CE) is believed to be an anthology of various holistic views aiming to achieve a sustainable and waste-free society created in the 1990s [130]. Due to global economic uncertainty, the CE paradigm has been getting added attention to cater to the negative impact of the traditional linear model (take-make and dispose of) [4, 13, 28, 72]. Therefore, it has become prevalent for businesses to shape a circular business model by synchronising the value propositions towards sustainable economic benefits and environmental welfare [4, 87, 117]. CE is a paradigm shift where the manufacturers aim to prevent the depletion of resources and enhance the resource and energy efficiency that facilitate sustainable development [44, 76, 113].

Figure 7 presents the linear framework of the CE business model. As seen in the diagram above, the CE principle is a system-based concept that focuses on decoupling revenues from used and discarded products at various stages of a product’s lifecycle [78, 79]. It involves closing the loop in the supply chain [44, 78, 86], that intends to minimise the waste by recovering the value through reverse logistics [120, 134]. There are two important aspects of CE to be considered. The first one is the green economy/biodiversity/biomimicry paradigm [9, 48, 132]: effective use of material flow that emphasis using the consumables products that are made using the least toxic

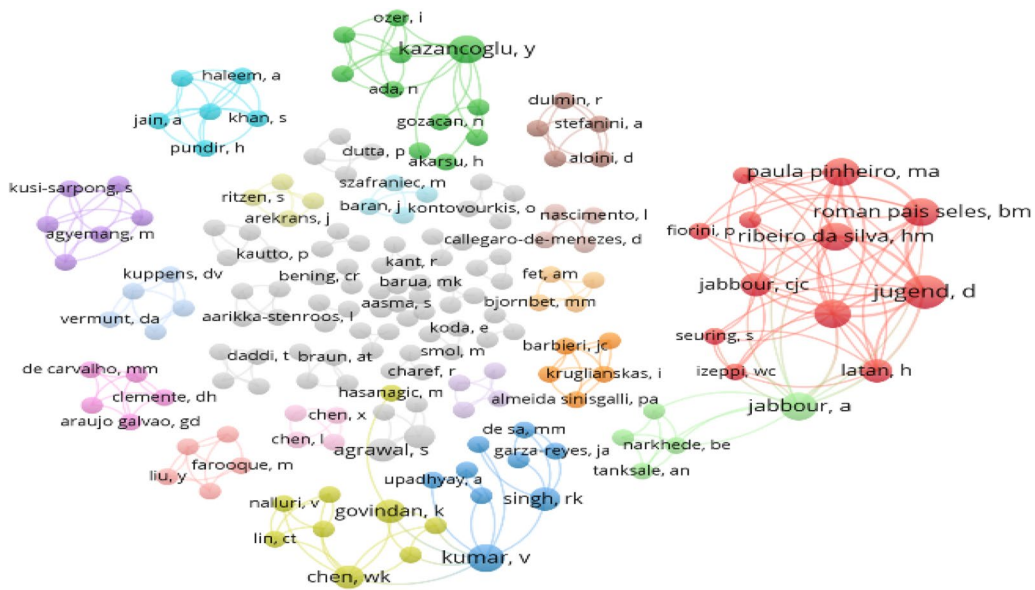


Fig. 5 Author collaboration for BMC related CE and servitisation literature

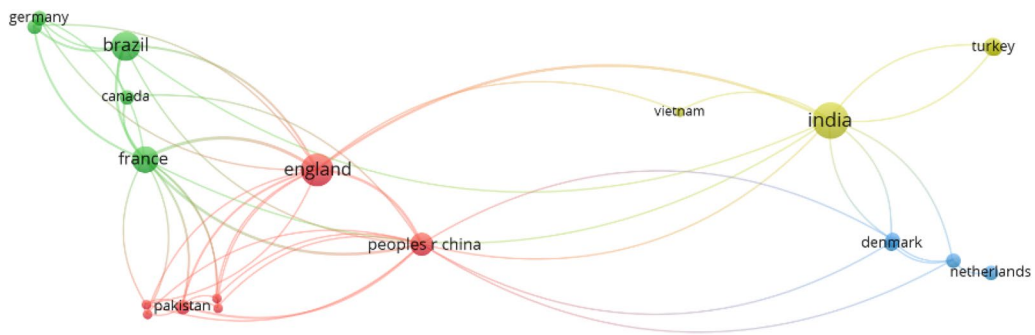


Fig. 6 Country-wise articles

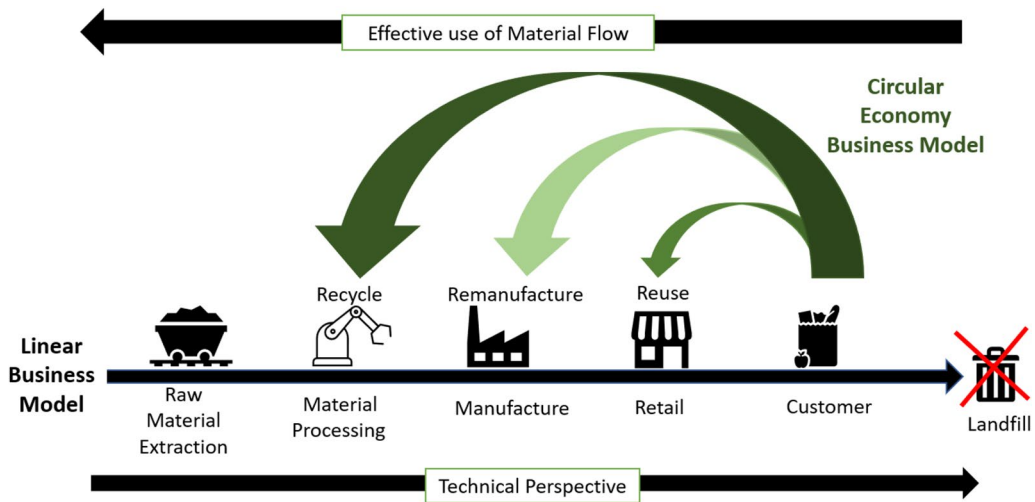


Fig. 7 Linear economy and circular economy Source Author's creation

biological components. It would not be wrong to say that a green economy is a prerequisite for CE ([132], while the second element is associated with a technical perspective [87, 92]. These are the associated operations and procedures (recycling, refurbishing, resale, or other related services) that design a circular product by using minimum resources with superior efficacy through the shared platform [4, 53, 63, 111]. Hence, the CE paradigm is paraphernalia in the market as a business concept among practitioners and policymakers to tackle environmental depletion, biodiversity loss, and societal welfare [30, 117].

Servitisation

Manufacturers are gradually incorporating service-based strategies to renew business practices that enhance the perceived value across the product lifecycle and sustain competitive advantage in the market [1]. Servitisation is often labelled as a shift from product-oriented manufacturers to a system offering a mix of products and related services to create a differentiation strategy [56, 95]. The earliest concept of servitisation is linked to [141], who coined the term “servitisation” in the late 1980s [70] and defined it as firms that offer fuller market packages or bundles of a customer-focused package of goods, services, maintenance, upgrade, customer-support, self-service, and knowledge [4, 40, 70].

The terms “Servitisation” and “Product-Service System (PSS) are often used interchangeably in the business management literature [15, 42]. From the above definition, it is evident that servitisation is a service-driven transformational process. It is consistent with Fig. 8 that this differentiation strategy enhances the

perceived value by replacing a product-centric BM with a product-service model ([37, 67]. Research has shown that servitisation incentivises firms to optimise resource utilisation [137]. This transition requires an endearing change in organisational structure strategy, culture, processes, and human resources to rapidly adapt to the renewed business environment [6, 139].

Later [94] defines servitisation as: “The innovation of an organisation’s capabilities and processes so that it can better create mutual value through a shift from selling product[s] to selling Product–Service Systems” [94]. According to the above definition, PSS consequently servitisation brings strategic and competitive benefits for firms [41]. Servitisation is customer-focused and plays a vital role in a firm’s value creation; therefore, firms must develop new competencies and capabilities. It entails firms introducing paradoxical capabilities that are expected to strongly impact product development, lifecycle management, and cost analysis [80].

A review of current research suggests that servitisation offers a customised bundle of products and services to fulfil customer needs to create customer value [130], where shifting from traditional sales-oriented organisations to service-based ventures is preferred [69]. A service typology classified servitisation into two types: services supporting the customer, such as the operating lease of an asset, and result-oriented, where the provider manages an asset on behalf of the customer. Another classification of types of services is presented in Table 3, proposed by Baines and Lightfoot [80] according to the market offerings by the manufacturers such as:



Fig. 8 Servitisation is a key enabler on the path to a viable circular economy business model *source* Author’s creation

Table 3 Types of services

Base services	These are basic/core services offered by manufacturing firms Example: a machine tool or related part with the product
Intermediate services	These include services related to repair and maintenance services offered with the product The involvement of the service provider/manufacturer is relatively more than the base service offerings
Advanced services	The revenue stream of advanced services is associated with usage and penalties through a contractual agreement agreeing to share the rewards and risks associated with products

Findings and discussion (antecedents of business model/key activities)

Findings

Over the last decade, these paradigms have constantly been getting attention from several academic fields, like organisational behaviour, business model design, social psychology, financial management, and operational management [10, 71, 61]. Despite this, there are still numerous research gaps related to managerial practices, such as: when servitisation is profitable. [7, 129], what are the associated risks [15], whether the transformation to a CE principle is achievable and measurable [136], and whether the manufacturing firms should confine to this transition [15]. This SLR is developed to construct a framework that presents an accumulated constructive knowledge of the key variables (CE and servitisation) and their managerial implications.

One of the focuses of this study is to assess the relationship between servitisation and CE. Traditionally, the economic system was based on linear BM where only virgin material would enter that, leading to unnecessary resource loss in the production chain and end-of-life waste [30, 84] and their primary objective was increasing economic returns primarily [25, 45, 136]. Management and business studies-related literature has always given unprecedented importance to BM. It is a management hypothesis that defines the company policies regarding their targeted customers and their expectations, how the enterprise satisfies its segmented customers, how they will finance its operations, and how the enterprise makes profits [28, 29, 129]. The management executives are constantly pressured to curtail the competition by adopting an efficient and adaptable BM that delivers flexible designing and transparency in manufacturing/offering a high-quality product and service package [1, 42, 87].

BM has gained added interest from researchers and practitioners as this framework has been studied under different contexts such as: “Business Model”, “Business Model mapping”, Business Model Framework”, and “Business Model Canvas” Studying this shift would aid in identifying the potential prospects in the combined BM from the firm’s perspective. [68]. Therefore, it is particularly beneficial for management executives to understand the internal and external forces before adopting CE principles within their servitisation business model [53, 103]. Our research highlighted that the current CE literature had given unprecedented prominence to understanding the firm-level success and failure to nurture innovation within their business operations [29, 54, 98, 134], whereas servitisation literature has analysed BM with transitions in the service network, different network actors [111], competency-based capabilities [111], benchmarking [90], value domain [10, 23, 28].

Therefore, this paper focuses on investigating the main managerial practices to align the key components of servitisation BM that align with one or more of the CE principles. In this study, the author has decided to draw upon the manifesto comprising nine components of business model canvas (BMC) presented by Alexander Osterwalder.

Key partners

Firms need to identify their key partners, such as producers, distributors/retailers, end-user/other businesses, policymakers, government, and licence providers in order to operate the business and satisfy their individual needs [1, 30, 69]. Therefore, several studies researched the BM from the manufacturer’s perspective and analysed the connectivity and flexibility components of supply chain management [133]. This comparison is because implementing the CE principle within the servitisation approach can only be fruitful if both the supplier and the customers work together towards attaining environmental and operational sustainability in the market [27].

Key activities

Key activities vary significantly among the firms competing in the same market. Many scholars analysed the broader streams of key activities from CE lenses [71, 114] in the light of servitisation approaches [42, 70]. In particular, several contributions have studied the two perspectives to establish a theoretical framework that formulates the business strategy for product longevity through servitisation [14, 89] and the other one is related to reconfiguration of servitisation BM for sustainable design practices [54, 102]. Therefore, this calls for reconfiguring an innovative BM that leverages the economic, social, and environmental welfare where customers are at the forefront [122].

Key resources

The principal goal of CE is to minimise resource usage, energy use, and waste generation during production [5]. Hence, the analysis suggests that several independent research studies the key resources from distinct perspectives, such as consumption and preservation of natural resources [25], sustainable process through the CE paradigm to keep the resources to optimise the material flow [20], and dependencies on resources/human resource management [43, 88]. However, these studies still lack sufficient empirical investigation [3, 94].

Value propositions

This element describes the drivers of differentiated customer value. [19, 23, 69]. Establishing an effective relationship with all the value-chain actor’s impacts

leveraging the shared value and drive to achieve a collective goal. In the servitisation business model, services are central to creating additional value [1], while in the CE context, reducing production, material consumption, and waste is the main value creator [101]. The literature suggests that the concept of CE has acted as a catalyst in the evolution process of traditional manufacturing firms [2, 103, 113, 134] while servitisation is a strategy or a solution for value co-creation in the reconfiguration of the ecosystem [42, 129]. Although value proposition is one of the elements of the BM value domain, researchers have given it exclusive importance [23, 69]. The morphology used by researchers to investigate the value domain is

- Value propositions (products and services) [66, 110, 127, 135].
- Value delivery (risks) [15, 110], delivery processes [55], and customer/market segmentation [47].
- Value creation (stakeholder perspective [87, 116] and value chain [81, 132]),
- Value capture (finances, costs, revenues, and returns [45, 123, 138]).

Customer relations

It is an indisputable fact that strengthening the customer relationship leverages a firm's visibility in the market [65]. Stakeholders play a vital role in developing and implementing strategic interventions in a circular BM [38]. Compared to other elements of BMC, customer relationship has received a less managerial commitment in academic research through service orientation [74]. It is a vital intervention of the CE paradigm to drive consumer behaviour towards sustainable consumption to mitigate the adverse environmental impact. At the same time, the servitisation approach extends a product's lifecycle through multiple material loops.

Channels

Setting up a reliable and steadfast supply chain network across the manufacturing procedure is at the infancy stage [46]. Accordingly, several authors indicate a need for managerial studies covering material inflow and outflow through agile reverse and forward logistics throughout [35, 134]. When implemented in servitisation BM, the CE paradigm requires dynamic competencies from collaboration with stakeholders [26]. In today's competitive world, the demand for shrewd products with improved functionality and value-added services integrates with closed-loop processes across the supply chain network [70]. This shift is an opportunity for economies to decouple economic gains from the price unpredictability of resources to maintain a sustainable competitive

advantage in the market. Our SLR highlights strong evidence about possible favourable outcomes of infusing circular principles in a sustainable product through servitisation for value creation along the forward supply chain [104, 134]. Adapting to the change in BM requires process adjustments and proactive flexibility to be in harmony by opting for circular initiatives [36]. In following SLR, it has been observed that not many authors have determined the value-retention of used/returned products, or the risks and costs associated with reversing logistics [70].

Customer segment

The findings reveal that the firms are opting for servitisation BM to acquire new customers by offering innovative value-added services [15] along with the circular product [5, 28, 70]. The managers and the strategic executives need to choose a viable strategy that would help them to provide maximum satisfaction to their customer segments because the customer is not interested in owning the product, but they are only interested in the benefits or the outcome that it delivers [10, 111]. In this domain, the most cited reason for integrating the CE principle in servitisation affirms that it reconciles the growth stance with environmental prudence by delivering superior perceived value for the customers [63, 76, 100]. Moreover, it is also evident from CE literature that this transition ensures uninterrupted economic growth in extended market segments by offering sustainable product and service packages.

Cost structure

According to Ellen MacArthur Foundation, the CE is a holistic interpretation of the systematic approach towards sustainability adopted by businesses [39]. Various authors have used different expenditure structures to investigate the cost patterns because the CE paradigm incurs high upfront costs at the initial stages [134], and servitisation grants sustainability and quality assurance on a long-term basis [99]. At the same time, the servitisation approach is seen as the technical components and procedures that emphasise engineering and designing a sustainable product that stays in circulation for longer periods. Both components focus on the usage and optimisation of waste or discarded products. Therefore, to remedy the risks and other additive costs incurred in the forward and reverse supply chain, the whole system must follow change management [22, 70, 72]. Managers need to measure the impact of CE adaption in servitisation BM [73, 88]. This SLR observed that CE could present meaningful opportunities by investigating the technical, economic, and compliance challenges [134].

Revenue stream

Most of the literature that analysed the adoption of the CE concept within the servitisation BM emphasises developing multiple revenues [109]. These revenue streams are generated by using waste or discarded resources and using them to develop a new product or using them as a by-product for a new product [5, 84, 136], and by designing a sustainable and energy efficient product [132]. Whereas some authors have highlighted a huge drawback of this novel BM, i.e. the revenue stream in this BM takes a longer period as compared to the linear model where the value is paid at the time of sale [32, 33, 109]. Therefore, firms need to plan wisely to counter the negative effect of time difference on their cash flow [131]. Therefore, it will not be improper to say that there are scarce theoretical and empirical studies on this domain [88].

Moreover, the CE is defined by majority of the authors as an economic system that swap end-of-life concept by recirculating the material/resources in the supply chain to achieve sustainable development by creating

environmental, social, and economic benefits for current and future generations [50, [62]. While most of the management literature conceptualised value domain at the system [70] or network levels, highlighting the role of organisational integration [90] and change management [139] to achieve optimal performance [82]. Kohtamäki et al. [65] suggested that firms adopt servitisation strategies to minimise the associated costs and enhance customer services [65, 139]. A study was presented by Reim, Sjödin, and Parida [111] that identified major capabilities and market-related challenges and presented a contingency model to accommodate four servitisation strategies (service extension, service benchmarking, digitalisation, and customer co-creation [107, 111]. Thus, most servitisation literature combines process views with an inter-organisational perspective discussing the manufacturing firm’s efforts in implementing CE principles to co-create and deliver the value propositions [52].

Figure 9 illustrates the mapping of CE principles and servitisation approach in a BMC, depicting the following analysis results. It is evident from the analysis that

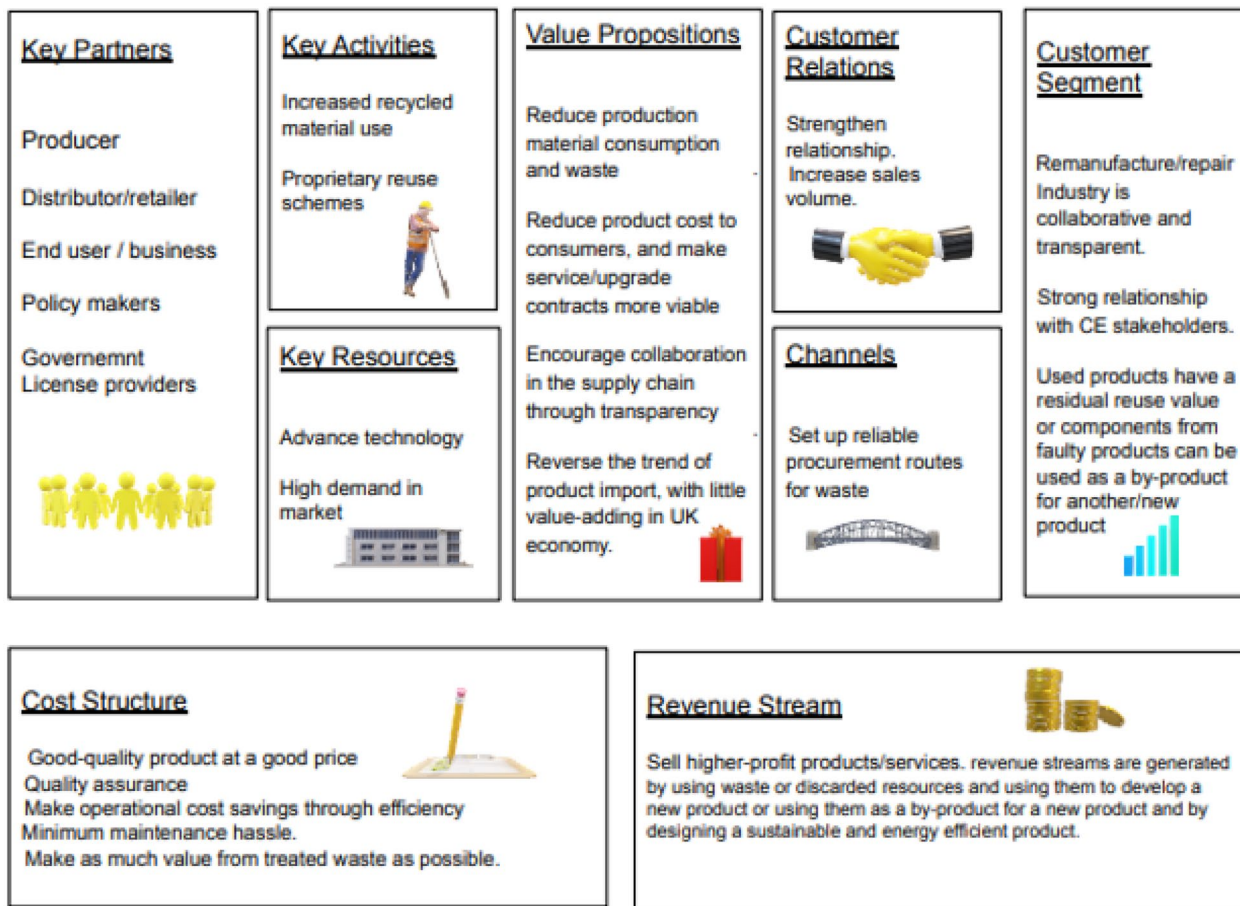


Fig. 9 Mapping of CE principles and servitisation approach in business model canvas

manufacturing firms are adopting the CE paradigm within their BM to support the functionality and efficiency of the product (Bressanelli et al., [10, 71] as well as deliver maximum value to their customers [105]. Thus, understanding the implication of value co-creation and identifying the firm's dynamic capabilities provides greater insight for managers to decide the innovation infusion linked to ecosystem-related capabilities into their strategy [107]. In this context, most of the management literature gives a great emphasis on redesigning the long-life use of products [12, 121] with enhanced durability [79] with the aim of closed-loop-supply-chain through 10R [5]. While few articles analysed the theoretical perspective to bridge the gaps in strategy and innovation development literature by investigating the conflicting interests among stakeholders [1, 139], misalignment of strategy [70, 139], and ineffective knowledge management across the value chain [40, 70]. The existing CE and servitisation provide theoretical guidelines or assumptions about this transformation. However, there is still a lack of case studies or practical empirical studies that investigate their interdependencies of them [95]. Thus, to understand the implementation of the CE paradigm within the servitisation BM, it is highly recommended that all the above antecedents of the CE and systematic approach of servitisation must receive holistic attention from academia and practitioners to study from strategic management and BM's perspective [132].

Discussion

Circular product refers to the concept of designing and producing products in a way that reduces waste and maximises resource efficiency. In a circular economy, products are designed to be easily repaired, reused, and recycled rather than discarded after a single use. This approach can lead to various environmental and economic benefits, such as reduced resource consumption, lower greenhouse gas emissions, and improved company profitability.

Companies can implement servitisation strategies to capture value and generate revenues from circular products. Servitisation involves bundling a product with additional services, such as maintenance, repair, and disposal, to create a more comprehensive offering for customers. This can help companies to differentiate themselves from competitors, increase customer loyalty, and generate additional revenue streams.

Companies should design a feasible servitisation package that meets customers' needs and aligns with their overall business strategy to manage the interface between circular products and servitisation. This may involve identifying key customer segments, developing

tailored service offerings, and implementing effective pricing and marketing strategies.

A suitable typology for implementing this combination may involve categorising circular products and services based on their level of complexity and customisation. For example, companies could offer basic repair and maintenance services for standard circular products while offering more advanced customisation and design services for premium products. This could help to balance the cost and complexity of servitisation with the potential benefits of increased customer satisfaction and revenue generation.

Conclusion and future recommendations

Conclusion

The first research question was formulated to analyse the relationship between CE principles and the servitisation approach within the strategy context. Later identifying the future research area in managerial practices from the key CE and servitisation literature. Therefore, the author adopted an SLR using Denyer and Transfield's CIMO criteria to develop a critical analysis [34]. This SLR helped the author to reach a strong stance on CE and the servitisation domain. There have been many independent studies covering these topics, but there is a relatively sparse combinatory management-practices-based investigation on these despite their strong links. Therefore, this paper attempts to address this gap by conducting an SLR to critically evaluate the management practices in extensive CE and servitisation literature. The second research question, however, tried to determine more about value co-creation when organisations implement the CE principle and servitisation approach to their business models. The results conclude that circular servitisation is evolving based on the development of innovative BM integrated with value creation and alignment of the supply chain network, while managerial practices play a vital role in moderating value creation and value capturing that impacts the shaping of this distinctive BM.

This paper constitutes the base of managerial practices, identifying how the servitisation approach supports the CE paradigm concerning BM, value proposition, and supply chain network. Findings show that CE is a novel phenomenon, so managers are required to consider a system perspective when designing their strategy. Due to the volatile and unpredictable market state, firms need to shift from product orientation to service orientation to achieve potential added value in the CE [69, 134, 135]. Our results also show that servitisation will further support CE by connecting end-of-life product design with the business strategy [79, 130, 139].

Limitations

The CE and servitisation are evolving concepts that have recently seen several advancements. Comprehending the CE and servitisation from the BMC lens helped unveil future research agendas. However, this study is not free from limitations. A *possible limitation* is the small sample size, which includes reviewing only a small proportion of research articles. Additionally, another limitation is related to the scope of the study, which only focused on the business and management subject area, excluding other potential subject areas that could provide valuable insights into the CE and servitisation concepts. Furthermore, the study only considered articles written in English, which may have limited the inclusion of relevant studies published in other languages. Finally, the study only considered articles up to September 2021, and new research could have been published since then.

Future recommendations

The current proposed research agenda highlights the following affluent gaps that need to be addressed by identifying the dissimilarities between CE and servitisation literature:

Definition and typology

Firstly, this SLR has helped the author observe that the CE paradigm is regarded as a concept that prolongs the life cycle of a product in most of the definitions [2, 11, 140]. At the same time, the servitisation strategy has been observed to be akin to the CE principle [42, 70], where the managers and strategic executives are required to adjust their internal structure to support the transition phase [55, 87]. Our analysis points out a lack of consensus on the definition of CE and servitisation. Most authors have used Kirchherr et al. [62] as the basis for advancement in the competitive market. Irrespective of keeping the resources in circulation for as long as possible is not always a sustainable option [2]. At the same time, few authors provide insight into the system ecology [103]. Therefore, for new circular products and services and CE policies, we suggest assessing a unified definition that covers economic, environmental, and social parameters [21, 134], while a unified definition of servitisation and its type is also recommended [95]. Furthermore, firms are required to achieve a differentiated advantage in the competitive market through the adaption, integration, and reconfiguration its resources, skills, and functional competencies in a digital environment by involving customers in the value co-creation process [74, 107]. Ideally, there should be more empirical research from operational management discipline to determine a data-driven

discussion supporting informed decisions towards realising the CE principle from a servitisation perspective [95, 108, 113].

Antecedents of business model/key activities

Secondly, this paper proposed the elements of CE typology [84]-based servitisation BM [1, 42, 70, 87]. The simulation results demonstrate that these two innovative trajectories should find a convergence to avail the potential benefits from servitisation applications in a CE [63, 69]. Most of the literature covered SLR debates on a firm's resources to be heterogeneous, which makes the firm different and unique compared to the others in the market. The same goes for its traits and capabilities. Resources (human and material are said to be the focal point that commands the strategic formulation of a company). Therefore, mapping different BMs to understand their key drivers and barriers that affect a firm's growth and diffusion has been one of the principal directions for future research [10, 88, 140]. Despite the critical role of servitisation in achieving the CE value drivers, i.e. increasing the resource efficiency, closing the loop, and extending the product lifecycle [40, 42, 95] will expand the network among various stakeholder groups [87, 106]. The literature provides scarce insight into the value propositions of transformation of this innovative BM [7]. When the effect of servitisation BM may vary on contextual factors [70], therefore, an interesting issue for future researchers could be to analyse the cause-of-effect relations of this transition from lenses of customer engagement, reconfiguration of the revenue model, optimisation of the cost structures, and reorganising the external linkages that offer servitisation [63, 91].

Value creation and capture domain

Thirdly, managerial commitments play a vital role in aligning the resources with a firm's strategic objectives. Therefore, the diversification through reconfigurations of value propositions in CE must be consistently managed than just being sustainable. On the other hand, servitisation is seen as an approach that brings new market opportunities [70, 87] by adapting to customer and other stakeholders' needs that will eventually generate income [115]. Results suggest that a value proposition should emphasise value creation and value capturing and delivery [2, 43, 102, 113]. Consequently, circular or remanufactured components reduce the associated manufacturing costs, enhance the functional efficiency of used resources, and reduce wastage [106, 113]. In this paper, we discussed the product lifecycle extension cycle, where the customer and provide manufacturer user could have long-term relationships in a market where substitutes are easily available through servitisation [1,

Table 4 Conclusions and future research directions

Extant empirical research themes and key sources	Current research gaps	Future research questions/directions
<p><i>Definition and typology</i> [2, 11, 42, 21, 55, 62, 71, 74, 84, 87, 95, 103, 108, 114, 134, 140]</p>	<p>When talking about the CE paradigm and servitisation approach, following SLR points out a need for more consensus on the definition of CE and servitisation and its type</p>	<p>We are assessing economic, environmental, and social parameters to measure the viability of the CE principle in a servitisation setting. There should be more empirical research to determine a data-driven discussion supporting informed decisions towards realising the CE principle from a servitisation perspective</p>
<p><i>Antecedents of business model/key activities</i> [1, 7, 10, 40, 42, 63, 69, 71, 87, 88, 91, 95, 106, 140]</p>	<p>Mapping the key elements of CE principle and servitisation approach in a business model canvas (BMC) to understand a firm's growth stance and diffusion</p>	<p>What are the cause-of-effect relations of this transition from lenses of customer engagement, reconfiguration of the revenue model, optimisation of the cost structures, and reorganising the external linkages that offer servitisation BM</p>
<p><i>Value creation and capture domain</i> [1, 2, 43, 71, 87, 91, 102, 114, 115, 106]</p>	<p>Results suggest that a value proposition not only emphasis on value creation but also value capturing and delivery</p>	<p>What are the key value propositions in the new ecosystem, and how are they recognised and generated</p>
<p><i>Supply chain domain</i> [10, 25, 45, 69, 71, 79, 104, 114, 120, 134]</p>	<p>There needs to be a method-based framework for supply chain management and how it incorporates efficiency, sufficiency, and consistency strategies Whether this transition will lead to a market shift depends on how well servitisation can support CE, which leads to a sustainable supply chain</p>	<p>What is the point of intersection among sustainable design, reconfiguration of BM, and alignment of the supply chain network that connects the product's lifecycle with their business strategy?</p>

91]. Therefore, further research should investigate the integration of the smart product into a service package that holds sustainable value propositions from a socio-technical perspective. Moreover, not all value propositions are explored, future researchers could further investigate the role of innovative value propositions in a new flexible ecosystem and how it is recognised and managed. It has been noted that most of the prior studies have failed to consider all aspects of value propositions. For example, value exchange, extraction, transformation, and destruction are not analysed. It is recommended that future researchers conduct a more comprehensive analysis of value creation in the context of CE and servitisation because different aspects of value propositions have a significant impact on the overall sustainability of any business model and ecosystem.

Supply chain domain

Finally, there have been some papers that discuss the transition from linear BM to CE [45, 69, 113, 134] and how it facilitates the value creation and value delivery through servitisation [10, 71]. The alignment of the supply chain network supports the sustainable design of a product and the efficacy of processes. Still, current research shows a lack of a method-based framework for supply chain management and how it incorporates efficiency, sufficiency, and consistency strategies [104, 120]. So, future research should try to close this gap by investigating an answer. Whether this transition will lead to a market shift depends on how well servitisation can support CE, leading to a sustainable reverse-logistic-based supply chain [25, 79]. This paper provides insight into the management practices concerning sustainable design, choosing end-of-life strategies, and planning the reverse logistics of components in servitisation. Another important research gap for future researchers is to test various configurations of management practices incorporating sustainable design, reconfiguration of BM, and alignment of the supply chain network. This calls for examining the managerial capabilities in connecting the prolonged lifecycle of the product with servitisation. Further research could investigate the manifesto of choosing to incur economic costs and get higher returns over longer periods or to limit investments and get lower returns avoiding minor negative impacts on the ecosystem.

Table 4 presents a tabular representation of the conclusions and future research directions which depicts that the extant empirical research themes and key sources in the circular economy (CE) and servitisation have been identified in the literature review. Some key themes include the definition and typology of CE and servitisation,

antecedents of business model/key activities, value creation and capture domain, and supply chain domain. However, there are research gaps in these themes. More empirical research is needed to determine a data-driven discussion supporting informed decisions towards realising the CE principle from a servitisation perspective.

Future research directions includes: determining cause-of-effect relations of the transition from the lens of customer engagement, reconfiguration of the revenue model, optimisation of the cost structures, and reorganising the external linkages that offer servitisation business models.

Additionally, it is necessary to identify key value propositions in the new ecosystem and how they are recognised and generated. Furthermore, a method-based framework for supply chain management that incorporates efficiency, sufficiency, and consistency strategies needs to be developed, and the point of intersection among sustainable design, reconfiguration of BM, and alignment of the supply chain network that connects the product's lifecycle with their business strategy needs to be explored.

Abbreviations

CE	Circular economy
PSS	Product-service system
BM	Business model
BMC	Business model canvas
SLR	Systematic literature review
CIMO	Context, intervention, mechanism, outcome
EMF	Ellen McArthur foundation

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I declare that this research work has been composed solely by myself and that it has not been submitted in any previous publications in whole or in part.

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