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Atif, Sehrish; Ahmed, Shehzad; Rafi-Ul-Shan, Piyya Muhammad

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An Exploration of Relationship between Circular Economy and Servitisation: A Systematic Literature Review

Sehrish Atif 1*, Shehzad Ahmed 1, Piyya Muhammad Rafi-ul-Shan 2

1 School of Business & Creative Industries, University of the West of Scotland, Paisley, PA1 2BE, UK,
1Sehrish.Atif@uws.ac.uk, 1 shehzad.ahmed@uws.ac.uk,
2 School of Business Management and Law, Cardiff Metropolitan University, Llandaff Campus, Cardiff, CF5 2YB, UK, PRafi-Ul-Shan@cardiffmet.ac.uk
*Corresponding Author: Sehrish.Atif@uws.ac.uk

Purpose: Circular Economy (CE) benefits servitisation by improving productivity, flexibility, and resource efficiency and reducing waste and energy consumption. However, a combinatory investigation of these business models is relatively sparse despite their liaisons. Therefore, this paper focuses on addressing this gap by conducting a systematic literature review and proposing an empirical research agenda for future researchers.

Research Approach: This paper uses a systematic literature review (SLR) approach proposed by (Denyer & Tranfield, 2009) CIMO criteria (Context, Intervention, Mechanisms and Outcome) to understand the link between CE and servitisation. This critical analysis intends to identify how the CE paradigm contributes to the development of the servitisation agenda.

Findings and Originality: The findings of this study reveal that the combined discussions on CE and servitisation are limited irrespective of their interdependencies. The results indicate that the firms are projected to reconfigure their BM elements when their focus shifts from product-oriented to servitisation approach. The findings reveal that identifying the key stakeholders help a firm to choose an appropriate strategy based on sustainable value propositions that entail cost structure and revenue streams to close the resource loop. Overall, most publications are either theoretical frameworks or single/limited case study-based research work that discuss different extents of the servitisation approach and how it support the CE value drivers (increasing the resource efficiency, closing the loop, and extending the product lifecycle). Later, few empirical research agenda is proposed with various research directions to address the substantial research gaps on CE and servitisation.

Research Impact: This paper will also provide insight into practices and strategies from servitisation literature in the circular economy context and identify the research gaps for future research.

Practical implications: This study yields some interesting insights for managers and practitioners. It highlights the importance of choosing an appropriate strategy to utilise a firm’s resources in an efficient manner by adapting CE principles into servitisation BM to derive maximum potentials of economic, environmental, and societal dimensions.

Keywords: Circular Economy, Servitisation, Product-Service System

Introduction
Since the industrial revolution, businesses have been pursued better strategies comprised of efficient supply chain activities competing for priority, and scrutinising fast-changing technical processes (Atif et al., 2021). Furthermore, the increasing cycle of waste production and extreme shortages of resources has led the world to adopt Circular Economy (CE) paradigm within their BM (Ghisetti & Montresor, 2019). Evidence suggests that value capture has been considered as the primary challenge of CE (Oghazi & Mostaghel, 2018) that can be overcome by shaping servitisation strategies (Martín et
al., 2021) and stakeholder’s engagement/collaboration (Martín et al., 2021). Despite a general agreement that CE paradigm plays a vital role in enabling servitisation BM little attention has been devoted to investigating their specific role in this transition. To date, little is known about the relationship between CE and servitisation in general (Machado et al., 2020). It is not clear how circular product captures value while generating revenues by designing a feasible servitisation package, and how companies should be managing this interface. (Kohtamäki et al., 2019) And finally, what would be an appropriate strategy to implement this combination (CE and servitisation) in their BM (Kühl et al., 2019). This paper adopts a systematic literature review (SLR) methodology to identify and review 81 articles from CE and servitisation/PSS field. This paper is organised as follow: Chapter 2 will present a summary of the methodology used to conduct this SLR; followed by chapter 3 that displays the analysis of the critical review of CE and servitisation literature; while the fourth chapter will shed some light on the relationship/affiliation between CE and servitisation and chapter 5 is the final section that presents the conclusion of the analysis along with future research directions for researchers.

Methodology
This study adopts the SLR method presented by Denyer and Transfield (Denyer & Tranfield, 2009). It is an evidence-based approach that identifies the current state of knowledge, using secondary data from a relevant field of interest (Kitchenham et al., 2009). It is viable to know how the relationship among key constituents (CE and servitisation) occurs especially the related circumstances to reach a conclusion about their overlaps. The author has adopted the SLR approach to provide a deeper understanding of the key variables in a structured way to reveal research gaps and identify the future research agenda in an organised manner.

In the first phase of question formation for the SLR, the author used Denyer and Transfield’s (Denyer & Tranfield, 2009) CIMO criteria (Context, Intervention, Mechanisms, and Outcome) to understand the link between CE and servitisation such as:

- **Context:** According to CIMO logic, the main emergent themes from CE and servitisation literature perceives CE principle as an enabler for servitisation through increased product longevity (Kühl et al., 2019), closed-loop supply chain (Lieder et al., 2017; Yang et al., 2018) and resource/functional efficiency (Heyes et al., 2018; Kühl et al., 2018).

- **Intervention:** This element of CIMO determines or infers the effect of the event through comparing and contrasting interventions in different contexts. Therefore, the flaring of operations via multi-stakeholders (Kristensen & Remmen, 2019), value creation, and capturing (W. Liu et al., 2019), competitive advantage (Jensen & Remmen, 2017) and reconfiguration of BM (Adel & Wiesner, 2015; Geisdoerfer et al., 2017) while redefining the supply chain management (Bal & Badurdeen, 2020; Kumar et al., 2020) has been studied to engender a reliable outcome.

- **Mechanisms:** The mechanism explains the constellation between different interventions that bring a particular type of outcome and their settings such as supply chain management (Bal & Badurdeen, 2020; Kumar et al., 2020), cost management (Kalsoom et al., 2020) and change management (Werning & Spinler, 2020).

- **Outcomes:** all research/studies are conducted to document the impact of the pre-decided interventions and to monitor their intended and unintended effect. Applying CIMO logic, the impact of this combination (CE and servitisation) on firm performance (F. Ayala et al., 2021), the contextual factors that impact the supply chain (Kumar et al., 2020), and the economic viability of this transition (Copani & Behnam, 2020).

The second phase involved classifying the relevant keywords in accordance with the objectives of the study to appropriately position the research work to the applicable subject area. After extensive discussions among the authors, in total nine keywords were chosen which were then refined by using Boolean logic. Four keywords related to the research domain were finalised that met the screening criteria, i.e. Servitisation, Product-Service System (PSS), CE and BM. Later these keywords were refined
by different combinations, for instance, "CE and/or Servitisation", "CE and/or PSS", "PSS and/or Sustainability", "Sustainability and/or Servitisation", "business model and/or Servitisation", "CE and/or business model" and "business model and/or PSS". Eighty-one articles were extracted and analysed to identify the patterns, directions, comparations and variances in articles related to the key variables of this study (CE and servitisation).

The main aim of this study is to investigate the relationship among the key variables (CE and servitisation). Thus, the third phase involves downloading the finalised articles published in a pre-decided time span (2015-2021) from the databases. The three databases that were used are: Web of Science, ScienceDirect and Emerald Insight. These databases are seen as the most influential and credible data storage systems as they store high-quality and peer-reviewed papers.

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

- Empirical papers from the business and management subject area.
- CE and servitisation literature from Multidisciplinary disciplines such as supply chain management, accountancy, marketing and etc.
- Papers are written using the English language only.
- Scientific papers from peer-reviewed journals only.
- Papers with at least one keyword (CE, servitisation, PSS and BM) in the title or abstract were selected.
- Non-academic documents/papers were excluded.
- Duplicate papers were excluded.
- Papers that were out of the pre-selected time span (2015-2021) were excluded.

This rigorous process aided the author to finalise 81 relevant papers to conduct the critical analysis review for this study. hence, figure 1 and 2 show the yearly number of publications related to CE and servitisation:

**Figure 1: Yearly number of published papers on Circular Economy**

<table>
<thead>
<tr>
<th>Year of Publication</th>
<th>No. of Publications</th>
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<tbody>
<tr>
<td>2015</td>
<td>3</td>
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<td>2016</td>
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<td>2017</td>
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<tr>
<td>2020</td>
<td>11</td>
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<tr>
<td>2021</td>
<td>7</td>
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</tbody>
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**Figure 2: Yearly number of published papers on Servitisation**

<table>
<thead>
<tr>
<th>Year of Publication</th>
<th>No. of Publications</th>
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<tbody>
<tr>
<td>2015</td>
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<td>2016</td>
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Results/ Analysis:
Circular Economy
The increasing economic uncertainty and negative environmental effect of the traditional linear take-make-dispose model have driven the need for a transition towards an innovative sustainable arrangement in the BM. Linear Economy presents an open loop where the lifecycle of a product starts by extracting resources and then disposing of the used product into the environment after 1 cycle. Thus, there are certain characteristics that are integral to the CE. This model can be used to explain how CE can be applied to each constituent of the BM, but firms can also decide to apply hybrids, (Senzi et al., 2016) these are:

- Closed-Loop Supply Chain (CLSC)
- Resources recovery/Reverse Logistics
- Product Life Extension
- Shared Platform/ Indirect Reverse Logistics

Scarcity of resources (Han et al., 2020), depletion of ecological risks (Schröder et al., 2020), human wellbeing and social equality challenges raised the question for sustainability trends in society (Atif et al., 2021). Therefore, the idea of the Circular Economy (CE) can be considered as an anthology of various holistic views aiming to achieve a sustainable and waste-free society that was created in the 1990s (Turner, 1990). This novel model progressively developed from various schools of thought such as cradle-to-cradle (Schröder et al., 2020), green economy (Beier et al., 2018), biomimicry and industrial ecology (Kirchherr et al., 2018). Lately, CE has been prevalent in the market as a business concept among practitioners and policy-makers (EMF, 2015).

Servitisation
Servitisation is often labeled as a shift from product-oriented manufacturers to a system offering a mix of products and related services to create a differentiation strategy. Manufacturers are gradually incorporating service-based strategies to renew business practices that enhance the perceived value across the product lifecycle and sustaining competitive advantage in the market (Adel & Wiesner, 2015). The earliest concept of servitisation is linked to Vandermerwe and Rada, (1988), who coined the term “servitisation” in the late 1980s (Kühl et al., 2019) and described it by saying: “corporations are increasingly offering fuller market packages or bundles of customer-focussed combinations of goods, services, support, self-service, and knowledge” (Vandermerwe and Rada, 1988). From the above definition, it is evident that servitisation aims to promote transformational processes that replace a product-centric BM with a product-service model.

Linking Circular Economy principle and Servitisation approach
The CE paradigm used by servitisation has been constantly increasing over the last decade (Bressanelli et al., 2018; Kühl et al., 2018). Despite this, there are still numerous research gaps in the literature. such as: when servitisation is profitable? (Baines et al., 2017); what are the associated risks (Bustinza et al., 2019); whether the transformation to a CE principle is achievable and measurable (Yang et al., 2018) and whether the manufacturing firms should convert to this transition (Bustinza et al., 2019). In spite of this, there has been notable research that covered a wide range of themes in a different context and using different research tools has been taking place. This SLR is developed to construct a framework that presents an accumulated constructive knowledge on the key variables between CE and servitisation.

CE has been defined by most of the authors as an economic system that avoids landfill at the end-of-life, by recirculating the material/resources in a supply chain to achieve sustainable development by creating environmental, social and economic benefits for current and future generations (Elliott, 2005; Hartley et al., 2020; Kirchherr et al., 2018). While, most of the servitisation literature conceptualised value domain at the system (Kühl et al., 2019) or network levels (Isaksson et al., 2018) highlighting the role of organisational integration (Mishra et al., 2020) and change management (Zighan et al., 2021) to achieve optimal performance (H. Liu et al., 2019). Kohtamäki et al., (2020) suggested that
servitisation strategies should be adopted by firms to minimise the associated costs and enhance customer services (Zighan et al., 2021). Another study was presented by Reim et al., (2019) that identified major capabilities and market-related challenges and presented a contingency model to accommodate four servitisation strategies (service extension, service benchmarking, digitalization, and customer co-creation). Thus, the majority of servitisation literature combined process view with inter-organisational perspective discussing the manufacturing firm’s efforts in implementing CE principles co-create and deliver the value-propositions (Hedvall et al., 2019).

It is evident from the analysis that manufacturing firms are adopting the CE paradigm within their BM to support the functionality and efficiency of the product (Bressanelli et al., 2018; Kühl et al., 2018) as well as delivering maximum value to their customer. Thus, understanding the implication of value co-creation and identifying a firm’s dynamic capabilities provides greater insight for firms to decide the level of innovation needed in their strategy. In this context, CE literature gives a great emphasis on extending the lifetime-in-use of products (Bressanelli et al., 2019; Senzi et al., 2016) with enhanced durability (Lieder et al., 2017) with the aim of closed-loop-supply-chain through 10 R (such as Reusing the discarded product or deploying its component as a by-product; Rethinking the Strategy; Reducing or limiting the resource usage; Reusing through outsourcing; Repairing and maintenance; Refurbishing and Restoring by upgrading; Remanufacturing; Repurposing a rejected product with different functionality and recycling of products or material. While the majority of servitisation related papers took a theoretical perspective to bridge the gaps in strategy and innovation development literature by investigating the conflicting interests among stakeholders (Adel & Wiesner, 2015; Zighan et al., 2021), misalignment of strategy (Kühl et al., 2019; Zighan et al., 2021), and ineffective knowledge management across the value chain (F. Ayala et al., 2021; Kühl et al., 2019).

Conclusion and Future Research Directions
This paper is a contribution to CE and servitisation literature. The SLR helped us in identifying how the servitisation approach is providing support to the CE paradigm in relation to BM, value proposition and supply chain network. Findings show that CE is seen as a relatively novel phenomenon, so firms are required to consider a system perspective when designing their BM. Due to the volatile and unpredictable market state, firms need to shift from product-orientation to service-orientation to achieve better potential added value in the CE (Kristensen & Remmen, 2019; Werning & Spinler, 2020). Our results also show that servitisation will further support CE by connecting end-of-life product design with the business strategy (Lieder et al., 2017; Tukker, 2015; Zighan et al., 2021).

Firms are required to achieve a differentiated advantage in the competitive market through adaption, integration and reconfiguration of their resources, skills and functional competencies in a digital environment by involving customers in the value co-creation process (Lee et al., 2020). Ideally, there should be more empirical researches to determine a data-driven discussion supporting informed decision towards realising CE principle from a servitisation perspective.

To conclude, there have been some papers that discuss the transition from linear BM to CE (Ghisetti & Montresor, 2019; Kristensen & Remmen, 2019; Werning & Spinler, 2020) and how it facilitates value creation and value delivery through servitisation (Bressanelli et al., 2018; Kühl et al., 2018). When it is, the alignment of supply chain network that support the sustainable design of a product and efficacy of processes. Still, current research shows that there is a lack of a method-based framework of supply chain management and how it incorporates the efficiency, sufficiency, and consistency strategies (Kalsoom et al., 2020; Rafi-Ul-Shan et al., 2018). So, future research should try to close this gap by investigating an answer for the question: will this transition lead to a market shift? It depends on how well servitisation can support CE that leads to a sustainable reverse-logistic-based supply chain (Chiappetta et al., 2020).

References


