# GLOBAL IMPLEMENTATION OF CIRCULAR BUSIENSS MODELS – DECISION SUPPORT

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**ABSTRACT**

**Purpose:** Circular business models have a huge potential to lead to economic, social and environmental benefits. But in order to archive this it is crucial to reach global implementation. Therefore, the purpose of this paper is to investigate how firms can assess the potential and criteria for implementing circular business models in different global markets.

**Design/Methodology/Approach:** To reach the stated purpose, we have adopted a quantitative research approach and undertaken 25 explorative interviews in three large Swedish manufacturing companies and their global service network.

**Findings:** In this paper, a decision support tool to choose the appropriate circular business model for global implementation has been developed that facilitates the first steps towards circular business models implementation. It identifies eleven criteria that should be analysed to decide the appropriate circular business model.

**Originality/Value:** Circular business models have not yet reached wide implementation. One reason is that they are often presented as one fits all solutions but this is not appropriate for global implementation. Therefore, the decision tree that is developed in this paper helps companies to choose the circular business model that is most appropriate for a specific product in a specific market.

**KEYWORDS:** Circular business models, Servitization, Product-Service Systems (PSS), Global markets, Service network, Decision making.

## 1. INTRODUCTION

The circular economy is a necessary response to the global need for an ecological economy, which requires economic activities that are consistent with the three principles: Reduce, reuse, and recycle (Ying & Li-Jun, 2012). Circular business models have a huge potential to lead to economic, social and environmental benefits. But in order to archive this it is crucial to reach broad implementation of circular business models beyond pilot projects and local initiatives. The largest effects can be reached when large companies that even operate globally implement circular business models as the core of their operations. However, global implementation of circular business models is challenging and the variety of different circular business models requires the consideration of many factors.

The dispersed nature and diversity of customer segments, each of which has specialized requirements and regional differences, makes implementing circular business models a problematic undertaking requiring new organizational capabilities and routines (Baines et al. 2007; Parida et al. 2019; Reim et al., 2019). More importantly, recent studies indicate that providers of service innovation need to align their agenda with their distribution network; otherwise they risk market failure and unexpected costs (Story et al., 2016). In contrast, much of the prior literature has focused on internal changes (e.g. capability development) of providers and the technical feasibility of circular business model offers, and thus, the demand and preferences from the global distribution and market side has almost been ignored in literature (Tukker, 2004).

As most large manufacturing companies operate globally, their delivery network partners also tend to be globally distributed. This adds to heterogeneity within the global distribution network, where products and services sales largely rely upon readiness and willingness of their distributers to sell circular business models successfully (Lewandowski, 2016; Reim et al., 2019). Without the alignment of the providers sustainability and circularity strategy to the distributers demands and requirements the customers will not be able to take advantage of the full potential. Even though the importance of business model development for circular economy has been highly emphasized in literature

(Lewandowski, 2016), there is a gap in literature on how to choose and implement circular business models globally. To fill this gap, the purpose of this paper is *to investigate how firms can assess the potential and criteria for implementing circular business models in different global markets*.

Our results build on an exploratory case study with three global manufacturing companies and representatives from their global distributer networks. The results identified eleven criteria that help to determine which circular business model is most appropriate for a specific product in a specific market. The criteria are developed based on circular business model tactics, namely, sustainability, product and service design, network, marketing and contracts. There is no one-fits-all solution to global implementation of circular business models and a careful analysis of decision factors is necessary. The next section provides the theoretical background to this study. This is followed by a description of the research methodology. In section four the key findings and the decision tool developed from our case study are presented. Finally theoretical and managerial contributions are presented together with suggestions for future research.

## 2. THEORETICAL BACKGROUND

### 2.1 Circular Business Models

During the last century, industrial and technological development, together with global trade, has resulted in enormous economic growth that has enhanced human welfare. However, this development path is rooted in exponentially increasing resource usage (Kok et al., 2013). The circular economy is essentially a response to the global need for an ecological economy, which requires human economic activities that are consistent with the three principles: Reduce, reuse, and recycle (Ying & Li-Jun, 2012). Against this background, circular business model need to be designed to create and capture value while helping achieve an ideal state of resource usage (e.g., finding a model that most closely resembles nature and comes close to achieving the complete cycling of materials). Accordingly, the goal of the business model shifts from making profits through the sale of products or artefacts to making profits through the flow of resources, materials, and products over time, including reusing goods and recycling resources. This reasoning implies that companies can reduce negative impacts on the environment by delivering and capturing value through this alternative value proposition. However, undertaking such ambitious transformation requires close collaboration and coordination between industrial network actors to achieve close or slow material loops.

Lewandowski (2016) uses six business actions to implement the principles of the circular economy opportunities depicted from the ReSOLVE framework (Ellen MacArthur Foundation, 2015) to describe circular business models. Regenerate describes the shift to renewable energy and materials. It is related to returning recovered biological resources to the biosphere. Share actions aim at maximizing utilization of products by sharing them among users. Sharing means also reusing products as long as they are technically acceptable to use, and prolonging their life through maintenance, repair, and design-enhancing durability. Optimise actions are focused on increasing the performance/efficiency of a product and removing waste in the production process and in the supply chain. They may also be related to leveraging big data, automation, remote sensing, and steering. What is important is that optimization does not require changing the product or the technology (Lewandowski, 2016). Loop actions aim at keeping components and materials in closed loops. The higher priority is given to inner loops. Virtualize actions assume to deliver particular utility virtually instead of materially. Exchange actions are focused on replacing old materials with advanced non-renewable materials and/or with applying new technologies (e.g., 3D printing). It may also be related to choosing new products and services (Ellen MacArthur Foundation, 2015).

### 2.2 Business Model Tactics

The different types of circular business models describe how sustainable value can be generated. But a set of tactics based on that choice will determine how much value will be generated. Tactics are defined as the company's residual choices at an operational level after deciding which business model to apply (Casadesus-Masanell and Ricart, 2010). Reim et al. (2015) identified 5 tactics that are relevant to consider for PSS implementation and are indeed also relevant for circular business model

implementation. The five tactics are contracts, marketing, networks, product and service design, and sustainability which are described applied to circular business models in the following.

The first of the five tactic areas, contracts, addresses how rights and liabilities are distributed among the involved parties (e.g., provider or customer). A circular business model contract is designed to address all aspects related to providing the service and to state the rights and liabilities of involved parties clearly. Such contracts are significantly more complex than selling a specific product outright, and the terms of the agreement must be adapted according to the context (Richter and Steven, 2009). The complexity of the contract depends on the quantity of the specified regulations included in the contract. Importantly, the long-term relationship between the provider and customer based on the circular business model contract is crucial; therefore, it must to be handled carefully in order to balance the interests of both parties. It is also important to establish incentives to reduce the risk of adverse behaviour in the relation (Azarenko et al., 2009). The literature indicates the importance of assessing risk carefully and ensuring suitable compensation for the risk-bearing party. Richter and Steven (2009) perceive contracts as the foundation for representing and implementing a particular business model. Formulating the contract has a major impact on creating value and generating revenue while operating under a specific business model. To maximize the captured value of the circular business model, it is essential to align with the contract-related aspects of responsibility and terms of agreement, contract formalization and complexity, and incentives and risk level (Reim et al., 2015).

The second of the five identified tactics, marketing, describes how circular business model providers interact, communicate, and use customer and market insights to implement their business model. Several studies noted that implementing a business model has important implications for the company's marketing activities (Kindström, 2010; Schuh et al., 2008). When competing with low-cost producers, the service offering with its sustainability benefits is a very important method of nonprice marketing that can attract customers (Schuh et al., 2008) and thus differentiate the provider from competitors. In addition, many authors stressed that the long-term relationship (as opposed to a transition-based relationship) has a significant impact on customer loyalty in the circular business model context (Sundin et al., 2010; Tucker, 2004). This intimate relationship ensures increased insight into the customer's operations and an understanding of their needs and preferences. Such insights are extremely valuable for developing new offers (Azarenko et al., 2009; Tukker, 2004). Moreover, more intense customer interaction and focus on sustainability means that marketing activities differ significantly from traditional product- or service-oriented innovation marketing.

The third of the five identified tactical areas describes how circular business model providers use their network relationships with external partners to ensure successful implementation. Facilitating circularity and providing services adds several new tasks to the operations of manufacturing or service companies. Because the companies cannot perform these tasks independently, they must develop networks and partnership infrastructures (Baines et al., 2007; Kuo, 2011). In this context, a network describes the relationships and interactions with different external stakeholders (e.g., customers, dealers, service partners, and suppliers). The need to collaborate closely makes the partner selection process important (Mont, 2002). Providers must be willing, for example, to work with unfamiliar prospective partners as they attempt to compensate for lack of in-house competences (Evans et al., 2007). This tactic, however, is not only about with whom to collaborate but also the type of collaboration, which can differ significantly based on the services offered (Schuh et al., 2008). After choosing a partner or partners and determining the level of interaction, much effort is needed to develop ways to coordinate the relationships and share the right information efficiently in the network.

The fourth of the five identified tactical areas describes how circular business model providers design product and services to meet the diverse needs of customers and successfully implement circular business models. Product and service requirements change along with the various types of services provided as companies offer circular solutions. To meet new product and service design requirements, special emphasis is placed on aligning physical product characteristics with service offer characteristics and vice versa. Several preferable product properties (e.g., the ability to be maintained,

upgraded, and reused easily) can be identified, which will increase the value creation of the circular business model (Sundin and Bras, 2005). A close, long-term relationship with customers may also favour or require a product and service design that is adapted to special customer needs. This adds further complexity to providing the service (Azarenko et al., 2009). In the literature, several case studies and conceptual papers highlight the importance of an adapted product and service design in which the entire life cycle of the product is considered (Sundin and Bras, 2005).

Sustainability focused operational practices represent an important and final tactical area. Most studies take for granted that implementing circular business models drives environmental benefits. However, recent studies have acknowledged that circular business models in some cases can even have a negative effect on the environment while maintaining only economic benefits (Kuo, 2011, Tucker, 2004). Thus, deploying sustainability tactics can ensure circular business models are implemented successfully and can signal a proactive approach that will ensure sustainability driven changes meet the dual goals of economic and environmental benefits. The highest potential for sustainability improvements results from either increased resource use or innovations that make the production or delivery process more sustainable.

## 3. METHOD

The present study is based on an exploratory case study involving three global Swedish manufacturing company that actively offer circular business models. We studied the case companies from different levels including strategic and distribution network level. This research design was chosen because there is limited knowledge about how circular business models can be implemented in a global setting and the factors effecting the choice of circular business model. Information from rich real-life cases can help identify new aspects and phenomena derived from reality (Eisenhardt, 1989; Yin, 2003), such as relationships between provider and distributer that form the conditions for successful circular business model implementation. The case companies have been chosen because of their long experience with advanced service provision and operations in global markets which facilitates the implementation of circular business models. In particular, the case companies are working actively with improving sustainability in all aspects of their operations which also includes their international business. Furthermore, the case companies have undertaken significant steps to change their global business model to ensure sustainability advances through circular business models in global markets. Thus, all three companies represent appropriate cases for the present exploratory study.

The company A is an international world leading provider of construction equipment. They offer products and services in more than 125 countries through proprietary or independent dealerships. Currently they offer several services in addition to their machines like maintenance contracts, extended warranty and to keep track of error codes and fuel consumption. Twelve respondents were interviewed which are actively involved in the current service provision and development at the company. These were from top management and middle management levels as well as the regional distributers.

The company B manufactures press hardened automobile parts for global market. The unit of interest in this case is the tooling department located in Sweden which internally supplies to the press hardening factories across the globe. Services currently offered by company B are maintenance training, simulations and process optimization. To improve their efficiency of their products, they are currently developing an business model which is based on guaranteeing a certain “number of strokes” that their tools will perform for a specified duration. The improved resource utilization brings significant sustainability benefits. We conducted interviews with six respondents from different parts of the organization, e.g., head of product, project manager for product-services, and financial project manager.

The company C manufactures forest machines for the global market. They offer several circular business models that include fleet management systems as well as advanced service agreements that controls the machine to do maintenance in the post appropriate way to increase the lifetime of both the machines and all individual parts. We conducted interview with seven respondents from different parts of the organization, e.g. sales manager, business developer, IT manager, and managers of international service points.

The present study's research approach was qualitative and based on semi-structured and open-ended interviews. The interview guide was designed to explore the global differences when implementing circular business models, related challenges and readiness level. Furthermore, questions about the needed support and future circular business model plan were ask to compare the maturity between the different global settings.

The face-to-face interviews lasted between 60 and 90 minutes, and interviews were recorded and transcribed in addition to the notes the researchers took during the interviews. The companies also shared internal documents before the interviews that were used to help the researchers understand their operations. These documents and the transcribed interviews and notes built the basis for the analysis.

The data analysis was based on open coding content analysis where headings were written into the transcriptions based on different risks that where mentioned (Elo and Kyngäs, 2008). This first-order categories were then analysed for links in order to cluster them into theoretically distinct groups, the second-order themes, and finally aggregate theme or dimensions were identified (Nag et al., 2007). The preliminary results of the present study were shared at the validation workshop, and the participants commented and added to the findings.

## 4. RESULTS

Our empirical results clearly show that global markets vary significantly and that circular business models cannot be implemented as a one fits all solution to all markets. In order to decide which circular business models is most appropriate in a certain market, this study developed a decision tree with eleven decision criteria that are structures based on PSS implementation tactics (Reim et al., 2015). Figure 1 shows the decision tree and in the following the decision criteria are explained in detail.

### 4.1 Sustainability Decision Criteria

The decision tree should be used for a specific market and a specific product that has potential the positive triple bottom line effects. The first criterion that is connect to increased resource utilization. When the product itself has not potential for increased resource utilization, the only possible circular business model is the regeneration business model. This business model focuses on efficient production and energy recovery in production to reach sustainability benefits.

When the product itself has potential for increased resource utilization, larger benefits are possible. Therefore, criterion two asks which innovation type is driving the new circular business model, either incremental or radical. Incremental innovations would leave the underlying technology aspects of the product rather unchanged and instead the way of providing the product with related services or complements would represent the circularity of the business model.

Radical innovations question all underlying assumptions of the product, including technology, distribution and appearance. This radical innovations have high potential for circularity because systems are redesigned from scratch and circularity can be considered from early on. Commonly, certain markets are more open for radical innovations that can change a whole industry, markets that lag behind might need more preparation for bigger shifts that can be reached with the implementation of rather incremental approaches.

### 4.2 Product and Service Design Decision Criteria

Following the path of incremental innovation from the sustainability aspects, the third criteria of the decision tree explores whether service agreements are appropriate to improve the functionality of the product which would benefit circularity. Service agreements are close connected to the reuse, remanufacture and recycle logic of the circular economy. Also PSS are defined around environmentally friendly values that mainly build on the increase of the service part of the product provision. If service agreements are not appropriate to improve the product, the choice of circular business model is limit to customer operation optimization business models. This type of circular business model does not improve the product itself but rather how it is used in relation to other products or equipment at the customer. Fleet management is a common example from our case studies which can be offered to the

customer without more advanced service agreements as an add-on product which optimizes operation to be more sustainable.

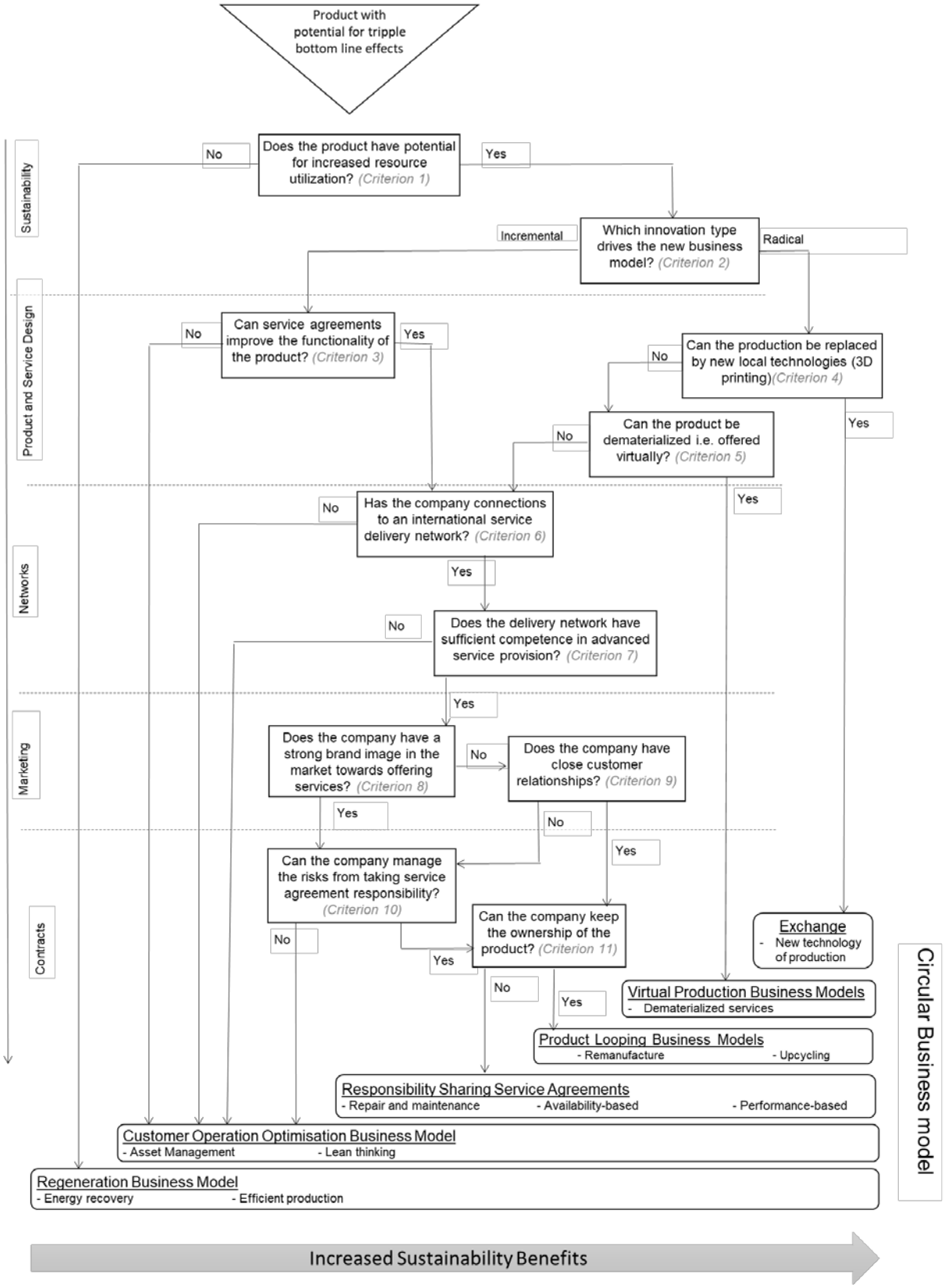


Figure 1: Global Circular Business Model Decision Tree

Radical innovations have a major impact on product and service design. Criterion 4 analyses whether the global production of the product can be replaced by local production for example through the use of 3D printing. Especially for spare parts this can be a disruptive technology that significantly reduces transportation and production to stock. If this is possible, an exchange circular business model can be implemented which has the highest potential to favour circularity and sustainability. This is the case because this business models can also make use of the logic that is behind all other circular business model types. If the production cannot be replaced, criterion five asks if the product can be dematerialized for example by being offered virtually. When this question can be answered with yes, a virtual production business model should be target because of its significant benefits for sustainability. Our responders frequently described that for example machine training secessions can be hold with remote coaching and based on data analysis instead of a coach driving around to visit all operators.

### 4.3 Network Decision Criteria

For products that can be significantly improved through service agreements but cannot be dematerialized, the criterion six which is related to the network tactic explores the companies connection to an international service delivery network. Without a supportive service delivery network only the implementation of the customer operation optimization business model will be a viable option. When the connections to the international service delivery network exist, it is important to figure out whether the service network has sufficient competence to provide advanced services (criterion 7). If not, again only customer operation optimization business models should be considered because they do not necessarily require local service delivery networks. Because service delivery network actors can be either owned by the provider company or external partners, the competence can also be acquired from different sources. But the provider company should be well aware of the current competence level of their service delivery actors.

### 4.4 Marketing Decision Criteria

Not only the competence of the service delivery partners varies significantly in different markets, also the market perception of advanced services. Therefore, criterion eight analysis if the company has a strong brand image in the market towards offering services that facilitate circularity. If not, criterion nine highlights the importance of a close customer relationship that facilitated the adoption of new service offerings. The customer readiness and acceptance are crucial for the success of the circular economy. This underlines that the marketing tactic is highly relevant in this setting to prepare customers for new ways of consumption and product ownership.

### 4.5 Contracts Decision Criteria

When the brand image of the company is low and the customer relationship is not very close, it is important for the company to question whether the company is able to manage the risks that are related to service agreements (Criterion 10). When no sufficient risk management solution can be found only customer operations optimization business models should be offered until the risk management can be secured and more advance circular business models can be implemented. If the risk management question is solved, the company should finally, based on criterion eleven, evaluate whether it is possible to keep the ownership of the product or not. When the company keeps the ownership, product looping business models are a good option to implement because remanufacturing and upcycling is easily possible. If the ownership is preferably transferred to the customer there are anyways a huge variety of service agreements available that are based on sharing responsibility and are in line with PSS offers that facilitate sustainability and circularity.

## 5 CONCLUSIONS

The present study makes several theoretical contributions. First, the application of business model tactics to circular business models is crucial to support the global implementation of circular business models (Reim et al., 2015). This is especially important because global distributers are very different

from each other and there is no one fit all solution to support them in the process of becoming a circular business model provider (Zarpelon Neto et al., 2015). Furthermore, the categorization highlights that circular business model implementation is affected by factors on various levels and business areas which differ in terms of readiness level of global distributer network.

The second contribution of the present study is to develop a circular business model decision support framework that builds on the business model tactics. Specifically, we identified eleven decision criteria that guide the choice of circular business model. The different circular business models have been identified and described in literature (Lewandowski, 2016), but decision support has been rare especially when it comes to global implementation of circular business models.

For managers responsible for developing circular business models globally, it is especially important to realize that the adoption of circular business models by the diverse distributer network is crucial in order to reach out with their sustainability strategy to the customers. There are many reasons why service networks hesitate to adopt circular business models and the readiness level varies significantly. Therefore, understanding of the fact that global service networks have to be treated differently based on their prerequisites and characteristics is crucial. However, the global service network actors are not only influenced by their own characteristics, the customers they serve and also the overall market conditions contribute significantly to the differences. Furthermore, this understanding will significantly improve the relationship between manufacturer and the service network because the most appropriate circular business model will be chosen.

Although the results provide several contributions to the emerging circular business model literature, the present study has certain limitations that should be considered when interpreting the results. Accordingly, the limitations provide a starting point for future research. First, by choosing cases in which companies are actively working to develop its circular business model offers, we gained insights from their long experience. The insights are limited to large Swedish manufacturing companies, however, thus adopting a broader case selection would provide the potential for better cross-case analysis. Future research could also conduct further empirical studies to validate or extend the findings of the present study through quantitative studies. Second, the present study analysed the circular business model implementation from the manufactures view. Therefore, we recommend that future research takes a different view and develop circular business model implementation strategies that are also based on the internal activities of the service network. Future research should investigate whether these findings hold under other conditions (e.g., companies from Asian countries). Finally, the present study identifies criteria that affect the choice of the circular business models. Our list may be incomplete, however, and the criteria are not weighting to determine the most critical criterion. Creating this weighting would be very beneficial for future circular business model implementation.

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