Circular Business Models for Highly Customized Technical Products

Degree Project

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Today, companies stand in front of a massive shift, leaving traditional linear business models behind ascending towards circularity. With a growing demand for sustainability from customers as well as regulatory institutions, transforming to be circular will soon no longer be a choice but a necessity. For companies this constitutes a challenge, as a transformation from linear to circular entails a change in their core strategy. This will be especially apparent for companies producing highly customized technical products. With a footing in these challenges, possibilities for development circular business models for these products are explored.

Introduction & Background

In an era where sustainability has evolved from a buzzword to a critical imperative, businesses are obligated to drastically rethink their business models. Sustainability and responsible resource use have become top priorities, driven by regulations on waste and emissions and a growing awareness among consumers. The concept of a circular economy has emerged in this context, aiming to keep products and materials in continuous use rather than letting them become waste. This shift is rapidly becoming essential not just for gaining a competitive edge but also for staying operational and aligning with societal trends. The circular economy may include maintenance, reuse, and recycling to extend the lifecycle of products. Many companies are integrating these principles into their offerings, reprocessing used products and reintroducing them to the market (Ellen MacArthur Foundation, n.d.). However, while this approach is more straightforward for simpler, generic products, it becomes significantly more complex for highly customized and technical products and components, which require careful consideration of various additional factors to create effective circular offers.

Objective & Methodology

The objective of this study was to explore the feasibility of implementing circular business model initiatives for highly customized technical products. Conducted as a qualitative case study with an abductive research approach, the study combined exploratory and problem-solving methods. Empirical data was collected through interviews and a literature review. The research evaluated a specific circular offering for a case company, investigating how to propose value to customers, the challenges and opportunities of implementation, and the organizational capabilities required. Key questions included how the value of reused technical products could be communicated and delivered to customers, and what organizational factors that support implementation of circular business models.

The Case Company

This thesis is based on a case study of Alfa Laval, a global leader in heat transfer, separation and fluid handling. (Alfa Laval 2024). The focus is on the company's service department in the Energy division's Gasketed Plate Heat Exchanger (GPHE) business unit. The study investigates a circularity offer

involving the reuse of GPHE plates, where used plates are refurbished and restocked for future service needs. This approach allows customers to choose refurbished plates instead of newly produced ones during maintenance. The specific market investigated was Benelux.

Theory

Different theoretical models were used in this thesis. Figure 1, the Circularity Cluster framework, aims to conceptually illustrate how the different theoretical models combined present essential factors for developing a circular business model for highly customized technical products. The framework highlights the three main dimensions of the business model: value proposition, value delivery, and value capture. Each dimension must consider a circular strategy, requiring companies to shift from traditional values and actually consider sustainable value (Nußholz, 2017). The outer edge of the circle represents tools and considerations for these dimensions, such as the Value Proposition Canvas by Osterwalder et al. (2014) and key elements for value delivery by Bocken (2014). These are key activities, resources, channels, partners and technology. Value capture emphasizes both economic and sustainable impacts, proposing Life Cycle Assessment and Life Cycle Costing (Kossila, 2022). Additionally, the framework includes organizational maturity and the regulatory landscape, indicating that success depends on the company's structure and compliance with relevant regulations.

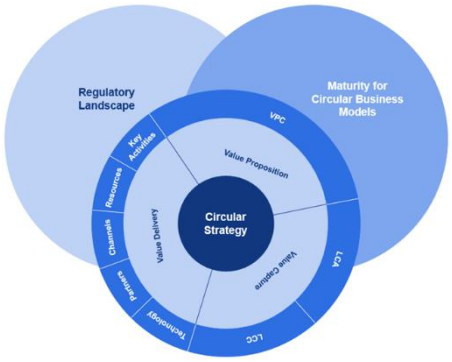

Figure 1: The Circularity Cluster framework

Value Proposition

The Value Proposition Canvas model has two components, the customer profile and the value map. The customer profile is divided in jobs, pains and gains, which describes the customers' needs, pushbacks and the beneficiary outcomes which they want to achieve. The value map consists of a product or service, pain relievers and gain creators which describe how the product or service will relieve the pains or create the beneficiary outcomes described in the customer profile.

Based on interviews with customers, customer profiles were created for each interviewee regarding GPHE service. Value maps for reused plates were fitted against these profiles. What could be seen from these was that a reused plate had the potential to match all jobs, pains and gains identified from the customer profiles, and especially the ones ranked as most critical.

Furthermore, the interviewees ranked the aspects sustainability, price, availability and quality according to importance. The results are illustrated in Figure 2. What could be seen was that different roles consider different things important, probably due to their role specific demands. To successfully market the sustainability value of an offer one must consider who to approach. However, most interviewees wanted a combination of the aspects, and to meet the demands of the customer profiles all aspects need to be considered. To create a successful circular offer companies cannot just rely on the value of sustainability but needs to ensure that the other aspects are met as well.

Figure 2: Interviewees rankings of key aspects

Value Delivery

Following Bocken's value delivery model, the key activities needed to establish the value proposition is reconsidering product strategy, taking back used plates, selection of plate models, refurbishment, warehousing transportation and marketing. To create circular business models, products must be designed for reuse, which poses an issue when they are too customized. By considering partial standardization, making the products applicable in several application, this issue can be reduced. When taking back plates, creating as many channels as possible is desired. However, the main potential was found in credit-based, buyback and voluntary return of plates from customers. The plate models with most potential to be used was concluded to be M15 and M10 in titanium or stainless steel, due to the economic value and volumes found in those plates. Furthermore, it is important to establish functioning refurbishment processes including quality check, transportations and suitable storage. In the investigated case, a third part logistics provider located in Benelux was found most suitable for storage. For marketing, it is important to target the customers which have applications suitable for the offer.

For resources it is important to think about people, capacity and investments. Cross-functional teams are suggested together with training in circular business models to ensure that the entire company is in line with the agenda. Increased capacity will be necessary in storage, the refurbishment process and transportation. With this, investments in storage, service centers and transportation are needed, as well as in inventory control systems.

For channels, there is a need for appropriate communication channels. The sales channels used today can be further used for this purpose, however, what is important in this aspect is to meet the right people as found in the value proposition.

For this offer, it is important to have strong customer relationships, as the customers also are the supplier.

Technology innovation and increase of integration of single technologies into systems are favorable when delivering value. In the case of Alfa Laval this could mean to integrate the current circularity initiatives running within the company into this project. Furthermore, a process for creating sustainability certificates as well as developing a system for inventory control is crucial technological needs.

Potential for Successful Implementation

Companies using a linear business model generally need to transform widely to be able to successfully implement a circular business model. To do this, there are several barriers to overcome. The situation of Alfa Laval was analyzed using a framework by Bocken and Gerards (2020), describing barriers to sustainable business model innovation. The results are illustrated in figure 3. Overall, Alfa Laval was found to have rather high maturity for sustainable business model innovation, especially on an institutional level. However, on an operational level there are more to be done. The main areas which need to be improved are to develop the organization to be more cross functional, allocate more resources specifically towards sustainability and design incentive systems and performance measurements to prioritize sustainability as well.

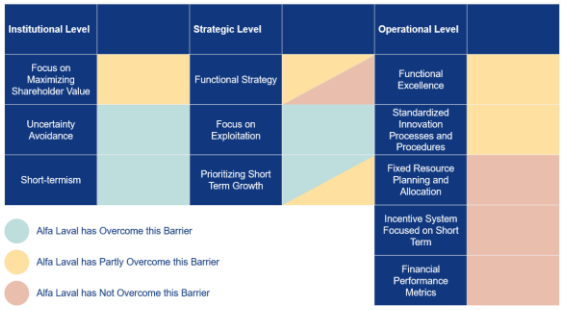

Figure 3: Alfa Laval performance regarding barriers to sustainable business model innovation

Furthermore, Osterwalder et. al (2014) also described bureaucracy, resource allocation, risk aversion, short-termism, and slow processes as the main challenges for companies to implement new business models. One could assume that struggling in these areas is common for companies trying to implement circular business models.

Looking at the regulatory landscape, there are several regulations, directives, acts, tools and other incentives within the EU which are promoting a more circular and sustainable union. The way these regulations affect the product are through valuing, economically benefiting and demanding reuse, preparation for reuse and transparency. The expansion of new regulations in this area have also exponentially been developed, and for organizations to keep up with the regulatory changes they will need to set a clear focus towards circularity. Furthermore, titanium will be especially affected by upcoming regulations, which will place a great value in reusing it specifically.

Conclusion

When designing a reuse offer, what should be included in a proposed offer to customers are:

- A reused product
- A proof of the product's sustainable value
- A guarantee on the product's quality, including verifying documentation
- Shorter lead times and thereby increased availability
- A competitive price

To deliver the value of a reused product, focus should be on product design, enabling reverse flows of products, ensuring quality through testing and documentation, and optimizing storage and logistics. To make the offer feasible to deliver at a big scale and in an economically viable way, a company with highly customized technical products should focus on designing for reuse. They need to be observant of take back opportunities and create as many reverse streams of products as possible, with a focus on those favored by customers. To have a reliable reverse flow, good customer relationships is crucial. Processes need to be optimized for good service, setting up systems for quality control and choice of storage location should be based on an optimization of distance to market, flexibility, storage space, available infrastructure, and sustainability. Finally, a circular offer should be promoted to customers that are acceptant to and have suitable usage areas for reused products. The communication should be focused on customer representatives higher up in the organization that are engaged in sustainability. Furthermore, training in sustainability and circular business models should be offered to internal employees as well as customers to achieve awareness and will to change.

Lastly, to succeed with circular business model innovation organizations need to overcome barriers such as bureaucracy uncertainty avoidance, short-termism and resource allocation. Furthermore, the analysis of upcoming regulations surrounding circularity concluded that the right time to act is now. To meet regulations, and to have the possibility to be a front runner within circularity, companies should consider adapting to circular business models as soon as possible.

Contribution & Future Research

The thesis contributes valuable insights into the market potential for the reuse of highly customized technical products. It offers an understanding of customer needs and preferences through qualitative interviews and theoretical frameworks. It formulates a circular offer tailored to meet customer demands, emphasizing sustainability, reduced lead times, and competitive pricing. Additionally, the study highlights effective value delivery strategies, including the importance of product design, quality assurance, and communication. Insights into organizational readiness for circular business models are provided, along with recommendations to overcome barriers. Furthermore, the thesis proposes a new research process model. Potential areas for future research could be to deeper analyze value capture, sustainability assessments, market expansion, and scalability of such offer.

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