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Lessons Learned from Practice when Developing a Circular Business Model

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Abstract

A circular business model (CBM) does not emerge in a vacuum. The company Plasto started its CBM journey in May 2014 and has encountered some key challenges, the most important being quality standards of products made from recycled materials. Ensuring quality is crucial to establish trust in the market, and this entails technical testing and competence development among employees. Plasto has realized that working with circular material streams must be seen in a larger context, and it has chosen the United Nations' Sustainable Development Goals as a facilitating framework. By June 2017, the company is committed at the top-management level, and has started a strategy process based on the needs of a Circular Economy and sustainable development. The case of Plasto shows that developing a CBM occurs in close interaction with external actors, and, essentially is created through a process of learning and experimentation.

Introduction

The Circular Economy (CE) is emerging as a solution to some of the core challenges our society is facing, and both business practitioners and academic scholars are embracing the concept (Kirchherr & Hekkert, 2017). This is creating a demand for new business models.

The company Plasto produces plastic components in the business-to-business (B2B) market, and decided in 2014 to investigate the strategic advantages of what the company calls ‘circular material streams’. As of June 2017, it established the long-term goal of using 50 percent recycled materials in one of their product groups.

The case focuses on recycled plastic materials and implications for Plasto’s supply chain. This reflects a circular business model (CBM) development process that aims to create value from waste by means of recycling. The remainder of this chapter describes the drivers and barriers to Plasto’s CBM process and the lessons learned to overcome key challenges.

The case of Plasto

Plasto is a small family-owned company that supplies plastic products to a variety of industries. It was founded in 1955 and is based in in the city of Åndalsnes in the west part of Norway. It is a company with around 40 employees. Most of the customers are based in Norway with several in the local area of Åndalsnes. However, through their customers’ products, their high-end components are spread internationally.

Up until the early 2000’s, Plasto was dependent on the automotive industry as a low-margin supplier to a car manufacturer. Financial difficulties resulted in a changed business model, going from standard components at low margins, to innovative and customised products at

higher prices. Today, Plasto’s strategy is centered on research-based innovation with a special emphasis on networks and external collaboration. The company is renowned for its open attitude and willingness to commit resources to research and development (R&D) projects in collaboration with universities and research institutions.

Plasto’s core business is to produce and deliver plastic components; the main product/market areas are aquaculture, maritime, oil and gas, furniture and automotive. Products are offered through advanced technology for injection moulding of thermoplastic polymers. See details in Box 29.1 on Plasto’s core competence.

Core competence of Plasto:

1) Knowing how to design the product so that it fulfils the customer’s demands.
2) Knowing how to design the mould so that the final product acquires the required qualities, for example strength of the different parts of the product
3) Knowing how to adjust the injection process of the production equipment so that these qualities are realised.

Box 29.1 *Plasto’s core competence*

In 2016, approximately 50 percent of its market was in the aquaculture industry through the customer AKVA Group, which supplies equipment to fish farming operators. Figure 29.1 shows an example of brackets that hold cage pipes together, along with walkways on the top of the fish farm, which are Plasto’s main products supplied to AKVA Group. The products are manufactured from high-density polyethylene (HDPE), which is a commonly recycled material.

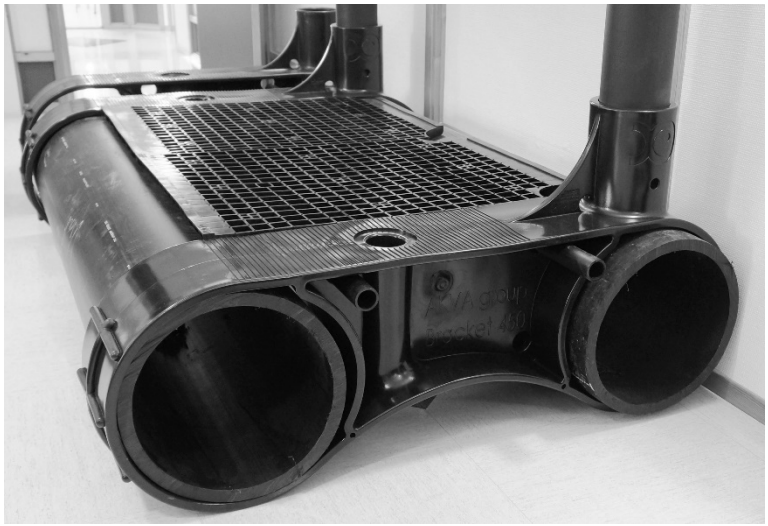

FIGURE 29.1 *Brackets and walkways supplied to AKVA Group*

The collaboration between Plasto and AKVA Group was established in 2008, and is described by both parties as a trust-based and long-term relationship. Representatives from both organizations work together to design moulds, the product and the production process, as these activities are dependent on each other to produce the desired output – e.g. a bracket with specific qualities and features. As of June 2017, AKVA Group has committed to contribute to Plasto’s ongoing efforts of evaluating risks and opportunities of recycled materials, and how to develop a CBM in the longer run.

About the Process

The role of external stakeholders and collaboration is well established in the academic literature on CE business models (N. M. Bocken, de Pauw, Bakker, & van der Grinten, 2016). However, implementing this takes time and reflects trial-and-error learning (Sosna, Trevinyo-Rodríguez, & Velamuri, 2010). The case of Plasto indicates generic features of such a process, and especially the role of external networks in achieving internal commitment among managers and employees.

The development of Plasto's CBM has taken place in the context of the R&D project 'Sustainable Innovation and Shared Value Creation in Norwegian Industry' - SISVI[i]. The CBM process started as a conceptual idea of the CEO at a kick-off meeting in May 2014, when he was challenged by university researchers on how to change the company's business model in a way that could reduce the environmental impacts of its operations. As a follow up activity, a dedicated project manager became responsible for overseeing the CBM process in collaboration with the researchers. The project manager's main responsibility was to link R&D activities with marketing efforts and customer needs, and he is still Plasto's main contact point in the SISVI project as of June 2017.

- May 2014: Plasto's CEO presents the CBM idea to partners in the SISVI project.
- September 2014: A dedicated project manager begins to follow the CBM process.
- September 2015: Plasto hosts a two-day research seminar.
- September 2016: The project manager gets access to valuable networks.
    - The company Nofir provides valuable contacts and insights.
    - The company Containerservice becomes a potential supply chain partner.
    - The Polytechnic Society provides an arena for learning.
- March 2017: The project manager receives input from Interface and Ocean Cleanup.
- June 2017: The management group participates in a workshop on business model development.

Box 29.2 HERE *Main developments in the CBM process*

Box 29.2 describes the main developments from May 2014 to June 2017. The first phase is represented by the two-year period from September 2014 – September 2016. SISVI researchers, along with master students, conducted several interviews with Plasto representatives to understand its context, challenges and strategic goals. In September 2015, the company hosted a two-day seminar with researchers, students and industry actors from the local community (SISVI, 2015). Moreover, a sub-project was initiated to conduct a Llife Cycle

Analysis (LCA) of Plasto's products delivered to AKVA Group (brackets and walkways), with the purpose of calculating the environmental impact of using recycled materials. In general, activities in the first phase were aimed at understanding the industrial context, and especially at identifying the challenges of developing a CBM.

September 2016 was the starting point for the second phase of the project, when external actors became involved in the process. At a CE conference, Plasto got to know two experienced companies in the industry: Nofir and Containerservice. Nofir specializes in recycling discarded fish farming equipment; and Contanierservice has unique technical capabilities related to the handling and cleaning of collected materials. In the same period, the Plasto project manager committed to an initiative regarding the application of the United Nations' Sustainable Development Goals (SDGs) to the companies' strategies and operations (UN, 2016). This was organised by the Polytechnic Society Norway, a non-profit organization that facilitates multi-disciplinary and cross-sectoral activities for societal purposes. The project manager attended three interactive workshops between September 2016 - June 2017.

In March 2017, an academia-industry workshop was organized by the SISVI project in Utrecht, Netherlands (SISVI, 2017). Plasto, Interface, and Ocean Cleanup were present as industry organizations. Interface is the world-leading producer of modular carpets and is well known for its corporate sustainability leadership (N. M. Bocken et al., 2016). Ocean Cleanup is a non-profit foundation developing advanced technology to clean the oceans of plastic waste. Follow-up activities were conducted with representatives from both organizations by the author to collect viewpoints on Plasto's CBM process.

The final activity to facilitate the CBM process, was a one-day workshop in June 2017 with Plasto’s management group facilitated by the aforementioned project manager along with the author. The ‘Value mapping tool’ produced by N. Bocken, Short, Rana, and Evans (2013) was applied explicitly in order to understand how environmental and social values are created or destroyed by the company’s existing business model. Importantly, representatives from two external organizations, iKuben and ProtoMore, were given the task at the workshop of arguing environmental and social standpoints. These were actors from the local community that knew the company well and had good knowledge of CBMs and the SDGs.

To summarise, between the period of May 2014 to June 2017, Plasto became increasingly committed to a process of developing a CBM. More specifically, the company went from an internal focus on opportunity mapping to actively sharing experiences in external networks. Moreover, the company’s management invested a considerable amount of time on the process from September 2016 and now have started to see the strategic relevance of a changed business model.

Drivers and Barriers

An underlying driver and a motivation for Plasto’s development of a CBM is the supply chain configuration. At present, Plasto relies on one single supplier to produce brackets and walkways to AKVA Group. Having the ability to use recycled materials means increased flexibility in supply due to access to multiple sources of raw materials. In addition, an estimation of the costs of recycled materials produced by Cotainerservice show that Plasto will reduce their costs compared to procuring virgin materials.

Another driver is increasing expectations from external stakeholders in terms of sustainability and environmental responsibility. This is particularly the case when it comes to plastic waste in the oceans with the issue of micro plastics becoming more of a media issue (theGuardian, 2017). In April 2017, Plasto's CEO stated in the Norwegian Financial Times:

> "*We have identified new possibilities with a proactive approach. Sustainable utilisation of plastic materials is a prerequisite for further development within several industries. Micro plastic waste in the ocean is not a problem caused by our deliveries, but like any other company, we have a responsibility to utilise the raw material in a sustainable manner*."
>
> (Finansavisen, 2017)

Responding to CBM drivers has led Plasto to encounter some barriers. First, the secondary materials need to be collected from coastal locations. For example, fish farming cages containing HDPE components must be collected, dismantled and then transported to production facilities. Second, the materials must be cleaned through a melt filter. Currently, this process needs an additional actor such as Containerservice because Plasto does not possess the technology needed,. A longer-term option is for Plasto to integrate a melt filter in its injection moulding machine, which enables the company to handle secondary materials directly. Third, and most important, the quality of the products must be assured in accordance with technical standards and customers' needs. These challenges require testing and experimentation with related competence development for the R&D engineers. Quality considerations are discussed in more detail below.

Typical quality features of plastic products are strength and stretching behaviour. According to Plasto's project manager, the quality of a product is inherently linked to the variation in raw

material properties. As an example, the walkways depicted in Figure 29.1 demand less rigorous quality standards than the brackets holding the pipes together. The brackets ensure the stability of the fish farm and must endure the impact of heavy seas, which means that the plastic material must be reliable in rough conditions. Consequently, AKVA Group's main concern is that the brackets meet high quality standards and its technical staff have shown skepticism towards changing the raw materials used in established production processes. As a result, Plasto decided that the natural starting point for production of a product from recycled plastics is the walkways, rather than the brackets that must comply with stricter industry standards.

Working with recycled material also demands new competence among internal staff. Product engineers are used to working with virgin material that has well-known properties, leading to predictable behaviour during the production process. Recycled material, on the other hand, requires experimentation to understand the strength and stretching behaviour of the final product. This gives rise to psychological barriers since the engineers must think differently and change their routines and practices. However, according to the project manager, this can be reframed as something positive as the engineers will need to develop unique skills to tackle the more challenging material properties.

The Importance of Networks to Overcome Barriers

The specialised knowledge and technical capabilities needed to develop a CBM do not emerge in a vacuum. One of the key learning points for Plasto is the importance of engaging external actors in the development process.

"Getting to know Nofir and Containerservice was a milestone. We had realised that setting up a supply chain would be the most complex element of the whole project, but as a first step

we can use their existing chains, we can learn from them, and in the long run this can enable us to establish our own chain." (Plasto project manager, April 2017)

This statement points to an essential aspect, namely that CBMs demand new types of collaborative relationships and a willingness to interact and learn from external actors.

A similar experience happened when Plasto presented its CBM process at the workshop in Utrecht, Netherlands where Interface and Ocean Cleanup were represented. The other participants contributed with comments and suggestions for further work. Norbert Fraunholcz, the lead engineer for recycling at Ocean Cleanup and Jon Khoo, an innovation partner at Interface also provided written feedback on Plastos CBM process at a later stage.

"A next step would be in my opinion to be able to make a statement that the parts made from recycled HDPE are just as good as those from virgin plastic, so for the customer there would be no difference in use." (Norbert Fraunholcz, March 2017)

Norbert Fraunholcz from Ocean Cleanup stressed that achieving quality standards is crucial to establish confidence in the market. Moreover, he recommended that Plasto should dig deeper into the possible differences in technical properties of recycled and virgin materials and this should relate to a specific application e.g. the production of the walkways. In this way, Plasto could show the customer that the final product meets the quality standards.

Jon Khoo from Interface, emphasised different challenges Plasto was likely to encounter. This was based on his experience with NetWorks a successful CBM development focused on the recycling of discarded fishing nets into carpet tiles (Luqmani, Leach, & Jesson, 2017). He

argued that Plasto must overcome a conservative market that is used to virgin materials and is not motivated by environmental concerns. Moreover, the company must secure the right partners and make sure to have a ‘plan B’ if the situation changes. Lastly, there must be a business case that makes sense to the board of directors and benefits that customers understand. Plasto’s project manager expressed that the workshop was both inspirational and practical. Interface experience of working with CE at an operational level was particularly useful and provided practical insight that was transferable to Plasto.

Another input from external actors was through the Polytechnic Society Norway where Plasto indicated how the CBM process fits in the broader context of the SDGs framework. Plasto presented its experiences on two occasions within workshops where other company representatives were present.

The project manager highlighted that two working sessions in the Plasto management group had been assigned to the SDG framework and that they decided to prioritise four of the SDGs, while recognising that Plasto’s operations were linked to all the goals. For example, goal number 14 is of specific strategic importance since it deals with the oceans and marine resources, and is therefore closely linked to Plasto’s position in the aquaculture industry. Establishing a goal of 50 percent recycled materials within 2020 was a significant output of the process and the project manager has indicated that the SDG framework has in general facilitated internal communication over the CBM process.

Conclusions

Developing a CBM is a process of trial and error, which implies that companies will benefit from an incremental approach to minimise risks. The Plasto case illustrates how external activities and interaction with stakeholders speeds up the process.

The challenges of Plasto’s CBM relates to product quality. The substitution of recycled from virgin materials increases the production complexity and creates potential skepticism among customers and internal stakeholders such as engineers. The case also shows the importance of technical testing in trust-based collaboration with the customer. This process also allows the company to invest in and to develop internal competencies based on solid experience.

Below are some lessons learned when developing a CBM based on the Plasto experience:

- The challenges of the CE represent opportunities for innovation and business development.
- Company management must commit to a process of learning and allow for technical testing and experimentation.
- Collaboration between industry actors and academia helps to develop internal competencies along with external networks.
- Sharing of early results and experiences to external actors has a motivating and accelerating effect on the development process.
- The commitment of top management is essential coupled with a willingness to allocate financial resources to R&D.
- The development process must be designed to include inspirational events with external stakeholders so that management is kept motivated and interested.

- The case study illustrates how R&D projects can play a facilitating role in promoting CBMs. Moreover, governmental agencies can help to move CE projects amongst small and medium sized enterprises (SMEs) by providing financial support that facilitates industry-academia collaboration.

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[i] The research findings presented are based on a four-year project called 'Sustainable Innovation and Shared Value Creation in Norwegian Industry' (SISVI), operating from May 2014 to May 2018, see https://www.sisvi.no/. Plasto is one of the core industrial partners in SISVI, which is owned and managed by the NTNU, the largest university in Norway.