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Co-creation – a facilitator for circular economy implementation? A case study in the kitchen industry

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Abstract: Although the concept of Circular Economy (CE) has gained significant attention in business and academia, knowledge and strategies on how to bring circularity into practice still remains limited. Most research efforts are theoretical and focus on waste handling, resource use and environmental impact. Only few studies focus on the practical implementation of CE. There is a lack of research on practical cases, where both the design process and involved stakeholders are considered. This paper reports on a case study carried out in collaboration with a Scandinavian kitchen manufacturer, to increase the understanding on how co-creation strategies can contribute to the implementation of circular economy in the kitchen industry. Based on three workshops followed by five interviews with workshop participants, insights have been gained regarding barriers and opportunities for implementation of circular economy in small manufacturing firms. Results indicate that the co-creation workshops have led to an increased understanding of CE and change of attitude towards CE among the participants.

Background

In order to minimize pressure on the environment and overcome the linearity in the lifecycle of products, Circular Economy (CE) is increasingly considered as a promising solution. CE is defined as ‘an industrial system that is restorative or regenerative by intention and design (Ellen MacArthur Foundation, 2013), which aims to eliminate waste, by keeping products, components and materials at their highest utility and value.

Only recently, industry has gained more interest in CE as the competitive and economic advantages of circular business models have become more recognized (Lewandowski, 2016). But for companies, the transition from a linear to a circular business model is a complex process that requires fundamental changes to an organization. These changes might mean that the current capabilities and networks of a company lose its usefulness (Aminoff, Valkokari, Antikainen, & Kettunen, 2017)

Especially for small and medium-sized enterprises (SMEs), barriers such as financial resources, knowledge of CE, technical and innovative capabilities, lack of support from supply and demand network and government,

and company culture are factors that might prohibit becoming circular (Rizos et al., 2015, 2016). The transition to a CE will not succeed if companies attempt to overcome barriers individually, but rather by establishing new ways of working, new business partners, new roles of existing partners and new kinds of collaboration between stakeholders (Aminoff, Valkokari, & Kettunen, 2016). The transition requires collaboration between all stakeholders in the supply chain (Leising, Quist, & Bocken, 2018).

To achieve new ways of working and collaborating, co-creation processes could play a role. Co-creation refers to an act of collective creativity (Sanders & Stappers, 2008) and research by (Setchi, Howlett, Liu, & Theobald, 2016) highlights how co-creation of value with partners, other stakeholders as well as consumers is a crucial and strategic element in maintaining competitive advantage. However, thus far there has been limited studies focusing on the relation between co-creation and CE, especially on practical cases where both the design process and involved stakeholders are considered.

The research presented in this paper is a case study in the kitchen industry. Previous studies have shown that premature alterations and replacements of the kitchen and its appliances lead to unnecessary material flows and climate impact (Femenías, Holmström, Jonsdotter, & Thuvander, 2016). In the EU, 80% to 90% of disposed wooden furniture, of which kitchen furniture represents a significant percentage, is incinerated or sent to landfill (European Environmental Bureau, 2017). Hence, it is worthwhile to investigate how kitchens can be developed in a more resource efficient direction by applying CE principles.

Therefore, this paper aims to explore the role of co-creation strategies in practical settings as a way to understand and overcome barriers for CE and enable CE implementation in SMEs.

Methods

As a part of the case study, three co-creation workshops were carried out with a medium sized Swedish kitchen manufacturer. The company has not formerly been active in developments for a CE but has a sustainability agenda. The workshops were followed up by interviews with different employees of the company, to evaluate attitudes and interpretations towards the circular economy and the collaborative workshops.

Workshops

A series of three co-creation workshops were carried out with the aim to 1) develop an understanding of CE principles 2) explore the potential for circularity in the kitchen industry and for the involved kitchen manufacturer and 3) co-create circular kitchen concepts and business models that would lead to the development of a circular kitchen prototype. The workshops were conducted at the company and lasted between a half and a full day. Each workshop featured a team of five researchers and several representatives from different departments of the company such as management, product development, marketing, IT and customer service, up to ten participants in total. Table 1 gives an overview of the different workshops with their purpose, activities, participants and outcomes.

All workshops were prepared, led and documented by the research team. Between the different workshops, ideas were further iterated to be presented and evaluated in the following workshops. Data was collected in the form of audio recordings, photos, written notes, observations and generated workshop material. A qualitative content analysis was performed and focused on revealing how attitudes towards CE were formed and changed throughout the workshops and how ideas were generated, selected and further developed. A critical perspective was applied on how roles, relationships, and the collaboration affected the outcomes of the workshops.

Interviews

Qualitative, semi-structured interviews were carried out with five workshop participants from the company by three of the researchers that were also involved in the workshops. The participants for the interviews played an active role in at least one of the co-creation workshops and had varying positions within the company. Three of the interviews were carried out face to face at the company, lasting between 25 and 55 minutes and two of the interviews were performed textually through email. They concerned the participants experiences from the workshops as well as their understanding and attitudes towards CE and the vision of the project. To guide the interview, workshop material and a diagram of the CE system (Ellen MacArthur Foundation, 2013) was used. The interviews were audio recorded with permission from the participants and later transcribed. The transcripts were then coded and analyzed in parallel by the two first authors, using the software NVivo 12 in parallel. The coding was then compared between the two researchers to evaluate the degree of agreement.

Workshop	Purpose	Activities	Participants	Outcomes
#1 Jul-2018	Introduce project and members Build mutual trust Analyze market Identify stakeholders Generate ideas	Company presentation & factory tour SWOT analysis Stakeholder analysis Innovation workshop Idea generation for kitchens different user groups	CEO (owner) Product range manager Product coordinator Product manager Constructors (2) Concept marketer Researchers (5)	Stakeholder map Analysis of company and market Ideas for further development of circular kitchen
#2 Sep-2018	Evaluate concepts Circular business model ideation Identify relevant collaboration stakeholders	Concept presentation Concept evaluation Circular business model canvas Stakeholder mapping (continued)	CEO (owner) Product coordinator Product manager Constructors (2) Researchers (5)	Concept evaluation and selection of ideas Circular business model ideas
#3 Oct-2018	Agree on goal/vision for project/company Further development of selected concept	Define circular vision for project & company Discussion selected concept Opportunities & challenges for selected concept based on different scenario	CEO (owner) Product coordinator Marketing manager IT manager Customer service manager Researchers (5)	Circular vision ideas for 2022/2030 Concept evaluation Prototype plan

Table 1. Description of workshops

Findings

The analysis resulted in different findings related to changes in understanding and attitudes towards CE as well as barriers and potential for implementing circularity in the company.

Changes in understanding and attitudes towards the circular economy after the co-creative collaboration

All interviewees mentioned an increased understanding of the circular economy after the co-creation workshops compared to before, four interviewees also mentioned an increased awareness about it during daily work. The definitions of CE varied between interviewees, some emphasized product-specific parameters like lifetime extension and re-use of products

while others focused more on the business aspects.

'We need to find business models where a growing share of the companies' turnover consists of service-based revenues so that one finds a balance between production and services'

Interestingly, only one of the interviewees described the CE as a way of solving environmental problems, such as reducing the overconsumption of the earth's natural resources.

'If you look at the bigger picture, I understand that we live in a very manufacturing-driven society. We need to stop consuming so much of our planet.'

Overall the interviewees mention that aside from their increased understanding of CE, they are incorporating more circular thinking in their daily work. One interviewee mentioned that by working actively with circularity in the workshops, you start to think more in such tracks on a daily basis. The same person explained that the collaboration has indirectly influenced ongoing product development in the company and that the increased awareness has led to scaling down functionalities and material use in a new range of products.

'It has indirectly become an awareness that is taken into consideration when developing the new products for the upcoming product launches'

Another interviewee mentioned that sustainability aspects are now considered earlier in the process, e.g. more communication with suppliers about the impact of their products before they are purchased.

Barriers for implementing circularity

Throughout the workshops and interviews, several barriers for implementing circularity within the company were identified, such as the costs of changing the current capabilities, (reverse) logistics, potential increased prices of products, lack of support from supply and demand network, complexity of the supply network, lack of policies and regulations for the entire industry and lack of capacity in the company to focus on circularity.

One of the main strengths of the company is to deliver highly customized, ready-assembled components and kitchens through a structured logistical process to building projects. This expertise is strongly appreciated by their customers, as it greatly reduces installation time and complexity. However, this high level of specification and customization towards the customers has led to a wide product range with different components, dimensions, styles and colors. This makes circularity more difficult to achieve, as a narrower product range, standardization and modularity generally simplifies repairing, remanufacturing and recycling of products.

'From experience, I know that the company listens very much to our customers' demands and is very customer-oriented, and of course that has helped us grow, since we often introduce the solutions that customers demand. But introducing such a solution [based on circular economy principles] should in that case be demanded by our customers.'

During the second workshop, an idea was presented to the company regarding a modular kitchen concept consisting of a frame structure, which would allow for maintenance and repairs as well as easy disassembly to improve recirculation of components and materials. The idea was overall received with minor enthusiasm as a modular kitchen design would imply major investments to change the current production capabilities and was associated with 'flat packaging' which opposes the company's ideology of delivering ready assembled kitchens.

'If you are talking about a circular kitchen which means large volumetric products in the end, which one best solves with flat packaging or alternatively demountable frame structures to develop these solutions. I see this as the biggest obstacle, that it will be a big change for the company to launch large product ranges like this'

Processes are very optimized and specialized, changes to manufacturing processes would require big investments. The risk of investing in innovation without knowing if it pays off, is a big barrier. Furthermore, one interviewee mentioned that it is hard to establish circularity alone, it should be more industry wide thinking.

'It should be more for the whole industry, because then it is more that everyone must follow the same rules and so. It is not easy to be alone in starting with something like this, it must be industry-wide thinking.'

Two interviewees mentioned (reverse) logistics as a barrier, of which one interviewee associated circularity with increased logistics for the company, which might not prove to be a sustainable direction either. Furthermore, two interviewees mentioned a lack of support from the (complex) supply and demand network. Customers do not demand circularity and uncertainty exist whether to involve and collaborate with suppliers to recirculate components and materials, partly due to the complexity and length of the supply chain.

'We buy all the materials. We can't grind them down and do something with that ourselves currently. How to look at it, should one involve their suppliers? There's a lot of steps in between for those things to get back. Should we take back our own products? There is not much we can do with them here.'

Potential for implementing circularity

The use of more renewable materials such as solid wood and bio-composite were discussed as a potential direction instead of currently used materials like chipboard and MDF (Medium Density Fibreboard), which have a relatively short lifespan and limited possibilities for recycling. Many benefits could be seen in the use of more renewable materials, as long as these materials could be processed with the current manufacturing capabilities and would not result in significantly higher prices of the products.

One idea developed during the workshops which received most appreciation by the company, was that of a service solution that would enable tracking and recirculation of kitchens and materials and streamline maintenance and repairs of kitchens (see figure 1). This could avoid premature disposal and extensive renovations of kitchens, and was identified as a potential direction for more circularity, which was also emphasized by one of the interviewees:

'If one could simplify the replacement of fronts and such things, there I don't see any large barriers – that one could get maybe new materials that are based on the current cabinet frames. It is those that wear out most often, the fronts and the outer shell.'

Kitchen owners would be able to, through the service, identify their kitchen or components of their kitchen to order repairs and upgrades. This would extend the lifetime of their products and promote sustainable choices, rather than premature disposal of kitchens and extensive renovations. If renewable materials are used, the service could facilitate remanufacturing and recycling through reverse logistics of components and materials. Furthermore, it would give the kitchen manufacturer insights in the parts that are replaced most often, which is feedback that can be used for further development.

Through the developed idea's, great potential was identified for further iterations by collaborating with stakeholders and include them in a co-creative process, such as housing and recycling companies and material producers.



Figure 1. An appreciated idea was the service solution for tracking and recirculation of materials, components and kitchens

Conclusions

Based on three workshops and five interviews with a kitchen manufacturer, this study shows what role co-creation strategies can play when collaborating with SMEs in developing an understanding and awareness about circular economy and finding barriers and potential for circular economy implementation. The results indicate that the co-creative collaboration has led to an increased understanding of the circular economy and an increase in circular thinking amongst the participants of the workshops. It also gives valuable insights into barriers and potential for circularity that should be taken into consideration when co-creating with SMEs.

The company indicated a variety of barriers for circularity, the biggest one being the costs of changing the current production capabilities. Furthermore, the company is dependent on a complex network of suppliers and feels a lack of support from the supply and demand network, contributing to the feeling that the company has to 'close the loop' themselves. Although some of these stakeholders were invited to the workshops, they did not manage to participate in the end. Including some of these stakeholders into the co-creative process could have led to better results and more potential for collaboration and closing the loop.

Instead, a potential was seen in a smaller step towards circularity such as launching a service that enables lifetime extension of the current products, which could also form a stepping stone to the implementation of more renewable materials. This service solution would not imply major changes to the current capabilities and could be developed as a side-track. Implementation of renewable materials could then also create an incentive to retrieve materials to remanufacture kitchens.

The research is limited by the fact that it was a single case study with a small sample of interviewees and that not all interviewees participated in all of the workshops. Another point is to what extent the researchers should actively partake in the co-creative collaboration, as it might lead to counterproductive situations if they account for the majority of the generated ideas.

It could be beneficial to study the effects of co-creation in more cases and evaluate the impact on circularity in companies over a longer period of time. Future research will further develop three concepts that were generated in the workshops, study the effects of including more stakeholders in the process, and perform a comparative study between circular development for a Swedish and Dutch kitchen manufacturer.

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