

# Co-creating Circular Propositions in Complex Value Chains: Advantages and Drawbacks

Sonja van Dam<sup>1,\*</sup>

<sup>1</sup>Industrial Design Engineering, Delft University of Technology,  
Landbergstraat 15, 2628CE Delft, Netherlands

\*E-mail of corresponding author: [s.s.vandam@tudelft.nl](mailto:s.s.vandam@tudelft.nl)

## Abstract

In developing circular business models within complex value chains, collaboration with relevant stakeholders is essential. Based on a case study within the automotive remanufacturing industry, this paper presents five benefits and five drawbacks of applying co-creation in complex value chains to develop new value propositions.

## Keywords

Co-creation, circular value propositions, advantages and drawbacks, stakeholder engagement

## Introduction

Circular business models often impact diverse stakeholders in the value chain, requiring new ways of working and heightened collaboration (Bocken et al., 2018). To develop novel value propositions that benefit the diverse actors throughout the value chain, engaging with these different stakeholders and involving them is essential (Sangiorgi, 2011). Co-creation is an approach with proven benefits (Roos, 2015, van Dam et al., 2021) as it enables users and other relevant stakeholders to actively shape the design of new products and services (Holmlid et al., 2015, Sanders and Stappers, 2008).

To date, a majority of co-creation efforts in product and service design focus on involving consumers/end-users (Sánchez de la Guía et al., 2017). Co-creation with stakeholders (Bettiga and Ciccullo, 2019, Li et al., 2020) in more 'complex' value chains with an 'exceedingly complex nature' and 'dynamic set of production activities' (Sturgeon, 2001), is

less common. Even fewer literature can be found that touches upon on co-creation in complex *circular* value chains, with their added dimension of complexity due to the reverse logistic activities surrounding materials, parts, or products (a few exception being Blomsma and Brennan, 2017, Grunwald, 2022, Pedersen and Clausen, 2019). The added value as well as drawbacks in this context are therefore less understood.

This paper sets out to explore the benefits and drawbacks of employing co-creation in complex value chains to develop novel value propositions. Specifically, we delve into a case study within the automotive industry, focusing on the development of a reverse logistics platform for used car parts destined for remanufacturing, also known as cores (CLEPA, 2016). Spearheaded by a spin-off from a remanufacturer (a 'reverse logistics service provider'), this initiative aimed to streamline the reverse logistics process. However, the reverse logistics service provider was struggling to garner interest for the platform. Therefore, co-creation was decided on as method for the platform development process.

Given the automotive industry's layered structure, involving various tiers, trade levels, and stakeholders (Wolk & Nikolic, 2022), it serves as an ideal setting to explore the dynamics of co-creation in complex value chains. Furthermore, reverse logistics add an extra layer of complexity in this context (Fleischmann et al., 2000, Kalverkamp and Raabe, 2018) making effective collaborative strategies even more important. Through a reflective analysis of the co-creation process together with the reverse logistics platform developers, this paper gives a nuanced understanding of the applicability of co-creation within complex value chains and the benefits and drawbacks.

## Methods

This paper revolves around analyzing the co-creation process that was conducted as part of the reverse logistics platform development process for used automotive parts. The co-creation process consisted of four co-creation sessions and interviews with stakeholders involved in remanufacturing efforts: a wholesaler, a group of core brokers, and two remanufacturers, along with eight interviews (due to the effects of the COVID pandemic) with garages (Figure 1). The co-creation sessions were conducted between 2019 and 2022. These were planned at critical stages throughout the project to understand stakeholder's needs and vantage points, and to translate them into opportunities to simplify the reverse logistics of used car parts. The thematic analysis of the co-creation sessions themselves are detailed in van Dam & Bakker (In Press) and van Dam et al. (2020).

To evaluate the benefits and drawback of co-creating in this complex value chain, three employees from the reverse logistics service provider were interviewed one year following the completion of the project. During the 30-minute interview the platform and service development process and the role of co-creation herein were evaluated. The interviewees, who were actively engaged in the platform's development and surrounding services,

comprised an R&D project manager (SP1), a project manager (SP2), and a product manager (SP3). The recordings were transcribed verbatim and anonymized. Thematic analysis was conducted to distill and group the advantages and disadvantages, which are presented in the results section.

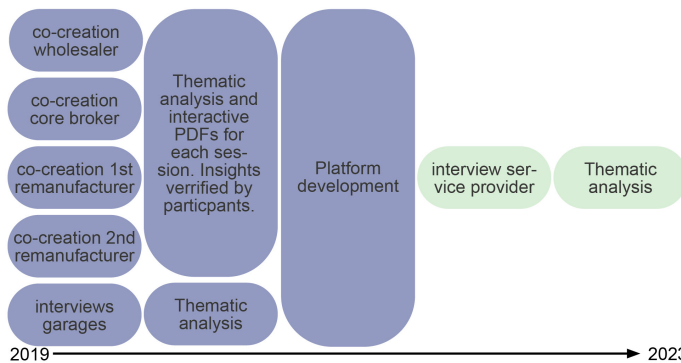


FIGURE 1 OVERVIEW OF CO-CREATION PROCESS AND ANALYSIS STEPS

## Results

The analysis of the co-creation process identified several benefits and drawbacks of utilizing co-creation in complex value chains. This section addresses five benefits and five drawbacks.

### *Benefits*

#### ***Co-creation fosters trust***

Co-creation can facilitate trust amongst stakeholders in the value chain, an important element for the efficient operation of reverse logistics systems. The reverse logistics service provider indicated that through the co-creation process, a long-term collaboration emerged, which persists to this day: SP2 *“The co-creation sessions were the door opener for us at [the wholesaler] and the eye opener for [them] that the project can be a trustful partnership. So, it helped us that [they] trusted in us (ReCiPSS project team) and motivated them to really support in the project.”*

#### ***Co-creation uncovers more insights when hosted by external, neutral moderator***

In the intricate dynamics of complex value chains, where relationships between stakeholders can be challenging, the presence of a neutral, external moderator is advantageous. In most sessions, it was noticed that stakeholders expressed their opinion openly and were outspoken in communicating challenges and issues they were facing. The reverse logistics service provider felt this would have been less if the sessions would have

been moderated by someone being suspected of having financial motives or vested business interests in the outcome. SP1: *"I liked a lot that we could hand over moderation to someone else. Someone neutral like you."*

### ***Co-creation sheds light on various challenges and needs of stakeholders.***

Through co-creation, the platform development team gained empathy for the vantagepoints of different stakeholders: SP1 *"that was really a game changer for us to understand really the needs and the, let's say, thoughts of wholesalers in comparison to what we have assumed or imagined. [...] you could really see and hear and learn from the people in the room. So, this I considered very valuable."* The learnings from the co-creation session, particularly the wholesaler session, strongly influenced the direction of the platform development and the services, with particular emphasis being given on the development of transparent information flows towards more stakeholders.

### ***Co-creation can lead to different ways of working***

Co-creation opened the eyes of the reverse logistics service provider to new product development approaches and the desire to implement co-creation more frequently: SP3 *"I think we should do [co-creation] more. [...] for me, the learning was OK for future service development as part of product marketing [we should have] more of those sessions."* SP1 indicated that for their new project: *"I miss someone like you [the author] in there, who is taking this perspective [...] putting it on a very basic level, and also emotional, and grasping people's interest. [...] I have the feeling that we sometimes skip this first step [co-creation] too quickly. And then start to work on something which we consider tangible, but then realizing, oh there is a lot of questions open, which we could have maybe answered if we have taken this step before."*

### ***Co-creation impacts stakeholders***

Co-creation has beneficial effects beyond the product and service being developed. The reverse logistics service provider felt that there were beneficial side-effects to co-creation for the stakeholders involved. SP1 *"The stakeholders who participated, they also learn something out of this sessions and I don't want to underestimate that because there was also an occasion for them to think about their place in the system and their interest and their problems and whatever and which they probably don't do in the regular business hours [...] they got different perspective on what they are doing and maybe got also more understanding on other topics or more eager to accept potential solutions for that."*

### ***Drawbacks***

#### ***Lack of physical proximity***

Stakeholders in complex value chains are often not in spatial proximity to each other. This can make it challenging to bring stakeholders physically together, which contributed to the

choice to conduct interviews with garages. The experience in this project was also that face-to-face interactions enhance creative processes. Despite the widespread adoption of remote working and online collaborative platforms like Teams, Zoom, Miro, and Mural due to the onset of COVID, they were still a barrier for certain stakeholders. More importantly, they couldn't replicate the effectiveness of in-person meetings. SP2: *"if you compare the [in-person wholesaler] workshop for example with the one with [the first remanufacturer], that one I didn't like that much because it was only online, which was also a problem, I think. Well, it's always the problem, online versus face to face, but especially in a workshop, even though there are a lot of technologies you can use, but you will never have the same result if you're not sitting face to face to each other."*

### ***Engagement and openness to co-creation decisive for outcomes***

Co-creation can have very successful outcomes, as was the case with the wholesaler co-creation process, but this is strongly dependent on the level of engagement of stakeholders. SP2: *"[participants] need to be open because, if not, it will most probably not lead to the results that we had."* SP3: *"the engagement rate is the most important."* However, the reverse logistics service provider also noted that levels of engagement varied for different stakeholders, which they felt was related to the online nature of some sessions. SP3: *"one drawback is if the engagement then is at a low level, there are just fewer results."* This could be caused by instances of multitasking observed during one online session.

### ***Relevance co-creation to stakeholders not directly apparent and co-creation time-intensive***

Co-creation is time-intensive by nature, which may relegate it to a low(er) priority. This can be particularly challenging when dealing with increased economic activities and labor-shortages, as was the case with garages with the uptick of the economy post-COVID. Furthermore, it can be challenging to enthruse stakeholders to co-create, because the added value can be difficult to demonstrate upfront, as it often only emerges gradually during the process. Taking part in the co-creation process directly benefited the wholesaler in this case study, but it took almost a year to find a wholesaler willing to participate and invest time. SP1: *"When we started with that process it was difficult to make these stakeholders aware that they are actually stakeholders in this process and that they have something to say [...] For the wholesalers, I could see that when we told them, OK, you have a vital part in the circular economy case, because if there, if you don't help with the reverse logistics of all that stuff, how could anything happen out of that? And I think this drawback is that people do not feel connected to that, do not feel part of that. And that was probably a drawback at the beginning, and you remember probably also how many problems we had to motivate wholesalers to work with us into the process. In the meantime, we have 3 wholesaler customers already operating on this platform."*

In line with this, it can be difficult for stakeholders to see their role in new product/service development because co-creation feels far away from their daily business operations. SP1 indicated that it was a combination of the complexity of the value chain and the difficulty in explaining the concept of co-creation that made it challenging: *“because the value chain is complex, probably not completely understood by all of the stakeholders. People do not feel involved. And therefore, when you approach them like, “could you participate in the co-creation work?” they say: Co creation? On what? For what? This is not my business.”*

### ***Mixing stakeholders in one session can be complicated***

Co-creating with various stakeholders across the value chain can yield mutual benefits through collaborative idea development. However, mixed sessions spanning vertically along -or horizontally across- the supply chain can be unfeasible when dealing with complex value chains. In the case of the automotive aftermarket, competition law as well as conflicting interests made it complicated to bring competitors around one table.

Likewise, financial dependencies as well as buyer-supplier dynamics may render certain stakeholder combinations undesirable. Within this case study, the wholesaler held a certain amount of distrust towards remanufacturers, due to financial losses surrounding deposits on used parts, which would likely not have been uncovered had they been in a session together. While the core broker session, in which a remanufacturer participated, underscored the vital role of core brokers in maintaining a steady supply of cores, the separate sessions with remanufacturers unveiled more complex dynamics: Core brokers also complicated the return of cores through regular supply chain channels.

On a similar note, the reverse logistics service provider had the impression that their presence in the session as observers might have inhibited remanufacturers from freely expressing their thoughts. This influence stemmed from their existing buyer-supplier relationships with the remanufacturers. SP3: *“I think also because we were part of it, opinions were not expressed, maybe in the same way if we weren’t part of this.”*

## Discussion

The results indicate that co-creation presents both benefits and drawbacks in the development of new value propositions within complex value chains. It can be a valuable tool for collaboration with stakeholders and rethinking their role in the system or network as also reported by (Pedersen and Clausen, 2019). However, adjustments are required to accommodate parties with conflicting interests during the co-creation process. In terms of product development, involving the client who commissioned the co-creation process as observers proves to be an effective technique to enhance their understanding of user’s perspectives (Kouprie and Sleeswijk Visser, 2009). Nevertheless, in the context of complex value chains with challenging relationships, the inclusion of clients may warrant

reconsideration. Balancing the necessity to foster empathy for stakeholders' challenges with stakeholders' ability to communicate freely is therefore essential. Furthermore, the benefits and drawback on online vs. in person workshops need to be carefully weighed, particularly when stakeholders are geographically dispersed. Davis et al. (2021) recognizes similar aspects and suggests a spatiotemporal model that incorporates the opportunities different time and space settings provide.

## Conclusion

This paper sheds light on the benefits and drawbacks of applying co-creation in complex value chains. Co-creation proved beneficial in fostering trust among diverse stakeholders in the value chain and generating added value for all participants using the new platform and services. However, the methodology necessitates adaptations for use in complex value chains, particularly in navigating the collaboration of parties with conflicting interests or challenging relationships in the co-creation process. By shedding light on the practical implications and outcomes of co-creation, the paper offers valuable insights for value chains considering co-creation. It underscores the importance of stakeholder engagement and collaborative development processes, while emphasizing crucial considerations in setting up co-creation initiatives for new value propositions.

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## References

- BETTIGA, D. & CICCULLO, F. 2019. Co-creation with customers and suppliers: an exploratory study. *Business Process Management Journal*, 25, 250-270.
- BLOMSMA, F. & BRENNAN, G. 2017. The emergence of circular economy: A new framing around prolonging resource productivity. *Journal of Industrial Ecology*, 21, 603-614.
- BOCKEN, N. M. P., SCHUIT, C. S. C. & KRAAIJENHAGEN, C. 2018. Experimenting with a circular business model: Lessons from eight cases. *Environmental Innovation and Societal Transitions*, 28, 79-95.
- CLEPA. 2016. *Remanufacturing Associations Agree on International Industry Definition* [Online]. Available: <https://clepa.eu/mediaroom/remanufacturing-associations-agree-international-industry-definition/> [Accessed 22-05-2020].
- DAVIS, A., WALLACE, N., LANGLEY, J. & I., G. 2021. Low-Contact Co-Design: Considering more flexible spatiotemporal models for the co-design workshop. *Strategic Design Research Journal*, 14.

- FLEISCHMANN, M., KRIKKE, H. R., DEKKER, R. & FLAPPER, S. D. P. 2000. A characterisation of logistics networks for product recovery. *Omega*, 28, 653-666.
- GRUNWALD, G. 2022. Sustainability co-creation in digitalized global value chains. *Strategic change*, 31, 19-29.
- HOLMLID, S., MATTELMÄKI, T., SLEESWIJK VISSER, F. & VAAJAKALLIO, K. 2015. Co-creative Practices in Service Innovation. In: AGARWAL, R., SELEN, W., ROOS, G. & GREEN, R. (eds.) *The Handbook of Service Innovation*. London: Springer London.
- KALVERKAMP, M. & RAABE, T. 2018. Automotive remanufacturing in the circular economy in Europe: marketing system challenges. *Journal of Macromarketing*, 38, 112-130.
- KOUPRIE, M. & SLEESWIJK VISSER, F. 2009. A framework for empathy in design: stepping into and out of the user's life. *Journal of Engineering Design*, 20, 437-448.
- LI, G., SHI, X., YANG, Y. & LEE, P. K. C. 2020. Green Co-Creation Strategies among Supply Chain Partners: A Value Co-Creation Perspective. *Sustainability*, 12, 4305.
- PEDERSEN, S. & CLAUSEN, C. 2019. Staging Co-Design for a Circular Economy. *Proceedings of the Design Society: International Conference on Engineering Design*, 1, 3371-3380.
- ROOS, G. 2015. Servitization as Innovation in Manufacturing—A Review of the Literature. In: AGARWAL, R., SELEN, W., ROOS, G. & GREEN, R. (eds.) *The Handbook of Service Innovation*. London: Springer London.
- SÁNCHEZ DE LA GUÍA, L., PUYUELO CAZORLA, M. & DE-MIGUEL-MOLINA, B. 2017. Terms and meanings of “participation” in product design: From “user involvement” to “co-design”. *The Design Journal*, 20, S4539-S4551.
- SANDERS, E. B.-N. & STAPPERS, P. J. 2008. Co-creation and the new landscapes of design. *Co-design*, 4, 5-18.
- SANGIORGI, D. 2011. Transformative services and transformation design. *International Journal of Design*, 5, 29-40.
- STURGEON, T. J. 2001. How Do We Define Value Chains and Production Networks?\*. *IDS Bulletin*, 32, 9-18.
- VAN DAM, S. S. & BAKKER, C. A. In Press. Between a rock and a hard place. A case study on simplifying the reverse logistics of car parts to enable remanufacturing. *Journal of Circular Economy*.
- VAN DAM, S. S., BAKKER, C. A. & HOOGEVEEN, L. A. J. The challenges faced in the reverse logistics of automotive cores: lessons from co-creation with stakeholders. IS4CE2020: Conference of the International Society for the Circular Economy 2020.
- VAN DAM, S. S., SLEESWIJK VISSER, F. & BAKKER, C. A. 2021. The impact of co-creation on the design of circular product-service systems: learnings from a case study with washing machines. . *The Design Journal*.
- WOLK & NIKOLIC 2022. The European Car Aftermarket Structure 2022.