CO-CREATION WITH DIVERSE ACTORS FOR SUSTAINABILITY INNOVATION

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Abstract

Sustainability driven innovations differ from current established technologies imposing new requirements on users and often interdependent with other actors' changes. Strategic Niche Management (SNM) stresses interactions between actors through niches i.e. protected spaces for experimentation to support innovation. However, it is unclear what activities are necessary when different actors are involved in developing and diffusing sustainability innovation. This paper aims at identifying activities crucial for sustainability innovation in an implemented mobility project. The results show that co-creation through iterations and reflections by combinations of diverse actors and users can be considered a core process for sustainability innovation. Six activities are identified as critical: matching the interdependencies by combining the actors' diverse competences and resources; facilitating to steer the group of actors into actions; engaging users at early stages of innovation; trying to drive change by offering the users an opportunity; co-creating through a multitude of actors with the development and usage simultaneously; steering and facilitating to enable co-creation.

Keywords: Co-creation, Innovation, Sustainability, Product-Service Systems (PSS)

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1 INTRODUCTION

Transitioning the innovation of products and services towards sustainability requires new approaches that facilitate capturing and creation of value for the innovation across stakeholder groups such as providers and consumers as well as other actors in the value network. Sustainable innovations are shaped by different processes as they impose changes across a multitude of actors along the value network or decision making process, thus, emulating a complex web of interactions and involvement that must be coordinated and organized in new ways. For instance, changes in infrastructure, consumer practices, regulations and policies are considered as critical for the success of sustainability promising innovations (Rene et al., 1998; Schot and Geels, 2008; Smith and Raven, 2012) making them interdependent with the actions and activities of diverse actors. Sustainability driven innovations often differ radically from prevailing set of technologies, whereby markets are not readily available or they impose new user requirements, initially making them less attractive or socially desirable (ibid.). Subsequently, facing a mismatch between the development and applicability in the early stages, these new technologies have hard time competing against incumbent technologies (ibid.). These patterns are similar to the radical and disruptive innovation typologies, however, there are additional complexities related to sustainable innovation. Geels (2011) argues that compared to many historical shifts, sustainability embarks on three additional complexities. First, he says, sustainability is a normative goal and collective good problem which entails debates around the relative importance of environmental problems in which private actors may have no incentives to address sustainability on their own. Second, he adds, solutions about sustainability often do not provide obvious user benefits and often rank lower than incumbent technologies in terms of price/performance dimensions, thus, they cannot transform existing systems without substantial changes coming both from top-down and bottom-up approaches and these denote politics and power struggles because of vested interests. Third, he continues, that issues of sustainability are global, intangible, and mainly about the future and here narratives and socio-political discourses play a role in framing the dialogue for change. Such debates pose new questions as to how such innovations are to be managed, implemented, and diffused widely given the nature of sustainability issues. Literature suggests that sustainable innovations have to be addressed in an integrated manner taking into account both production and consumption (Stevens, 2010; Vergragt et al., 2014) likewise the interactions between various actors. Though, supporting mechanisms for integrating these in the innovation process have been little investigated, especially in terms of engagement of diverse actors simultaneously. It is less clear what processes and activities lead to a more integrated innovation process, thus, contributing to successful introduction and usage of sustainably sound products and services. We extend this discourse to user involvement in the process (von Hippel, 1998) and argue for co-creation (Prahalad and Ramaswamy, 2004) between a multitude of actors to transcend the aforementioned interrelated factors. This paper, therefore, intends to add to this stream of literature by exploring what activities occur and shape interactions between diverse actors, and identify which ones are crucial for supporting sustainable innovation. We critically explore and analyse a demonstration project, where the authors have been part of a multi-actor engagement in order to develop and deploy a sustainability driven disruptive product-service system. The system delivered is a pool for light electric vehicles implemented in two large organizations as a more sustainable mobility alternative for commuting and in work related transports.

2 THEORETICAL FRAME

2.1 Strategic niche management and sustainable innovation

Strategic niche management is an analytical approach to understand the dynamics in the early development and adoption of new technologies that have a high potential to contribute to sustainable development (Schot and Geels, 2008). Founded upon theoretical background from constructivist science and technology studies into evolutionary economics (as in Nelson and Winter, 1982), attempts to understand the processes of socio-technical change resulted in quasi-evolutionary perspective on technical change by Rip (1995) and Schot (1998) that emerged into this analytical framework. SNM is built on the core assumption that transitions can be facilitated through modulation of so-called technological niches (spaces where radical novelties emerge) with the co-evolution of innovation, user practices, and regulatory structures (Schot and Geels, 2008). This assumption lays on the argument that

too much focus on development, testing, and optimization of technology has resulted in less attention or negligence to the broader societal embedding and social desirability of these innovations (ibid.). Initially SNM placed strong emphasis on the emergence of niches as a fundamental step in the innovation process (e.g. Levinthal, 1998). Niches were considered as the locus for radical novelties, as protected spaces, which would allow the nurturing and experimentation in order to learn about the applicability and social desirability of particularly sustainability promising innovations (Geels, 2002). However, forming niches showed to be insufficient for transition as dynamics of actors at different levels are strongly influential. The multi-level perspective (MLP) (first coined by Rip and Kemp, 1998) emerged as an additional analytical framework extending niche development (Geels, 2011). In addition to niches, the MLP focuses on the socio-technical regime level, where practices and associated rules are established, stabilizing existing systems as well as the socio-technical landscape (Geels, 2011; Schot and Geels, 2008). MLP views transitions as non-linear processes that result from the interplay of developments at three analytical levels: niches, socio-technical regime, and the socio- technical landscape (Geels, 2002; Rip and Kemp, 1998). The regime is of primary interest, argues Geels (2011), since it embodies the deep structures and stabilized socio-technical system (Geels, 2005). The socio-technical regime in SNM stresses the criticality of a community of broader societal groups such as scientists, policy makers, users and special-interest groups, and the alignment of their activities (Geels and Schot, 2008: p.543). These actors on one hand enact, instantiate and draw upon rules in concrete actions in local practices; and on the other hand, rules configure actors i.e. cognitive routines and shared beliefs, capabilities and competences, lifestyles and user practices, favourable institutional arrangements and regulations, and legally binding contracts. Regimes have stabilized institutional structures that can hardly be influenced by the actors individually (Geels, 2011). Thus, for innovation, the interactions between these different actors at different levels become crucial as they together can transform the innovation landscape, since their diversity in terms of backgrounds and interests may lend impetus as well as resources for approaching issues of sustainability.

2.2 Co-creation for sustainable innovation

According to Sanders and Stappers (2007, p.6) co-creation is ‘any act of collective creativity, i.e. creativity that is shared by two or more people’, and this collective creativity is critical for achieving more effective and efficient problem solving in innovation. This is an aspect that could extend SNM by bringing it from the analytical level to an operational level and practical use. A key idea is, as Shove and Walker puts it (2010, p.764) ‘that change takes place through processes of co-evolution and mutual adaptation’. Co-creation has been practiced extensively at the front-end development as well as lately at later phases of product development (Sanders and Stappers, 2007). It has emphasized value creation when firms and customers were engaged to provide meaningful output in the growth for the companies (Dhaka, 2015). When looking in the value creation processes in the conventional perspective, the roles of consumers and companies were distinctive and value creation occurred outside the markets (Prahalad and Ramaswamy, 2004). But, as access to information and the means of production have become more readily available, more individuals have the ability to innovate (von Hippel, 2005). Innovation became more democratized (ibid.) and value creation leaned more towards the closer interaction with consumers since co-creation of consumer experiences brought about competitive leverage (Prahalad and Ramaswamy, 2004). Although not a new concept, there are forms of co-creation being applied in practice particularly toward solving issues of sustainability as the innovations demonstrate a critical dependency on systemic changes. Oksanen and Hautamäki (2015) argue that today’s innovators require new capabilities that do not only focus on the innovation but also the entire chain around that innovation ranging from basic research to products, services and markets. In addition, because actors share opposing views of the problems, of solution methods, and of the legitimacy of possible solutions, Oksanen and Hautamäki (2015, p.92) add that best solutions are implemented if all stakeholders are able to find their role within the problem-solving network. Actors from public and private domains can together build innovations that may redirect technology development as well as the usage of new technology (Kemp et al., 2000). Hence, we consider the framing of actors from various domains into a broader setting for facilitating the development and diffusion through involvement and more democratized processes with equal role of actors.

2.3 Innovation through user involvement

Extensive research supports that the involvement of users is critical (von Hippel, 1988; Gales and

Mansour-Cole, 1995), although not without debate. Particularly in innovation for a sustainable development, user involvement has been suggested as highly important in order to create markets and increase the social desirability of such innovations (Blok et al., 2015; Jackson, 2005; Schot and Geels, 2008). Sustainable development requires sustainable consumption involving significant behavioural changes that are deeply engraved in social structures (Jackson, 2005). Influencing these changes is considered much more complex than advancing technology towards higher environmental goals (Blok et al., 2015; Jackson, 2005). Thus, engaging users is as important as engaging other actors in the innovation process. For sustainability innovation, this benefit is extended further to the societal impact, whereby involving users in the process, a mutual learning may occur. Users exposed to new technologies can therefore begin to adapt as well as adopt new practices as the innovation is being developed (Sopjani et al., 2016). Additionally, involving users in the development and trial phases of the innovation provides the opportunity to learn about the innovation, therefore potentially facilitate their adoption decision. Some research has shown that it is possible to influence behaviours and practices through activities of trying (Nevens et al., 2013; Strömberg et al., 2016). This extends further SNM's claims that processes of change occur in a co-evolutionary manner and through experimentation with innovations. Through engaging users in the process of trying out the innovation, possible changes may occur in the consumer practices hence simultaneously contributing to increased applicability.

2.4 Activities in co-creation

The analytical framework of strategic niche management and the multi-level perspective contribute greatly to the understanding of how to achieve sustainable development in a socio-technical system. By interpreting the suggested processes into actions of co-creation and stressing the need of actively involving actors and particularly users in this co-creation, it is possible to bring the framework one step towards to its practical implications. However, both at niche level and niche-regime level, it is unclear what activities are needed in order to gain momentum for diffusing innovations and what activities shape interactions between different actors. We attempt to shed some light to this by exploring the activities that happened in a case when actors were brought together at niche-regime level, and users were an equally important actor. Consequently, the research question in this paper follows: What activities occur when engaging in co-creation and which ones support the development and usage of sustainable innovation?

3 METHOD

3.1 Research method

In this paper we combine experiment methods for data collection in innovation research as suggested by Sørensen et al. (2010). We have analysed an ongoing large joint development project called LEVpool, initiated between several partners in academia, public, and private sector, which we present in the section below. For the analysis, we have collected data from six workshops conducted with all actors (2 with stakeholders, 4 with users) in the project at different periods throughout the innovation phases, following qualitative interviews with all individual actors, documents from the project, and meeting notes. The workshops were sessions between stakeholders which generated input for the innovation, whereby actors actively participated, engaged in discussions, shared ideas, and made decisions. We as researchers were part of this project where on one hand conducted research and on the other suggested actions based on the outcomes of those workshops. Each workshop was a building block of the innovation process from design to implementation and usage. Due to diversity of data sources, we sorted and clustered them (Creswell, 2003) based on activities that occurred within the group of actors in a timeline basis. Consequently, content analysis (Silverman, 2011) was performed in relation to the research aim in this paper in order to gather insights.

Figure 1. Input from the workshops conducted with actors

3.2 LEVpool – Product-service system innovation

LEVpool was a sustainability driven innovation project, developing and trying an innovative mobility solution for individuals. It was set up as a multi-actor initiative to reduce CO2 emissions due to commuting to/from and between workplaces. Two large workplaces saw the need for providing alternative solutions to employees at work and encouraging commuting by public transport or bike. LEVpool, as the name connotes, offered LEVs (lightweight electric vehicles) through a shared-use system. It integrated a product-service system (PSS) where the LEVs and digital booking services were combined to offer a new mobility alternative for two different types of users. For those who needed a vehicle to commute to work due to bad access to public transport or a distance further than possibility to bike, the solution offered the possibility to co-own a vehicle. These users were assigned as 'caretakers', driving the vehicle back and forth to work and were free to use this vehicle for private purposes in the evenings and weekends as compensation for easy maintenance, cleaning and full charging. The caretaker concept did not only solve the problem with lack of charging stations at the sites, but also ensured that the LEV was replacing a fossil-fuelled car to the greatest possible extent amongst the caretakers. During office hours the vehicles were offered to other colleagues, here called daytime users, who needed a vehicle to attend meetings and do other errands. Ten LEVs were placed at two large workplaces (serving as experimentation and trial sites); one site in a rural area south of Sweden and one in the area of suburban Stockholm.

4 RESULTS

In this section, results are shown from the LEVpool project in terms of the innovation process in its development and usage phase, where major activities were identified and are explored below. Figure 2 shows categories of results from the data collected about the whole project. It depicts the combination of actors, whom together brought the needed resources for the innovation requirements; the development activities that brought about the solution; users, as a critical actor for steering the project; and activities to reach usage of the solution as well as bring in knowledge about the innovation. In the middle, it shows the core activities that integrated the development phase and usage phase with the developers and users.

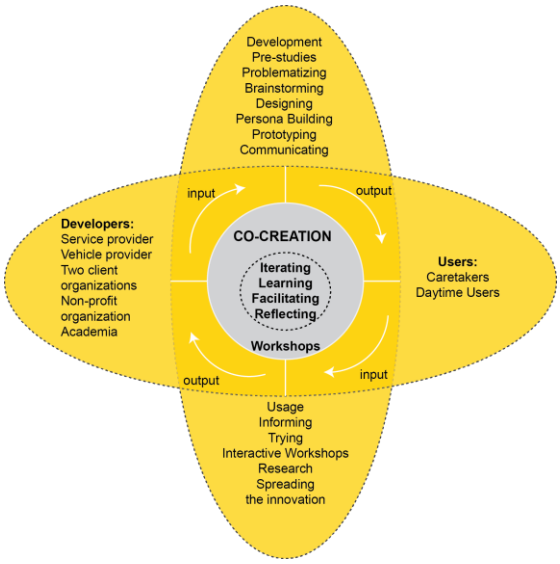

Figure 2. A visual representation of the actors, processes, and activities within LEVpool

4.1 Actors – Developers and Users

The LEVpool involved actors from private and public domains represented by a service provider, vehicle provider, two client organizations (a municipality and a manufacturing company), a non-profit organization, a research group, and users – led by the academic partner. However, each actor was responsible for the competences that they brought and managed their resources individually, but utilized each other's resources as needed during the different innovation phases. Resources such as booking system and the new LEVs, were brought by the two private firms. The service provider offered e.g. booking tool and support, vehicle assistance, and contract preparations and the vehicle provider assisted with vehicle equipment and know-how concerning the vehicle. The infrastructure, e.g the test sites, was provided by the two client organizations. In addition, to encourage their employees to use the pool, the two client organisations also provided some practical support at the test sites. The non-profit organization was in charge of the information spread within and out from the project, though, several actors in the project group contributed to the dissemination of information at the sites and efforts to make users to sign up for the pool solution. The users were those who used the product-service-system during the project period, i.e. booked and drove the vehicles. All came from different backgrounds and organizational cultures but had an interest in the area of transport or sustainability. They all brought different resources and competences providing means to develop the innovation. Because of their diversity, together, the actors complemented each other with their knowledge and expertise in their respective field that they individually were not capable of. The LEVpool project managed to collaboratively generate a potential solution, the tried PSS, to a critical environmental problem – tackling the high usage of fossil fuel car for daily commutes. The trials managed to attract a satisfactory number of users, continuous development of the product service system and a usage of light electric vehicles that reduced CO2 emissions. After the completion of the experimentation, results from the project showed that there were over 200 active users who used the solution on a daily basis and whom reported a change in perceptions toward electric vehicles after having tried the solution for a few times.

4.2 Development and Usage

The major activities that occurred during the development process were *pre-studies*, *problematizing*, *brainstorming*, *designing*, *persona building*, *prototyping and communicating.* Initially, the actors (excluding users at this point) wanted to identify the current issues faced at the two workplaces in terms of the mobility and transportation. Through pre-studies, the group learned about the travel behavior and aimed at understanding where the critical problems were. After exploring the problems, the group brainstormed about possible solutions and began designing the system to develop a functional use concept around it. The actors at this point had a product (the vehicle), and a platform (the booking system), but needed to find a solution of how to bring it into a product-service system that would offer multiple usages. With the initial solution designed, the group created personas of the typical users for the different envisioned concepts of use. At this point, the actors began organizing for prototyping the solution and communicating the project to the experiment sites to recruit users. The initial group goal was to deploy the system at the sites as soon as possible in order to learn about the innovation from the users' perspectives. The objective was to develop through involving the users, whereby it was necessary to set up the usage phase simultaneously. The major activities that occurred during the usage phase were *informing*, *trying*, *interactive workshops*, *research*, *and spreading the innovation.* The client organizations were engaged together with the rest of actors in informing their employees that they could try out the system both for daytime use as well as become caretakers. The initial users who applied to become caretakers were selected and invited in meetings to be further informed about the project, how it worked, and the rules of co-owning where contracts were signed with them. They had to bring the vehicle to work in the morning and take it back after work, in order to allow the daytime users to access and utilize the system during the day. The caretakers were heavily engaged in the project since they not only tried the solution for their everyday life and provided critical insights and ideas into the development process, but also showed others how it worked and recruited people. Interactive workshops were meeting points with these users, whereby experiences were shared, including issues, challenges, and benefits of being a caretaker. In addition, caretakers also revealed their experiences and learning with regards to electric vehicles and sharing, as well as their feeling of contributing towards sustainability. The caretakers also participated in surveys and interviews before, during, and after the trials. The combination of individual interviews and group discussions was used as complementing ways to qualitatively capture the caretakers' experiences and learning throughout their respective test periods.

4.3 Co-creation approach

The LEVpool approach was building knowledge and learning about a sustainability innovation through co-creating. The process was rather integrated between developers and users throughout development and usage stage since most activities were interdependent. This co-creation approach was characterized by activities such as *iterating, learning, facilitating, and reflecting* simultaneously. The activities in LEVpool emerged iteratively between the innovating actors and the users connected through learning loops. Throughout the development and usage phase, there were two iterative learning loops. In these iterative learning loops, the developers gained insights for the innovation performance and made improvements, which came from users' input. Similarly, the users gained insights about its applicability in their daily life. Being a rather radical and new concept for mobility, engaging the user at the early development phase was in a way a 'preparation' stage before adoption from the user's perspective. The knowledge transfers between users and the actors and vice versa were greatly facilitated through the use of workshops integrated by the research group, allowing mutual learning processes to occur. In the first learning loop, the actors worked together to *understand and define* the scope of issues concerning private mobility and as well *create and design* possible alternatives that would solve those issues. The user knowledge from the field pre-studies was brought into these actions. In the second learning loop, the most critical, the actors were organized to design the solution and begin *testing and exploring* with the users to gather knowledge from trials in real environments and co-create with the users. All the initial trial data gathered both from workshops with the users, interviews, and quantitative data from logbooks, were analysed and communicated by the research group to the actors. From this first learning loop, the actors made new decisions on how to proceed with the innovation development, made iterations to the design and saw the need for more communication activities on the sites. Users were constantly involving and bringing critical knowledge for each of the actors through the workshops, and by their usage, they co-created the system.

5 DISCUSSION

From the results, we draw three major insights that allow us to answer the research question posed in this paper. One is the way the actors have been combined in terms of their diverse backgrounds, resources and competences for the development of innovation. The second is the way the development and usage took place simultaneously in the innovation process. And third, the way users both affected the activities of other actors and the development process, and learned themselves while extending their new experiences to their networks, as a way to spread the innovation.

5.1 Combining competencies

The diversity of actors in the LEVpool project allowed for a steering that was critical for the innovation process as diverse resources were required to put together the product-service system. Since the solution was a system of product and service requiring changes in travel behaviour dependant on the users, more competences than the actors could provide individually were required. All the actors had an interest in one way or the other in the innovation at stake, e.g. the two employers wanting mobility alternatives for their employees; the service provider wanting to explore shared use of light electric vehicles; the vehicle provider wanting to understand more about the spread of light electric vehicles; and, the non-profit organisation aiming at spreading knowledge about new mobility solutions. All these actors were interested in bringing forward sustainability. The engagement of the actors contributed in different ways to bring the elements of the PSS together and achieve an initial user segment to try it and contribute further to the understanding of the innovation. The research group, besides conducting the research, facilitated the co-creation of the innovation by bringing in and out the learning between users and the rest of actors. SNM literature highlights that individual actors within niche-regime levels cannot bring about changes on their own because of the stabilized set of systems and rules, where their 'options for agency' are limited often in terms of competences and capabilities and others (Geels, 2011). However, when these are brought together, they can increase agency. In the case of LEVpool, the actors together managed to develop and implement the innovation, and even instantiate as Geels (2011) asserts, usage of the system that extended further to indirectly influencing the travel practices of users. This may be considered as an effort to destabilize existing regimes within the mobility sector, since all the actors one way or another represent the levels and layers of the broader societal groups (Geels and Schot, 2008). In this part, two critical activities emerge as supporting mechanism for sustainable innovation: *Matching*

the interdependencies through combining competences and resources between diverse actors; Facilitating to steer the group of actors into actions.

5.2 Simultaneous development and usage

Reaching actual usage by real users at early stage was as important as developing the solution. Trying the system can here be considered a critical activity since the functionality and applicability of the solution was unknown and particularly its everyday logistics were hard to predict. The vehicle, as well as the shared usage, and the 'caretaker' aspect, were all very new to the market. The users' usage was considered critical from the early phase and they co-created by experiencing the new system, and participating with their insights about the system. The users also learned themselves by trying a new alternative, different from their owned fossil fuel car and reportedly showed that they tried to disseminate the word about the solution and its contribution to sustainable development. This indicates that engaging the user at early stage and establishing usage is a critical activity since understanding about its applicability before finalizing the innovation was even more important than making the technology fully functional. SNM postulates that competing initially is difficult for sustainability driven products or services due to dominant designs, therefore experimenting in real contexts has been suggested (Raven and Bosch, 2010). As well, the lack of defined markets emphasizes the need for engagement to understand patterns of demand and user segments (Schot and Geels, 2008; Geels, 2002). LEVpool, however, extended even further since trying it also allowed the users to learn and take action toward shifting their travel practices – a desired change for sustainability. It is interesting to note that the users not only tried it themselves but also disseminated the concept within their networks. Thus, two activities can be considered crucial: *Engaging users at early stages of innovation before fully developing the innovation to define markets better and to understand applicability early; Trying in order to steer change within users through offering them an opportunity to change behaviour.*

5.3 Co-creating change

Iterations as an activity of engagement for co-creation were critical and learning loops allowed for a more simultaneous engagement of all the actors. Iterations and learning loops were core for co-creation to occur as this empowered the actors at all stages. As well, co-creation from development to usage made the innovation process more integrated and allowed for possible actions to take place to push the innovation forward since a holistic understanding of the requirements is provided. This way, not only are uncertainties reduced, but also a more applicable solution is adapted to the users' everyday context. Further, through co-creation, a broader value can be created because not only do providers build extensive knowledge of the users and their environments, but it also transcends new knowledge and learning to the users about innovations. This has both a societal impact in terms of utilizing resources more effectively e.g. sharing solutions, as well as reduced environmental impact e.g. efficient light-weight electric vehicles instead of fossil fuel cars that both take space and affect the emissions considerably. In this way, a broader range of actors feels inclusive in the efforts towards more sustainable development for which change is needed at all levels to reach the goals as SNM argues (Schot and Geels, 2008; Smith and Raven, 2012; Rene, Schot and Hoogma, 1998; Hekkert and Negro, 2007; Geels, 2011). Hence, critical activities for supporting both development and diffusion and that may contribute to gaining momentum for sustainability promising innovation as argued in SNM are: *Co-creating through a multitude of actors simultaneously with the development and usage, where mutual learning is mediated; Steering and facilitating to enable co-creation.*

6 CONCLUSION

In this paper, we addressed changes toward sustainability as an interdependent process interacting in symbiosis with organizations (public and private), innovation (technology, products, and services), and society (individuals and communities) as a 'win-win-win' strategy. Strategic niche management literature has investigated the internal processes that occur between niche-regime levels to bring innovations forward and influence transitions. However, SNM has been less clear in addressing concretely the processes and activities that lead to a more integrated simultaneous innovation process, thus, contributing to successful introduction and usage of sustainably sound products and services. This paper explored this dimension by asking what activities occur and which ones are critical between various actors for the development and usage of sustainability innovation? Based on the results and

discussion, six activities can act as critical supporting mechanisms: *matching the interdependencies through combining competences and resources between diverse actors; facilitating to steer the group of actors into actions; engaging users at early stages of innovation before fully developing the innovation to define markets better and to understand applicability early; trying in order to steer change within users through offering them an opportunity; co-creating through a multitude of actors simultaneously with the development and usage, where mutual learning is mediated; steering and facilitating to enable co-creation*. Co-creation, thus, can be considered a core process for sustainability innovation that needs to be driven by the combination of diverse actors and users from early stages of development until usage and through iterations, learning loops, facilitations, and reflections. It enables a broader value-creation among the actors in which activities are not linear and individual, but rather iterative and mutual. From a sustainability perspective, this way of integrating the innovation process may be a mechanism for destabilizing the incumbent regime or the socio-technical lock-ins that SNM postulates (Geels, 2011). This opens new areas for discussion in SNM when considering the lock-ins of the systems for instance. Perhaps one reason for the lock-ins is the missing supporting mechanisms that steer change towards sustainability. Goals are there, but individually it is difficult to reach them. Thus, co-creation may open new endeavours that both contribute to development and usage of sustainability innovation, as well as enable change to occur in and between layers. Indeed, a limitation in this paper is that the empirical context is narrow only to one case, therefore, further research is needed to address these in other contexts and cases so as to make scientific inferences of this occurring phenomena.

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