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CHAPTER 24: CIRCULAR ECONOMY INSPIRED IMAGINARIES FOR SUSTAINABLE INNOVATIONS

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Introduction

The Circular Economy (CE) has attracted a lot of attention in policy and business, where it is viewed as an important approach for achieving sustainable development. The CE-concept has its roots in historical, economic, and ecological fields, which highlights its relevance to sustainable business (Murray et al., 2017). Geissdoerfer et al., (2017: 759) have defined CE as: ‘as a regenerative system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops.’

CE, therefore, provides impetus for a new economic system with multiple opportunities for innovation (Korhonen et al., 2018; Geissdoerfer et al., 2017; Bocken et al., 2016; Ghisellini et al., 2016; Brennan et al., 2015). Innovations hold the keys to sustainable development and sustainable innovation implies ‘a collective commitment of care for the future through responsible stewardship of science and innovation in the present’ (Owen et al., 2013). Innovation consequently involves complex interactions between organizations, technologies, and industry sectors (Rip, 2012; Van de Ven et al., 2008; Abernathy and Clark, 1985).

As a critical dimension of policy making, innovation draws attention to the imaginations that are associated with it, in terms of unanticipated risks, uncertainties, ambiguities, social fragility and so on (Pfothenauer and Jasanoff, 2017; Jasanoff, 2006; Sturken et al., 2004; Beck, 1992). However, there is also a performative function associated to these imaginations that explore how innovations are realised

through ‘sociology of expectations’ (Pfothenauer and Jasanoff, 2017). Imaginaries capture and influence ideas, symbols, and feelings. In doing so, imaginaries help in producing a shared sense of belonging to guide the collective understanding of our world (Jasanoff and Kim, 2009). They contribute to the emergence of new social and technological configurations for future-oriented businesses with promises of innovation opportunities that do not exist except in the imaginaries of involved actors (Borup et al., 2006).

Jasanoff and Kim (2009:120) have defined such sociotechnical imaginaries as “collectively imagined forms of social life and social order reflected in the design and fulfilment of nation-specific scientific and/or technological projects”. They are frequently used to elucidate the “hidden social dimensions of energy systems,” as they represent important “cultural resources that shape social responses to innovation” (Jasanoff and Kim, 2013, pp. 189-190). The CE with its focus on reformulating our relationship with materials and goods (Stahel, 2016) through innovations embodies certain sociotechnical imaginaries.

Sociotechnical imaginaries define and shape the understanding of innovations from diverse perspectives and play an important role in mobilizing the required resources. Sociotechnical imaginaries, therefore, are descriptions of futures that are attainable and offer prescriptive means through which such futures could be attained (Jasanoff and Kim, 2009). Sociotechnical imaginaries are visions that involve the creation of shared sociotechnical futures through innovations. Such imaginaries provide ‘a thread of continuity and stability by extending existing frames of reference from the past into the future, thus mitigating the unknown through what is known and taming the disruptive quality of innovation through what is imaginable and permissible in a given social, political, and historical context’ (Pfothenauer and Jasanoff, 2017:788).

For sustainable innovation, the frame expands from traditional objectives such as economic growth, to those related to societal needs related to reducing inequality, and promoting sustainable production and consumption systems. Merli et al., (2018) have recently urged for research on CE to focus on societal changes required for global transition paths towards sustainable production and consumption systems. However, these new framings do not replace the existing ones, rather, framings compete with one another for the imagination of various stakeholders (Schot and Steinmueller, 2016).

The challenge is to figure out the kind of actions that could direct innovations for tackling such system wide transformations. Here public organizations play an important role (Mazzucato, 2015; 2016). These organizations act as intermediaries for facilitating the collective creation of imaginaries for innovations. Further, public organisations need to steer and evaluate dynamic change, and encourage

an experimental process of innovative change (Edmondson et al., 2018; Schot and Steinmueller, 2016; Mazzucato, 2013).

The aim of this chapter is to explore how CE inspired sociotechnical imaginaries, through collaboration and values, facilitate sustainable innovation. The empirical part of the chapter is based on a qualitative case study of Sitra, the Finnish innovation agency, and how it inspires imaginaries for sustainable innovation through CE. The CE is emerging as a socio-economic paradigm that could open ways for innovative and sustainable means of production and consumption; studies into the social implication of this remain insufficient (Merli et al., 2018). This chapter sheds new light on how CE, in addition to implying a particular mode of production and consumption, could also prioritize societal elements that enable sustainable innovation.

Below we present a review of sustainable innovations, imaginaries and intermediaries. Thereafter, the methodology is described, followed by a presentation and discussions of findings of the empirical study. The chapter ends with some conclusions including implications for theory and practice.

Literature Review

Sustainable innovations

While innovation is widely recognised as essential for addressing complex sustainability related issues, the current innovation frames and approaches may not be suitable for solving these issues (Adams et al., 2016; Boons and Leudeke-Freund, 2013; Soete, 2013). For instance, innovation in consumer products might have directed our societies towards “a long-term conspicuous consumption path of innovation” that destroys the value of the product forcing consumers to buy more frequently (Soete, 2012:9). For the desired transformative change, the focus of innovation needs to shift towards achievement of system-wide transformation from mere optimisation of existing systems related to products and processes (Adams et al., 2016; OECD, 2015).

Sustainability-oriented innovations require intentional changes in firms’ philosophy and values (Adams et al., 2016). This implies systemic innovations aimed at transforming existing societal relationships, interactions between firms, user behaviours and lifestyles, institutional orientations, and business objectives (Adams et al., 2016; Draper, 2013). Sustainable innovations should ultimately be able to address the economic challenges associated with deregulated markets and skewed incentive structures leading to recurring financial and economic turbulence (Jackson, 2016; Sachs, 2015). Moreover, sustainable innovation should consider societal issues related to inferior quality of work and life, and high levels of inequality (Piketty and Zucman, 2014; Stiglitz, 2012; Banerjee and Duflo, 2011; Sen, 2001). Sustainable innovation initiatives should also address environmental problems that are endangering our natural systems (Jackson, 2016; Steffen et al., 2009; Meadows et al., 1972).

Firms play a central role for sustainable innovations, as they are a part of both the problem and the solution; they reinforce the current economic paradigm, thus they may influence positive change towards sustainability (Adams et al., 2016). In practice, innovations in domains like new business models replacing products with services that offer alternatives indicate that the focus should extend beyond the technology, to include how innovations are used, who they involve, and how they affect behaviour change (Geels, 2004). By extending the frame to include sustainability, the complexity multiplies, and to facilitate the transition process, creating imaginaries becomes an effective tool.

Sociotechnical imaginaries

Originally defined by Jasanoff and Kim (2009) as ‘collectively imagined forms of social life and social order reflected in the design and fulfilment of nation-specific scientific and/or technological projects’, sociotechnical imaginaries emphasize action and performance along with materialization through technology. This involves developing capabilities for envisioning future scenarios that enable a shared understanding of the social and technical aspects of innovation and their implicated futures. These futures entail new configurations of technologies, markets, user practices, policies, and cultural discourses implying new sociotechnical imaginaries.

CE is related to sociotechnical imaginaries as it draws on an inheritance from fields like industrial ecology (Bocken et al., 2016; Clift and Druckman, 2015; Gregson et al., 2015), ‘cradle-to-cradle’ design (McDonough and Braungart, 2010), and ‘natural capitalism’ (Lovins et al., 1999), offering new ways of imagining our sociotechnical systems. In these ‘sociotechnical imaginaries’ the concept of waste would become redundant (MacArthur, 2013) through long lasting design, maintenance, repair, reuse, remanufacturing, refurbishing and recycling (Bocken et al., 2016). For instance, by offering a novel perspective on waste and resource management and a new cognitive unit and discursive space for debate, CE enables the alignment of decisions and actions on technologies and appropriate organisational structures to support them (Bocken et al., 2017; Blomsma and Brennan, 2017). The transformation in practices like design and reuse, with the objective of keeping materials in circulation through a series of systemic feedback loops (Hobson, 2016; Stahel, 2016; Bocken et al., 2014; MacArthur, 2013) creates a powerful incentive for attracting businesses towards CE.

The core idea of CE is driven by a vision of future opportunities for building profitable businesses through innovations that highlight resource efficiency; implying an economic and environmental focus (Murray et al., 2017; Ghisellini et al., 2016; Preston, 2012). Such innovations impact how we think about life, as how we make things dictates how we work, what we buy, and how we conduct our lives (Preston, 2012). In discussing CE models, there is a fundamental change in how the future is imagined. However, recent studies have also indicated that so far action on CE is largely limited to recycling and cleaner production (Merli et al., 2018), and reuse faces cognitive barriers (Ranta et al., 2017). In CE contexts, enabling sociotechnical imaginaries could offer a way forward, as unlike

narratives, they are explanatory and used for justification purposes. They could offer hypothetical futures and the resources and capabilities needed to make them concrete.

As sociotechnical imaginaries are intricately entwined with how institutions and economic activities are organised and structured, they influence the ways in which people think they ought to be organised and structured (Anderson, 2006; Taylor, 2004). Firms are embedded in a certain culture and environment that shapes their symbols, norms, and meanings and it is pragmatic to connect with them from within “the direct practice of social life” (Dewey, 1925, as cited by Scherer and Palazzo, 2007, in Alfred and Adam, 2009). For firms sustainability matters mainly because of the growing societal expectation that they must use resources and materials responsibly and wisely, reduce pollution and toxins in production and consumption processes, and address issues related to climate change (Ehrenfeld, 1999; Alfred and Adam, 2009).

Sociotechnical imaginaries could describe possible futures that incorporate these while prescribing how to attain them. Such imaginaries exert substantial influence on contemporary politics and shape discourses that determine economic, technical and social trajectories (Jasanoff, 2006). The concept of sociotechnical imaginaries is used to understand how national science and technology (S&T) projects evolve over time. Policies on S&T have been described as arenas for capturing the role of culture and practices that enable the creation and stabilisation of particular imaginaries that influence future pathways (Jasanoff and Kim, 2009). For instance, leasing as a CE business model would entail new ways of imagining ownership and lifestyles while developing capabilities for services, supporting technologies, lasting design, and existing policy frameworks that are currently attuned towards linear models. This is similar to sustainable innovation process arenas that are systemic and complex, involving interactions between diverse groups of actors – producers, users, entrepreneurs, early adopters, idea generators, policy makers, and financiers. It also brings into focus the importance of intermediaries.

Transition Intermediaries

Transition intermediaries are actors that facilitate coordination processes during complex transition processes involving industry, policy makers, research organisations, and other stakeholders (van Lente et al., 2003). Intermediaries could take various organisational forms, for instance, intermediaries that facilitate transitions to renewable energy have often been government agencies and organisations, NGOs (non-governmental organisations), public utilities and consultancies, including private energy service companies (ESCs) (Backhaus, 2010). Intermediaries understand the implied changes in sociotechnical systems, characterised by shifts in infrastructures, actor groups, technologies and contexts of application (Moss, 2009; van Lente et al., 2003).

Intermediary organisations intercede within existing systems of production and consumption to create and encourage competing debates and narratives while influencing underlying social interests during transition processes (Hamann and April, 2013; Hodson and Marvin, 2010; Seitanidi and Lindgreen, 2010). As sustainability transition processes have gained momentum, the roles played by intermediaries that aid these processes have come into focus (Kivimaa et al., 2017; Kivimaa, 2014). Intermediaries play an important role in the selection of the kinds of innovations that are given prominence, the way they are framed, and the process through which they are finally embedded within society.

The interconnectedness of sustainability issues demand innovations to be conceptualized through sociotechnical imaginaries that leverage the societal dynamics to create a link with what is desirable, with the help of intermediaries.

Methodology

The empirical study is based on qualitative single case study research, which was considered as most appropriate as the aim was to get rich and in-depth information about a previously unexplored phenomenon (Eisenhardt, 1989). The chosen case is Sitra, the Finnish Innovation Fund, an independent public foundation, which operates directly under the supervision of the Finnish Parliament. It was purposefully selected, as it is a key organisation that is building an understanding of current societal transitions and facilitating the ways and means of generating discussions and debates on pathways for such transition processes. Sustainability is an integral part of its agenda and it has identified CE as a key approach for inspiring sustainable innovations.

The applied research methods were interviews and written documents. In total, seven semi-structured interviews have been carried out in June and September 2017. The average length of an interview was 35-40 minutes. The informants were considered as most appropriate as they have important and influential roles related to Sitra's CE initiative. The written material was collected from various sessions during the World Circular Economy Forum (WCEF) hosted by Sitra in June 2017, this included presentations as well as panel discussions.

This study used the grounded theory approach (Jørgensen, 2001; Strauss and Corbin, 1994), as at its core, it involved studying a social process. This approach helped in identifying how the CE creates sociotechnical imaginaries or visions for hypothetical futures that could enable pathways for sustainable innovation.

Findings

There are two main findings from this study. The first relates to the role of sociotechnical imaginaries in prompting a collective process of meaning making for negotiating collaborative paths for

sustainable innovation. The second finding is related to the importance of sociotechnical imaginaries in leveraging national shared culture to develop visions for sustainable innovations.

Imaginaries for collective meaning making

Our findings indicate that Sitra's initiatives related to CE-inspired sociotechnical imaginaries for businesses of the future act as an incentive for firms to get involved. Initially, they revolve around activities that appear possible within the existing system of production and consumption. Models around recycling, repair, and maintenance are strong drivers as firms are able to visualize solutions within their current operations. However, during the workshops organised by Sitra, it became evident that while exploring practical pathways for operationalising these models, actors encounter the challenges underlying such models. These challenges include activities such as new logistics design, identifying new partners, reorienting firm objectives and designing innovative consumer engagement initiatives. In recognising these challenges, the actors begin focusing on the specific values attached to collaboration and sharing. For instance, both collaboration and sharing enable firms to distribute risks and responsibilities, scale up activities like logistics, material use, design, training, and make them economically viable. Thus, CE models allow for a shared understanding of contexts highlighting the values that shape future imaginaries.

The imaginaries inspired by CE are comprised of loops where the consumption and production processes result in little or no waste. During a CE conference organised by Sitra, we observed a gradual progress in understanding the application of imaginaries, as actors expanded their understanding of CE models through increased levels of interaction with these imaginaries. The pathways for the transition to CE models of repair, refurbish, recycle, renting, sharing, borrowing, and redesigning, trigger imaginaries that have wider implications. These implications are related to a deeper engagement with needs through a combination of products and services, which calls for meaningful relationships with the customer. Developing such relationships require proximity and our findings indicate that relating the CE models to the core social and cultural values of the participants enables this proximity. For instance, the participants' shared understanding of trust and collaboration along with an identification with societal values, within their common social and cultural contexts made it easier to build connections. Our findings show that the values strengthen the ties between actors and enable them to negotiate pathways for production and consumption systems through innovations that seek to address the economic, social, and environmental dimensions.

At the Sitra conference, we observed how CE models enable firms to visualise waste as a resource, and in trying to make sense of the practical implications of such visualisation, firms invoke not just the material and organisational resources that need to be deployed, but also imaginative resources. Imaginative resources are the ideas and thoughts that are invoked by the actors trying to make the transition from the current linear system towards a circular one. The imaginative resources help in

relating the goals, priorities, benefits, and risks to the firms, as well as the societal frameworks they are embedded in.

Pursuing the operational aspects of CE models result in deeper understanding of the underlying issues that constrain sustainability pathways, for instance, existing societal relationships, business objectives, behaviours and lifestyles, and institutional set ups. They also trigger a collective process of imagining change. These imaginaries are able to expand the values associated with collaboration and sharing to transparency and trust. It became evident that while collaboration and sharing are important for operationalising CE models, transparency and trust form the basis of building those values. In operationalising CE visions, the opportunities for business and innovations become linked to certain societal values. For instance, developing sustainable packaging through collaboration distributes the cost of development and builds scale, but it also forces firms to confront their existing principles regarding opening up parts of their business processes to outsiders. We observed how these realisations led to further discussions on the importance of values like trust and transparency in Finnish society.

Sitra brings together a wide range of stakeholders from and diffuses the ideas related to CE in order to encourage interactions for a rich social construction of what it means for different people. In practice this happened by engaging actors in workshops and at a conference. The CE pathways are co-produced during the interactions. The interactions resulted in creating specific relationships to issues and the meanings attached to them, to build an understanding of the kinds of innovations that are acceptable. Environmental issues, for instance, resonate because of the ways in which various actors describe their relationship with nature – as an important common resource, a source for various economic activities and enriching social experiences involving family and friends. The focus then shifts to the kind of innovations that would incorporate these objectives without privileging one over the other. Through this process, the interrelatedness of the environmental, economic and social elements becomes evident.

Imaginaries rooted in culture

The interviews with Sitra and interactions with other actors during the conference indicated that in Finland, there appears to be a strong identification with innovations and a certain pride in technological prowess. This coupled with a deep cultural tradition of making and fixing things, makes CE emotionally and intellectually engaging and practically appealing. Such culturally specific imaginaries of innovation become productive means of engagement, as they resonate with the ideas underlying CE.

Through CE, Sitra is inspiring collective sociotechnical imaginaries through a shared national culture of building world-class organisations, exploring entrepreneurial opportunities, leading to new job

creation and skill development. The idea of a national first mover advantage acts as a key motivating factor. The appeal of acquiring a knowledge-based competitive advantage is strong and actors believe that CE models could, through opportunities for sustainable innovations, enable that. There is a shared understanding that these experiences would serve as learning guides for future transition processes. The understanding and the consequent identification of innovation opportunities are within a certain cultural context. Here innovations are seen as a collectively imagined sociotechnical progress for Finnish society while acknowledging the problems they are expected to solve. We find that Sitra is employing CE to inspire a culturally constructed understanding of sustainability.

Sitra employed CE to create an experience of innovation processes, and what they can mean to diverse groups of people by invoking a shared national culture. Initially, by creating a set of imaginaries to generate engagement processes, followed by the creation of CE platforms for sustainable food, forest-based loops, technical loops, transport logistics, and a platform for common action for facilitating system-wide transition processes.

The key findings of the empirical study are illustrated in Figure 24.1.

INSERT FIGURE 24.1 HERE

Discussion

For CE, sociotechnical imaginaries offer an approach that enable processes of continuous engagement between the dynamics of innovations within their social and cultural contexts. Innovations are increasingly coming under the purview of practitioners, with diverse groups of actors engaging in doing, implementing, or fostering them (Pfotenhauer and Jasanoff, 2017). As CE gains relevance, the sociotechnical imaginaries associated with it open up pathways for exploring related innovations while engaging with the social and cultural meanings attached to them. Businesses and policy makers often view elements of innovation as something that can be identified and standardised across markets but in practice, many of these elements need to be pegged to particular contexts and sociotechnical imaginaries offers the means for doing so. For academics and researchers, they offer new ways of understanding innovation processes and capturing the connections and interrelatedness of such processes, to see what works and what does not, and why.

Existing studies on CE are mainly focused on resource management and environmental practices, while those intending to re-shape the socio-economic paradigm are rare. When linking CE to the broader aspect of sustainability there is often a failure to fully recognise the implications from social science perspectives (Merli et al., 2018; Murray et al., 2017). Our findings indicate that the sociotechnical imaginaries connected to CE can leverage national shared culture and play an important role in facilitating pathways for sustainable innovation opportunities. Imagination as ‘an organised

field of social practices' (Jassanof and Kim, 2009:122) plays an important role in creating social order. In this case, the national shared culture of making and fixing things and deriving pride from national innovation and technological projects provide the social cues for creating sociotechnical imaginaries for CE, and in doing so open up possibilities for sustainable innovation. These findings gain relevance because they add a new and interesting dimension to research on CE and its implications of sustainable innovation.

From the perspective of firms and policy makers, driving sustainable consumption and production is considered an essential strategy for achieving CE (Bilitewski, 2012) and the related activities are frequently connected to waste management (Pauliuk, 2018; Sakai et al., 2017). However, there is a need for strategies that can transform the upstream process of production and consumption (Bocken et al., 2017b). Invoking sociotechnical imaginaries through CE is one such strategy that lets actors devise their own understanding of how practices related to production and consumption could evolve, and what they imply.

The complexities inherent in sustainability challenges are difficult to address within our often-disconnected worlds of business and consumers, on one hand, and governmental policy and economic advice on the other (Grubb et al., 2014). We find that invoking sociotechnical imaginaries through CE acts as a bridging mechanism between various actors. The dominant perspectives on CE offer pathways that present a positive correlation between economic potential and sustainability goals, in terms of pursuing economic growth by focusing on environmental issues and resource scarcity (Merli et al., 2018). Our findings show how these pathways are driven by existing realities of the actors involved. They relate to economic growth powered by innovations as an important driver for action. The CE offers tangible ways in visualising these realities by addressing costs related to resource scarcity and product waste. Highlighting the economic potential generates interest and encourages participation in exploring ideas on CE, as do the standardised tools and methods that guide the transition process towards mitigating environmental impact (Merli et al., 2018). However, supporting CE models like repair, reuse and renting, implies shifts in sociotechnical imaginaries relating to use, practices, traditions, identity, behaviour, and relationships. These imaginaries add a third vital pillar (the other two being economic and environmental) to CE oriented innovations, and that is the social dimension. Our findings illustrate how sociotechnical imaginaries inspired by CE unveil the practical pathways for businesses to embark on sustainability journeys through innovations.

Social imaginaries are informed by people's understanding of their social existence, in terms of how they interact with each other; what goes on between them in order to fit existing norms and develop new ones to meet changing expectations (Jasanoff, 2015; Taylor, 2004). We explore how CE inspired imaginaries are constructed through shared cultural values that are effective in drawing attention to what is meaningful and important, within a certain community of people, for creating the connections

and collaborations needed for change. This change is characterised by a shift in the ways of doing things (practices) within existing norms. However, the shift is not easy, as the incumbent system's deep entrenchment makes it resistant to change (Unruh, 2000). The evidence for this can be observed, for instance, in the lack of studies that investigate how firms may integrate CE principles into their business practices (Merli et al., 2018; Manninen et al., 2018), or the continuing focus on 'traditional' cleaner production business practices (Merli et al., 2018). Therefore, studies highlighting social interactions are important. Our study contributes here by showing that sociotechnical imaginaries offered by CE shape the ideas that help in realising sustainable innovation.

Innovations characterise business transitions to sustainability and CE presents opportunities for such innovations by offering perspectives on waste and resource management through cognitive and discursive spaces for debate, for aligning decisions and actions on technologies and organisational structures (Bocken et al., 2017; Blomsma and Brennan, 2017). However, the findings of our study show that sustainable innovation cannot be captured in models, or best practices alone. Such innovations are deeply rooted in specific social, cultural, political and economic contexts.

Conclusion

The main conclusion of this chapter is that CE has the ability for triggering imaginaries resulting in actions that could facilitate sustainable innovation processes. From a theoretical perspective, this leads to an understanding of the social engagements necessary for operationalising CE models in order to make them sustainable.

For managers, engaging with sociotechnical imaginaries could reveal the shared meanings and values attached to the practical implementation of CE models, thus highlighting the significance of social elements of CE. For instance, collaborating with diverse actors highlight the relevance of both cultural values and social practices for facilitating sustainable innovation processes. Sociotechnical imaginaries have material outcomes in terms of influencing behaviour and narratives as well as feelings of individual and collective identities. Therefore, they could be useful tools for practitioners and policy makers who often find it difficult to qualify what sustainability entails. They can also influence the development of policy and institutions, and concepts like CE help policymakers to initiate diverse actors to interact with each other. Letting such sociotechnical imaginaries emerge through processes of societal interactions could enable the intentional changes required to orient innovations towards sustainability. Therefore, the role of intermediaries that create spaces for building collective purpose and collaboration opportunities is important.

An avenue for future research could be to explore the capabilities of intermediaries in different sustainable innovation contexts. There is also a need for more research exploring the possibility of building a model for creating imaginaries that enable innovations to move from the traditional technical focus to one of changing behaviours. In this context, it would also be interesting to explore

the idea of storytelling as a method of system building for sustainable innovation. The strategic value of storytelling for sustainable innovation lies in their ability to build connections between people, ideas, and activities for transformational change.

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