Sustainable business model innovation

The role of boundary work for multi-stakeholder alignment

Velter, M. G.E.; Bitzer, V.; Bocken, N. M.P.; Kemp, R.

DOI
10.1016/j.jclepro.2019.119497

Publication date
2020

Document Version
Accepted author manuscript

Published in
Journal of Cleaner Production

Sustainable Business Model Innovation: the role of Boundary Work for multi-stakeholder alignment

Velter, M.G.E.
Maastricht University, International Centre for Integrated Assessment and Sustainable Development P.O. Box 616, 6200 MD Maastricht

Bitzer, V.
Maastricht University, International Centre for Integrated Assessment and Sustainable Development P.O. Box 616, 6200 MD Maastricht

KIT Royal Tropical Institute P.O. Box 95001 1090 HA Amsterdam

Bocken, N.M.P.
Lund University, International Institute for Industrial Environmental Economics Box 196 *221 00 Lund, Sweden*

Delft University of Technology, Department of Industrial Design Engineering, Landbergstraat 15, 2628 CE Delft

Kemp, R.
Maastricht University, International Centre for Integrated Assessment and Sustainable Development P.O. Box 616, 6200 MD Maastricht

Corresponding author: *myrthe.velter@maastrichtuniversity.nl*

ABSTRACT

This study focuses on the boundary-spanning nature of sustainable business model innovation, studying multi-stakeholder engagement and alignment. Drawing on the concept of boundary work, we explore the different types of organizational boundary changes between focal companies and their external stakeholders, investigating specifically the process of exploring, negotiating, disrupting and realigning organizational boundaries. Based on an exploratory study of nine different sustainable business model initiatives from for-profit and non-profit organizations, our analysis shows how actors involved need to find alignment at normative, instrumental and strategic dimensions in order to achieve sustainable value creation. However, complexity for alignment emerges through different understandings of value, diverging interests, division of risks and responsibilities, and existing processes and activities that limits actors' openness to align. Mutual boundary changes are thus necessary in the process of multi-stakeholder engagement in order to enhance organizations' understanding of value and to capture the envisioned value. This paper functions as an agenda-setting paper, presenting first insights on how the boundary work lens

can advance our understanding of alignment processes between focal organizations and their external stakeholders, required for sustainable business model innovation.

KEYWORDS
Sustainable value creation; sustainable business model innovation; boundary work.

HIGHLIGHTS

- We discuss how organizations engage with stakeholders for SBMI drawing on 'boundary work'
- We develop a boundary work framework for SBMI, which is applied to nine cases
- Boundary work in SBMI is about exploring, negotiating, disrupting and realigning organizational boundaries
- Existing organizational boundaries in the value network make SBMI a complex negotiation and alignment process
- Boundary brokering is required to re-align critical boundary dissonance in multi-stakeholder settings

1. INTRODUCTION

Companies are increasingly challenged to make the pursuit of social and environmental objectives part of their fundamental logic of 'doing business'. It seems undeniable that this would involve radical forms of reorganizing the business model on a firm and systems' level, questioning both what and how value is created and captured (Evans et al, 2017a; Stubbs & Cocklin, 2008). While conventional business models focus on "satisfying customer needs, economic return and compliance" (Bocken, 2015, p. 70), sustainable business models (SBMs) have a much broader scope in their ambition to generate positive or eliminate negative societal impacts. They integrate multiple dimensions of economic, social and environmental value, and they exceed the customer orientation of conventional business models by considering value creation to a broad scope of stakeholders, society and the natural environment (Bocken, 2015; Schaltegger et al., 2015). Studies have therefore argued that the required fundamental changes in the purpose of business and in many aspects of how it is conducted necessitate sustainable business model innovation (SBMI) (Bocken et al., 2014; Schaltegger et al., 2012; Stubbs & Cocklin, 2008). This innovation process concerns, among others, the development of new value propositions, value creation and delivery networks, and value capture mechanisms (Teece, 2010).

Such an encompassing process of SBMI calls for a broader network perspective and entails that companies engage with a wider set of actors, including customers, suppliers and partners, NGOs and the government

(Bocken et al., 2014; Boons & Lüdeke-Freund, 2013). Thus, what was already pronounced in 'conventional' business model innovation, becomes even more apparent in sustainable business model innovation: it exceeds the organizational boundaries of the focal firm. The call for engaging with stakeholders is grounded in the expectation that not only are they potentially affected by SBMI, they also have something to contribute. Bocken et al. (2016) discuss stakeholders' roles in supporting "extending resource value" and "extending product value". Other studies emphasize the processes of experimentation and learning between firms and stakeholders, required to combine sustainability solutions at the level of firms' business models with system-wide change (Quist & Tukker, 2013; Rohrbeck et al., 2013; Stubbs & Cocklin, 2008). Similarly, studies on circular business models echo the need for multi-stakeholder engagement to find innovative solutions for closed loop supply chains (Leising et al., 2018).

At the same time, engaging in extensive interaction with external stakeholders requires extra efforts and is recognized as one of the key challenges in SBMI (Evans et al., 2017b; Geissdoerfer et al., 2018). Most importantly, stakeholders may possess different perceptions of value, they may have different and conflicting objectives and material interests, and they may be characterized by fundamental power imbalances (Bolton & Landells, 2015; DiDomenico et al., 2009; Powell et al., 2018). SBMI thus requires alignment of stakeholders' interests and demands (et al., 2013). Yet, while the literature has highlighted the need to further explore companies' relations with external stakeholders in SBMI (Boons & Lüdeke-Freund, 2013; Stubbs & Cocklin, 2008), how this happens in practice is still relatively underexplored (Pieroni et al., 2019).

To contribute to this discussion on how focal organizations engage with external stakeholders for SBMI, we draw on the concept of boundary work, which is about finding ways to accommodate such differences between stakeholders (Bocken et al., 2019). Boundary work can be broadly understood as actors' efforts to explore, create, maintain and challenge existing organizational boundaries through concrete efforts, including the use of boundary spanners (e.g. organizations, people, objects) and boundary management (e.g. communication practices) (Zietsma & Lawrence, 2010). Specifically, we frame boundary work in SBMI as a process of *exploring, negotiating, disrupting and realigning organizational boundaries*. This will be further explained in the following section.

This paper functions as an agenda-setting paper, presenting first insights on the ways in which boundary work advances our understanding of the processes of alignment between focal organizations and external stakeholders in SBMI. This serves to contribute to the pending question of how organizations can innovate their business models towards greater levels of sustainability (Foss & Saebi, 2017). Specifically, the paper responds to recent calls for further research on the processes by which organizations innovate SBMs in a multi-stakeholder setting (Bocken et al., 2019; Dentchev et al., 2018; Roome & Louche, 2016). Focusing on the multi-stakeholder aspect of SBMI, where actors' visions and interests for sustainability meet and

potentially conflict, may also provide a way forward to promote stronger forms of SBMs (Upward & Jones, 2016). By approaching multi-stakeholder alignment as boundary work, we aim to add a practice-based perspective that helps organizations to address the challenges of stakeholder relations during the process of SBMI (Geissdoerfer et al., 2018). The outline of this paper is as follows: section 2 describes the literature on sustainable business models, multi-stakeholder alignment and its complexities, resulting in the relevance of a boundary work lens for SBMI. The methods are described in section 3. Section 4 presents the results of the exploratory and validating interviews, which are being discussed and concluded in section 5.

2. LITERATURE REVIEW

2.1 From business models to sustainable business models

All organizations are incomplete and depend on exchanges with other systems to survive (Scott, 1998). The interactions of companies and their external environment, including stakeholders, are key to the discussion on business models and sustainable business models. Zott and Amit (2010, p. 216) have conceptualized a firm's business model as a "system of interdependent activities that transcends the focal firm and spans its boundaries". This indicates that business models go beyond organizational boundaries as the socially constructed "demarcation between the organization and its environment" (Santos & Eisenhardt, 2005, p. 491). While organizational boundaries are rarely explicit, they can be conceptualized as boundaries of 'efficiency' (denoting which transactions an organization conducts internally and which ones are conducted externally), boundaries of 'power' (focusing on how organisations can control their exchange relations), boundaries of 'competence' (delineating an organisation's resources, capabilities and knowledge), and boundaries of 'identity' (pertaining to understandings of 'who we are' as an organization) (Santos & Eisenhardt, 2005). Such boundaries are not static, but emerge and change through interactions with other actors (Abbott, 21995; Schreyogg and Sydow, 2010).

Business models extend organizational boundaries in that they link the focal firms' resources, capabilities and activities through value creation outside the firm, in particular with partners, suppliers, shareholders and customers (Barney et al., 2001; Eisenhardt & Martin, 200; Teece, 2010). Thus, while often not explicitly defined, firms' activities to relate to third parties to organise transactions and minimise costs or to harness their knowledge, ideas and technologies (Berglund & Sandström, 2013), touch upon different organizational boundaries, such as efficiency and competence (Santos & Eisenhardt, 2009).

The boundary-spanning nature of business models is even more pronounced in sustainable business models, which can be defined as "business models that incorporate pro-active multi-stakeholder management, the creation of monetary and non-monetary value for a broad range of stakeholders, and

hold a long-term perspective" (Geissdoerfer et al., 2018). At the centerpiece of this definition lies the notion of a sustainable value proposition – economic, social and environmental value, consisting of value captured, missed, destroyed, wasted and new value opportunities on both short- and long term for a broad range of stakeholders, including society and environment (Bocken et al., 2013). Sustainable business models therefore comprise a value proposition to customers, delivered by a wide value creation and delivery network, and a value capture mechanism that captures economic value for the business while simultaneously regenerating natural, social and economic value beyond organizational boundaries (Schaltegger et al., 2016) (see also Table 1). In addition to considerations of efficiency and competence boundaries, sustainable business models implicitly relate to identity boundaries, drawing on organizations' shared values and norms in a particular social context (Santos & Eisenhardt, 2005).

Table 1: Value as a as a multi-dimensional, multi-relational and multi-level concept

	Business Model	**Sustainable Business Model**	**Key sources**
Value form	Value created and captured	Value created and captured plus value absence, destroyed, missed or surplus, new value opportunities	Bocken et al. (2013); Evans et al. (2017b)
Value priority	Economic first	Societal & environmental value first or equal to economic value	Schaltegger et al. (2016); Stubbs and Cocklin (2008)
Value horizon	Direct, short- or medium- term	Direct, short- or medium- term plus indirect, long-term	Madden (2017); Stubbs and Cocklin (2008)
Value proposition	Customer value	Sustainable customer value and co-benefits through value for society & environment	Bocken and Allwood (2012); Boons and Lüdeke-Freund (2013); Patala et al. (2016)
Value creation & delivery network	Business, value chain, relevant network partners	Business and interlinked value chains plus value network including new and possibly non-traditional partners	Chesbrough and Schwartz (2007); Evans et al. (2017b)
Value capture	Economic business value (monetary & non-monetary)	Societal, environmental and economic value	Boons and Lüdeke-Freund (2013); Madden (2017); Schaltegger et al. (2016)

** Full development of Table 1 can be found in Appendix A*

2.2 Different dimensions of stakeholder alignment in sustainable business model innovation

Transforming the logic by which business generate and distribute value requires a process of innovation, either to develop entirely new business models, diversify into additional business models, or transform from one business model to another (Geissdoerfer et al., 2018). In such a process of sustainable business model innovation (SMBI), firms need to not only conduct changes in their own organization, but depend on (re-)alignment with stakeholders. Firstly, any changes to the business model of a firm require changes in the business model of other actors – otherwise it will not work (Hellström et al., 2015). Secondly, sustainable business models extend the emphasis on stakeholder relationships, moving from value creation for customers, suppliers or other business partners, to value creation with and for stakeholders (Freudenreich

et al., 2019), including customers, suppliers, business partners, NGOs, government actors and local communities (Boons & Lüdeke-Freund, 2013; Joyce & Paquin, 2016). As noted by Bocken et al. (2019), this engagement takes place in a 'value network' to denote the possibility of mutual value exchanges, where focal organizations explore and assess together with stakeholders issues such as value created, fairness, efficiency and effectiveness.

Focal organizations and stakeholders in their value network need to align on three distinct dimensions: normative, strategic and instrumental (Breuer and Lüdeke-Freund, 2017). At the *normative* dimension, sustainable business model innovation requires a redefinition of the purpose of the firm based on sustainable value (Stubbs & Cocklin, 2008). This involves a discussion between focal organizations and stakeholders on value propositions and how value is understood. Organizational boundaries are challenged, as value can only be created and captured across organizational boundaries (Brehmer et al., 2018). Alignment at normative dimension forms a foundation for decision-making and alignment at the strategic dimension (Bleicher, 1994; Breuer & Lüdeke-Freund, 2017).

At the *strategic* dimension, SBMI affects organizational boundaries as externalities formerly outside the business model, such as emissions or waste, are to be internalized (Bocken et al., 2015; Brehmer et al., 2018; Breuer & Lüdeke-Freund, 2016). This involves a discussion about which externalities can and should be internalized and how stakeholders can help in this; for instance, by adjusting their own activities. These shifting transactions need to be embedded in novel value propositions to create and capture mutual value. Decisions made at the strategic dimension direct implementation and execution at the instrumental dimension (Al-Debei & Avison, 2010; Breuer & Lüdeke-Freund, 2017; Solaimani & Bouwman, 2012).

At the *instrumental* dimension, sustainable business model innovation necessitates a change of organizational activities and processes, such as novel product and service designs, distribution channels, and pricing schemes (Boons et al., 2016; Breuer & Lüdeke-Freund, 2017). Although innovation always entails a change in activities, the magnitude of novelty and change is both larger and more long-term in SBMI compared to conventional business model innovation. This is, for example, because activities involve longer returns on investments and higher uncertainty.

All three dimensions where stakeholder alignment is required thus affect organizational boundaries, both of the focal organization and its stakeholders. This includes changes in efficiency boundaries (e.g. new organisational activities), competence boundaries (e.g. new knowledge and skills) and identity boundaries (e.g. new purpose of an organisation).

2.3 The challenges of stakeholder alignment

While alignment between focal companies and stakeholders is deemed critical (Bocken et al., 2019; Freudenreich et al., 2019), its importance also explains why sustainable business model innovation is so tremendously difficult (Evans et al., 2017b).

Stakeholder engagement in itself requires extra efforts in sustainable business model innovation compared to conventional business model innovation (Geissdoerfer et al., 2018), much less to speak about successful alignment on normative, strategic and instrumental dimensions (Breuer & Lüdeke-Freund, 2017). As the business model innovation literature has long recognised, there is no executive control by the focal organization as to how stakeholders should behave to make business models successful (Berglund & Sandström, 2013). “A main source of complexity in business model innovation is given by the uncertainty of impacts and behaviors of network members regarding the three sustainability dimensions” (Evans et al., 2017b, p. 605). However, beyond acknowledging the challenges of stakeholder relations during the business model innovation process (Geissdoerfer et al., 2018), this component seems to be under-researched in the literature on SBMI (Pieroni et al., 2019).

The literature on cross-sector innovation helps to shed light on the inherent complexities of bringing together organizations with potentially dissimilar organizational interests and practices. Here scholars have pointed out that multi-stakeholder engagement often struggles with seemingly irreconcilable differences in the goals of partner organizations (Huxham and Vangen, 2000), dissimilar institutional logics (Vurro, Dacin, & Perrini, 2010), differing value frames, norms and expectations (Dyer & Sing, 1998; Stark, 2009; Le Ber and Branzei, 2010a), unfamiliarity and mutual suspicion (Rondinelli and London, 2003) or cultural differences and misunderstandings (Berger et al., 2004). Organizations may possess competing material interests that influence their willingness and capability to align (Powell et al., 2018). Boundary dissonance, implying a lack of alignment of organizational boundaries between stakeholders for sustainable business model innovation – for instance, with regard to definitions of value or configuration of activities – is therefore likely to emerge (Stubbs & Cocklin, 2008). This is where tensions can arise between normative aspirations and capturing (at least some) financial value to secure economic sustainability and create opportunities for scaling-up (Bitzer & Hamann, 2015).

Where the multi-stakeholder context creates boundary dissonance, SBMI can be impeded. This makes the question of how to deal with boundary dissonance increasingly relevant. One assumption in the cross-sector innovation literature seems to be that conflict and tensions should be reduced or avoided to lessen their destructive forces (e.g. Googins & Rochlin, 2002; Crosby and Bryson, 2010). Others consider competing forces and value frames as vital ingredients for successful multi-stakeholder collaboration and innovation (Le Ber & Branzei, 2010a). Koschmann et al. (2012, p. 340) argue for the need for “surfacing and reclaiming – rather than ignoring and suppressing – relevant conflicts as a route to legitimate consent generation and ultimately, to broader support for collective decisions”. Similarly, the business model

literature mentions the traditional focus on control and gatekeeping, although this seems to be shifting towards a more dynamic approach. “It is precisely the alignment of control and value parameters that is of most relevance to business modelling” (Ballon, 2007, p. 7).

2.4 Research gap: a boundary work perspective on SBMI

Interactions across organizational boundaries and alignment of stakeholders are thus recognized as important for SBMI (Boons et al., 2016; Brehmer et al., 2018; Heracleous, 2004). However, there is still little knowledge on how focal organizations engage in processes of aligning with multiple stakeholders, specifically at normative, strategic and instrumental dimensions – all of which have implications for organizational boundaries. We approach such a process of exploring, establishing, reinforcing, disrupting and redesigning organizational boundaries between organizations and their stakeholders for SBMI from the perspective of ‘boundary work’ (Gieryn, 1983). We argue that framing SBMI as a boundary work process helps understanding these processes of alignment in multi-stakeholder engagement.

Originating from the science literature, the boundary work perspective aims to make sense of complex interactions between scientists and non-scientists in which roles of understanding and decision-making get blurred and re-asserted (Gieryn, 1983; Hoppe, 2010; Halffman, 2003). Strategic management literature mentions boundary spanning and brokerage to overcome differences and a lack of trust within an innovation community (Fleming, 2007). The concepts of boundary work, spanning and brokerage offer an interesting theoretical lens for understanding the interactions between prospective collaborators in a value network, i.e. between a focal organization and its external stakeholders, over relevant values, strategies and concrete actions for a new, sustainable business model. These interactions must suit the needs and interests of interdependent parties through multiple value creation, delivery and capture. Boundary work theory therefore investigates the concrete practices that enable conversation, interaction and coordinated action between the focal organziation and other actors, while accommodating actors to have their specific own value perspective, consideration and interests (Carlile, 2002; Halffman, 2003; Hoppe, 2010). Strategies to negotiate boundaries involve the use of boundary objects, such as texts, concepts and tools, and boundary spanners that help actors to have a shared reference. Such a shared reference, in turn, can serve to bridge differences discursively and materially through mutually aligned activities (Halffman, 2003; Hoppe, 2010). Boundary work for SBMI is about the coordination of mutually dependent activities without the use of external control.

Boundary work has also been applied in organizational theory (O’Mahony & Bechky, 2008; Smink et al., 2015; Zietsma & Lawrence, 2010), focusing not only on boundary bridging but also on boundary manipulation. Challenging the state of boundaries is particularly apparent in SBMI, e.g. by different NGOs or consumer groups, legislation, public opinion or competitor strategies (Boons et al., 2016; Haaker et al.,

2017; Smink et al. 2015). As boundaries have material consequences closely related to processes of status and monopolization, they are object of strategic consideration in which actors “struggle over and come to agree upon definitions of reality” and “maintain or disrupt systems of privilege” (Lamont & Molnar, 2002, p. 168). Zietsma and Lawrence (2010) therefore understand boundary work as “the attempts of actors to create, shape, and disrupt boundaries” (p. 190). Different practices of boundary work have been highlighted in the literature, including creating, redefining, disrupting or breaching, and bridging or crossing organizational boundaries (Carlile, 2002; O’Mahony & Bechky, 2008; Santos & Eisenhardt, 2005).

Our expectation is that the ways in which boundary work takes place, for example, the extent to which multilevel value creation is considered, influence the alignment of stakeholders’ organizational boundaries important for SBMI. This makes boundary work relevant as a practitioner activity and as a theoretical lens to explore how organizations deal with boundaries.

3. METHODS

3.1 Case studies and case selection

To analyze the role of boundary work in SBMI, we used an exploratory comparative case study approach whereby the unit of analysis is the company (Eisenhardt, 1989; Yin, 1994). This paper presents and compares nine cases of Dutch companies engaged in SBMI (Table 3). The chosen companies do not constitute a representative sample. Instead, given the emerging knowledge on SBMI (Lüdeke-Freund & Dembek, 2017), purposive sampling took place to identify information rich cases that can contribute to theory building (Eisenhardt, 1989; Patton, 1990). Both for-profit and non-profit companies were selected as they represent different purposes and are expected to take different approaches to SBMI (Table 3).

Table 3: Case description, as emerged from empirical enquiry

	Case	Organization	Organization type	Innovation phase	Sustainability aim*	Sustainable business models pursued
1	One	Heijmans	For-profit SME	Market	To fill empty urban spaces and provide affordable housing for young professionals through a modular, mobile home	Sell to intermediaries, move to renewable resources
2	Niaga	DSM-Niaga	Joint venture for-profit, MNE and Start-up	Market	To develop a mono-material carpet technology enabling circular carpet flows	CE closed loop manufacturing, low carbon manufacturing, licensing, green chemistry
3	Futureproof	Kingspan	For-profit, MNE	Market	To eliminate asbestos by replacing asbestos roofs of Dutch farmers with Kingspan roofs, insulation and solar panels in a cost-neutral way, using solar as financer	Product as a service, move to renewable resources
4	Ecor Circular Friesland	Noble Environmental	For-profit, MNE	Discovery	To apply Ecor non-toxic mono-material cellulose fiber production using (local) waste streams and applications in Friesland Provence	CE Industrial symbiosis, licensing, green chemistry
5	Food-for-Feed-for-Food	Nijsen-Granico	For-profit SME	Discovery	To create a circular and more sustainable food concept by collecting retailers' food waste and turn it into pig feed	CE closed loop manufacturing, industrial symbiosis, choice editing by retailers, responsible product promotion
6	Kipster	Kipster	For-profit, start-up	Market	To produce world's most environmental, social, and animal-friendly 'sustainable' egg	Sell to retailer, low-carbon manufacturing, move to renewable resources, choice editing by retailers, responsible product promotion
7	Philips New Karolinska	Royal Philips	For-profit, MNE	Market	To increase access to healthcare in partnership with New Karolinska Hospital, Sweden	Performance-based PSS, extended producer responsibility
8	BeeBanking	Stroom The Hague	Non-profit, SME	Market	To increase citizen awareness of the importance of securing biodiversity, specifically the role of bees in natural cycles, placing urban bee-banks and using bee-banking	Collaborative approaches, crowd sourcing, biodiversity protection and regeneration initiative ('net positive'), consumer education and awareness, alternative banking
9	Thuisbaas	Urgenda	Urgenda: Non-profit, SME Thuisbaas: For-profit, SME	Market	To accelerate residential retrofitting towards energy-neutral houses in a cost-neutral way (solar as financer)	Performance-based PSS, move to renewable resources

0 ** See Appendix B for detailed targeted value creation*

3.2 Data collection

Empirical data was primarily collected through semi-structured interviews with key informants involved in the innovation process (Table 4). Data collection was divided into two rounds of empirical inquiry: firstly, exploratory interviews on the role of boundary work in SBMI from which the framework emerged, and secondly, validating interviews on the tentative boundary work framework. During the first round of interviews, topics of discussion included the envisioned value creation, the innovated business model and its novelty, role of collaboration and non-business stakeholders, challenges and tensions in the innovation process, critical turning points, conducted boundary work activities, and obstacles for enhancing value creation. Interviews were triangulated with a review of published documents such as annual reports, presentations, websites and brochures.

The second round of data collection aimed to get a clearer understanding of how individual firms conduct boundary work in SBMI and to validate insights gained through the initial interviews. We applied focused sampling in grounded theory (Breckenridge, 2009; Charmaz, 2014; Glaser, 1978), which resulted in the selection of two cases wherein stakeholder alignment in the value network was particularly critical. Taking the firm's perspective of the network as the starting point, additional data was collected directly from collaboration partners in the network through site visits, expert consultations, participatory observation, and interviews. The questions focused on stakeholder alignment at normative, instrumental and strategic dimensions, and how alignment was facilitated through exploring, brokering and implementing boundary changes in the value network.

Table 4: Semi-structured interviews per case

Case	Organization	Role	Interviewees	Interview round		Interview context	Duration
				1 (exploration)	2 (validation)		
One	Heijmans	Initiator	Director Strategy & Innovation	x		FTF	60 min
Niaga	DSM-Niaga	Initiator	General Manager	x		FTF	20 min
	Niaga		Chief Technology Officer	x		FTF	75 min
Futureproof	Kingspan	Initiator	Commercial Director	x		FTF	75 min
	Kingspan		Bus. Manager Kingspan Energy		x	FTF	60 min
Ecor Circular Friesland	Ecor	Initiator	CEO Circular Economy	x		FTF	75 min
			Benelux		x	FTF	15 min
			Strategy & Corporate Affairs		x	FTF	60 min
	Reg. Inv. & Devt. Agency.	Investor & networking	CE Bus. Development Foreign Direct Investment Agri & Food		x	Phone	60 min
	Waste coll. & processor	Application & supply			x	Phone	45 min
			General Director				
	Builder	Application	R&D Manager		x	Phone	60 min
Food-for-Feed-for-Food	Nijsen-Granico	Initiator	General Director	x		FTF	75 min
	Env. NGO	Certification networking	Project Employee		x	Phone	45 min
	Municipality	Farmer support	Policy Officer Sustainability		x	FTF	60 min

Kipster	Kipster	Initiator	Founding Partner	x	FTF	60 min
Philips New Karolinska	Philips Healthcare	Supplier	Program Manager	x	Skype	30 min
BeeBanking	Stroom The Hague	Initiator	Head Project Office	x	FTF	60 min
Thuisbaas	Thuisbaas	Initiator	Director	x	Phone	60 min

3.3 Data analysis

In the first empirical inquiry, discovery memos were written per data source, reflecting on emerging issues, and exploration of dimensions and linkages between the concepts of SBMI, value creation, collaboration and boundary work. Subsequently data was inductively and descriptively coded line-by-line, using open coding. The multitude of codes (e.g. changing role, responsibilities, new process) were allocated to themes such as innovation type, hybridization, value definition, value proposition, values-based innovation, partners and partner selection, aim of collaboration, innovation phases, critical moments, success and failure factors, novelty of business model, boundary conditions, and learnings. We found central themes related to boundary work, such as the *content* of boundary work (e.g. understandings of value, envisioned roles and activities) and the *process* of boundary work (e.g. the challenges to facilitate this process), as well as different types of boundaries, presented in section 4.1. Additional literature review and discussions amongst the authors led to a more detailed boundary work framework, showing that SBMI involves alignment on three dimensions, with boundary work consisting of *exploring boundaries & boundary dissonance, brokering boundaries* and *implementing boundary change*. This resulted in improved themes and related interview questions.

In the second empirical inquiry, we focused data collection and coding (Breckenridge, 2009; Charmaz, 2014; Glaser, 1978) and deductively coded the field recordings and interview transcripts to validate the boundary work framework (Section 4.2). This highly iterative process between data collection, data analysis and theoretical categorization fits theory building from case studies as defined by Eisenhardt (1989) and Eisenhardt & Graebner (2007). Quotes presented in this paper are in English, yet it must be noted that they have been translated from the original Dutch, except for Philips New Karolinska.

4. RESULTS

4.1 Exploratory interviews

This section describes the results of the exploratory interviews on the role of organizational boundary changes, multi-stakeholder collaboration and boundary work in SBMI.

4.1.1 Organizational Boundary Changes

Empirical observations of this section aimed to explore how, if at all, organizations change boundaries in SBMI, and, subsequently, what these boundaries could exactly entail. We found possible boundary changes of initiating organizations as well as by actors in the value network, the latter being promoted during the innovation process (Table 5).

Boundary changes in the initiating organization were observed in all cases, referring to extended understandings of value, novel value propositions, business models and roles as, for example, a system integrator or sustainability steward (see also Appendix B for a more elaborate overview). The cases show particularly that SBMI required actors to take up new roles – for instance, from being a building company to acting as system integrator (Heijmans One) or from being a waste collector to delivering waste (Ecor Circular Friesland). This suggests organizational changes with regard to efficiency (new tasks) and competence (new resources required for new task).

Our nine cases confirm that companies attempt to innovate sustainable business models by engaging in novel collaborations. However, the inclusivity of actors from diverse domains differs between the cases. Cases initiated by governmental organizations and NGOs include civil society and/or sustainability funds in multiple roles (such as financers, customers, ambassadors) next to public partners (as financers and ambassadors) and private partners (as suppliers). Companies tend to focus on actors in the private domain in roles as financers, suppliers and customers. In cases 2 and 3, new partners were intentionally searched for in different sectors to bypass industrial lock-in after failing to collaborate with partners in conventional sectors. The interviewees mentioned required boundary change from customers, competitors, suppliers, financers, governmental and indirect stakeholders, although implementation of boundary change in the value network was not self-evident. Organizational boundary changes were most apparent in cases with circular business models (case 2, 4, 5), as illustrated in Nijsen/Granico:

> *"Previously, our customer was the pig farmer [...] we simply sold, as a value chain idea, we received raw materials, made a product out of it, and put it in a subsequent chain link, the pig farmer […] Now, my customer is the retailer, the end-consumer, and my current customer becomes my strategic partner" (General Director Nijsen/Granico, interview 19-05-2017)*

As will be explored below, not all value propositions were sufficient to implement boundary change. An extended overview of the main collaboration partners, partner novelty and reasons for collaborating can be found in Appendix B.

84 *Table 5: (Promoted) boundary change of the initiating organization and actors in the value network, mentioned by the interviewees*

Case	Actor	Original boundary	(Promoted) boundary change	Interpretation of organizational boundary type	Promoted boundary implemented?*
Heijmans One	Heijmans	Building company	System integrator, adding value through technology, innovation, sustainability Temporary pre-financer	Identity, competence, efficiency	Yes
Niaga	DSM-Niaga	n.a.	Resource steward, responsible for transforming materials without ownership, extended responsibility towards end-consumer	Identity, competence, efficiency Competence, efficiency	Yes
	Carpet producer	Purchase license, product and sell carpet to retail	Retain and remanufacture carpets		No
Kingspan Futureproof	Kingspan	Sales of roof and facade panels	Integrated stable improvement Temporary pre-financer to scale up	Competence, efficiency	Yes
	Farmer	Requests service/ product on contract-basis	Long-term commitment as subcontractor	Efficiency	Occasionally
	Subcontractor	Responds to request for service	Emerging as customer and organizing sales	Identity, competence, efficiency	Yes
	Banks	Bank loans to farmer	Emerging as competitor of the financing energy company	Efficiency	Yes, unintended
		Separate banking groups	Integrative financing of banking groups	Efficiency	Occasionally
	Energy company	Energy company receives solar electricity	Pre-financer using solar electricity as payment	Identity, competence, efficiency	Occasionally
	Farmer-relations	Accountant, professional associations, family, friends focus on economic value, risk aversion	Enhance understanding of value, long-term view	Competence	Occasionally
	Government	Asbestos and solar separately, temporarily financed	Maintain financing and couple themes	Competence, efficiency	No
	Government	Limited possibility for roof ownership	Fit legislation to purpose	Efficiency	No
Ecor Circular	Ecor	n.a.	Resource steward, extended responsibility towards end-consumer Temporary pre-financer	Identity, competence, efficiency	Yes No
Friesland	Gardener	Gardening company taking care of greenery	Deliver waste streams, use novel applications next to gardening	Identity, competence, efficiency	No
	Waste collector	Collecting private and public waste	Funnel and deliver waste streams	Competence, efficiency	No
	Building companies	Producing and installing building materials	Use novel materials and applications	Competence, efficiency	No
	Housing corporation	Focus on efficient materials	Focus on sustainable materials	Competence	No
Food-for-Feed-for-Food	Producer raw materials	Sourcing raw materials	Redundant	Identity, competence, efficiency	Envisioned
	Nijsen/Granico	Pig feed producer sourcing from food waste streams and (global) raw materials	Pig feed producer sourcing only from food waste streams, offering sustainable food concepts, system integrator	Identity, competence, efficiency	Envisioned

	Pig entrepreneur	Purchases animal feed from focal business	Strategic partner in sustainable pig keeping & part of	Competence, efficiency	No
	Retail	Retail purchases meat from butcher, price-focused, transactional, short-term relation	entrepreneurs redundant Emerging as strategic partner and direct supplier for animal feed,	Competence, efficiency	No
	NGO	Campaigning against retailers to increase animal welfare and change environmental	sustainability focus next to price focus, long-term Collaborating with retail to enhance sustainable food and influence	Identity, competence, efficiency Efficiency	Yes
	Butcherer	impact	customer	Efficiency	No
	Municipality	Butcher manufactures in bulk Promoting societal values through legislation and control	Butcher separates focal meat Early facilitation and promotion of societal values		Yes
Kipster	Kipster	n.a.	Most sustainable egg producer, reversed thinking		Yes
	Retail	Transactional, short-term, price-based contract	Relational, long-term, value-based contract	Identity, competence	Yes
Philips New	Philips	Sell and service of healthcare equipment	Extended, full responsibility for (competitor) equipment	Competence, efficiency	Yes
Karolinska	Competitor	Delivers healthcare to hospitals	performance Sub-supplier to Philips	Efficiency	Yes
BeeBanking	Stroom	Art institute with conventional, public financing	Collaborate with civil society for financing	Efficiency	Yes
Thuisbaas	Thuisbaas	n.a.	Extended responsibility for cost-neutrality, reversed thinking (possibilities based on average energy costs)		Yes
	Supplier	Install and sell equipment	Integrative approach, extended responsibility	Competence, efficiency	Occasionally
	House-owners	Purchase of e.g. solar panels, isolation	Commitment for integrated house retrofitting	Competence, efficiency	Occasionally

85 * *At time of interview*

86

4.1.2 Multi-stakeholder boundary exploration

We found that exploration of boundaries occurs throughout the innovation process: with increasing complexity of the value network, more time was required for boundary exploration. For the initiating companies, it was not always clear whether actor boundaries were aligned. In cases where initially shared understandings of value were perceived, dissonance emerged in later innovation stages, when commitment for changing activities was requested from collaboration partners. This happened, for example, in Kingspan Futureproof:

> *"We learned that initially the story always sounds good, as the marketing is organized so well that it always sounds good, and that real stumbling blocks come later, at the farmer's table" (Commercial director Kingspan FutureProof, interview 02-05-2017)*

Boundary dissonance in the firm's value network was perceived in seven cases and on multiple boundary dimensions (Table 6). The main boundary dissonance mentioned were misaligned business model elements, narrow understandings of value and responsibilities, and legal boundaries. Boundary dissonance was not in all cases critical for business model innovation. However, it did influence the value created. For example, the Niaga business model could be implemented with a mere economic understanding of value, as the technology reduces costs throughout the value chain through increased production and installation efficiency. However, alignment around the importance of sustainability was required to close the loop and internalize the envisioned externality of carpet waste.

Table 6: Boundary dissonance mentioned by interviewees

Boundary Dissonance Codes	# inter-viewees	Case	Examples
Short-term focus	2	Heijmans One	Long-term focus (30 year) of lease companies is required for long product lifetimes, while they focus on short term investments (10 year)
Value chain approach	2	Food-for-Feed-for-Food	Key-partners focus on value chain instead of ecosystems, imposing responsibility on the wrong actors in the value network
Limited feeling of urgency	1	Kingspan Futureproof	Actors, in particular customers, lack a sense of urgency for sustainability related issues
Limited consideration of environmental and social value	4	Niaga	Selection of materials is mainly about the fractional price differences / advantages (e.g. polypropylene vs. polyester) and not about product take back
		Kingspan Futureproof	Most clients are driven by a direct solution to their specific problem(s) instead of long-term benefits
		Ecor Circular Friesland	Circular Economy seems to focus mostly on the economy now, while it is also about different consciousness and behavior
Lack of integrated approach	1	Kingspan Futureproof	Separate actors focus on their own propositions (solar financing, asbestos removal financing) instead of coupling themes and finances

Business model	5	Heijmans One	Multiple innovations are required from external partners, particularly financing models
Limited responsibility	3	Food for Feed for Food Thuisbaas	Key-partners refuse to take responsibility for their role in the SBMI process A lack of responsibility for the results ended several collaborations
Legal	3	Kingspan Futureproof Niaga	Legislation is not fit for the purpose of shared ownership (of roofs) and material take back Legislation approves deviation from pure materials, which obstructs remanufacturing

The previous section showed that boundaries were not always clear and were explored during the innovation process. We found that simultaneously, boundaries themselves were subject to evolvement through extension, narrowing and redesign, as organizations learned about the implications of the innovation for their business model. An example is Kingspan Futureproof, in which energy companies enhanced their activities on the instrumental boundary dimension twice by pre-financing farmer projects:

> *"The project accelerated when the energy company said 'I would like to buy a part of the investment'. Well, that is very interesting, […] we made a framework agreement, no signed contract at all [...], but we agreed to make this happen in a pilot sphere. Then, they said 'we will buy these parts', until their tone even changed to, 'we want to buy the project as a whole'." (Commercial director Kingspan FutureProof, interview 02-05-2017)*

However, the energy company narrowed its boundary after being disappointed in piloting, causing a pause to the SBMI process:

> *"The same party has now also become an inhibiting factor, because now suddenly it realizes 'hmm, I have to do more than I thought and the financing is still quite risky, and is the target group financially enough, are they creditworthy enough? So, that is now again an inhibiting factor. So actually the second success factor, the second accelerator, which I now mention, is actually the first real big brake again" (Commercial director Kingspan FutureProof, interview 02-05-2017)*

The initiating business responded to this boundary dissonance through pre-financing, while searching for new partners and trying to find alternative business model options. Temporary boundary change happened in response to limited boundary alignment, taking up a novel role as pre-financer (cases 1, 2, 3, 4) or compromising on value creation (e.g. a less circular business model, as shown in DSM-Niaga). This suggests that boundary maintenance or change affects value creation and might lead to terminating the collaboration.

4.1.3 Boundary spaces, objects and spanners

Empirical inquiry aimed to explore in what ways boundary work activities took place. We found that a boundary organization external to the actors was absent in all cases. Instead, the initiating organizations themselves conducted boundary brokering, except for New Karolinska. Boundary brokering happened rather ad-hoc, and in the majority of cases, organizations met bilaterally instead of in a joint boundary space. Only Ecor and New Karolinska took a more systematic approach by facilitating joint meetings. In New Karolinska, boundary brokering started from a joint boundary space initiated by the Stockholm County Council:

> *"Stockholm County Council ran this process as a competitive dialogue, where they invited Philips, Siemens and GE, to many many different meetings, where we discussed different kind of matters, issues, where also a lot of proposals and thinking were done" (Program Manager Philips New Karolinska, interview 22-06-2017)*

Boundary objects were used to test commitment, support interaction and negotiate tensions. For example, DSM-Niaga mentioned that the joint creation of the total value model (including value beyond the traditional partners and return value) helped to enhance the importance of establishing take-back processes. The concreteness of the objects and its scope of interacting actors differed. Typically boundary objects transformed from abstract and open for adaption in early innovation phases (such as sketches, drawings, mockups) to concrete, rather fixed objects in later innovation phases (such as place making, piloting and calculation sheets). The use and development of boundary text was mentioned by eight cases (Table 7).

Table 7: Boundary objects mentioned by the interviewees

Case	Boundary text	Boundary objects and examples	
Heijmans One	paused landscape, put paused landscapes on play, generation Y, movable, mobile single home, movable single-person home, design	pictures, placemaking	Coupling paused landscapes with generation Y problem of affordable housing, and placing mobile homes as objects at paused landscapes to attract attention and pilot the envisioned benefits
DSM-Niaga	old world, new world, turning point, responsibility, circularity, mono-material	sketches, black box as mockup, shared calculation sheets	Coupling limited responsibility for value of the 'old world' with extended responsibility of the 'new world', and collectively create the value model to convince partner's managers and create trust
Kingspan Future-proof	sustainability, integrated, financing sustainability	infographic	Using words such as 'integrated financing' to couple asbestos to renewable energy. An infographic was used to illustrate potential environmental impact to high-level stakeholders
Ecor Circular Friesland	equity, economy, ecology	true cost modelling	Adopt collective True Cost Modelling based on equity, economy and ecology concepts
Food-for-Feed-for-Food	circular food concept, front-door, backdoor, circular pig, Pikster, ambition, integrally sustainable,	Project proposal, blockchain	Using a project proposal as object of discussion in the explorative phase. Blockchain is considered a possible virtual trust object in implementation phase

Kipster	animal welfare, sustainability, partnership	sketches	Using a 3D sketch in early phases to convince retail
Philips New Karolinska	*not mentioned*	room drawings, site visits	Collective meetings, discussion and site visits based on every room, using drawings to cover the full room equipment
Bee-Banking	pollination, life, bees, creating value	saving booklets, art object	Using saving booklets for financers (mostly civil society) conveying the message of the project and amplifying partner's contribution to life. Spreading the message through a physical art objects (Honey Banks) in urban spaces
Thuisbaas	reliable, energy-neutral, affordable	piloting	Piloting affordable, reliable and energy-neutral housing, leading to ending of collaborations as these expectations were not met

4.1.4. Discussion on exploratory findings

Resulting from this exploratory study on boundary work practices, we understand the role of boundary work in SBMI as the practices to create, shape and disrupt organizational boundaries in three highly iterative boundary work activities: (i) *exploring boundaries and boundary dissonance,* (ii) *brokering boundaries* and (iii) *implementing boundary change*.

Firstly, exploring the current state of boundaries in the value network aims for a better understanding of the external context and illuminates (critical) boundary dissonance between focal organizations and their stakeholders (Matos & Silvestre, 2013). Freudenreich et al. (2019) suggest that organizational transformation processes may be unlocked when the focal company and its stakeholders purposefully explore similarities and differences for joint value creation by examining what each stakeholder group considers to be valuable in relation to sustainability.

Secondly, boundary brokering activities are relevant to challenge, negotiate and reconcile critical boundary dissonance. Boundary brokering involves discussions on where organizational boundaries are to be established, while accommodating individual value frames and interests through boundary texts, objects and people (Carlile, 2002; O'Mahony & Bechky, 2008).

Finally, the nature and dimension of implementing boundary change is expected to evolve during the process, as the different parties gain knowledge about (the feasibility of) required boundary change and about value creation and appropriation. Any required boundary change thus relates to how it is perceived as 'fair' or 'effective' and 'efficient' (Bocken et al., 2019) and how stakeholder interests and expectations are being met. This can have wider implications when boundary changes lead to a fundamental change in the operation of sectors.

4.2 Deeper analysis of boundary work

This section presents the results of the interviews with a wider set of stakeholders involved in the boundary work activities for the cases of Food for Feed for Food and Ecor Circular Friesland. We examine the topics for discussion and negotiation in relation to boundary change amongst business actors and non-business actors.

Exploring boundaries and boundary dissonance

In the case of Nijsen/Granico the external actors are the owner of Kipster (case 6), an environmental NGO, and a municipality, of which the last two are new to Nijsen/Granico. The respondents agreed on the general idea (vision) of using food waste to feed pigs. They also agreed on the principles of 1) using circular and regionally sourced feed, 2) improving animal welfare and an environmentally friendly stable, and 3) use of sustainable logistics based on electric vehicles. Discussed value capture elements included the elimination of uncertainties regarding price, volume and timespan of production, but achieving this will require changes outside the present partnership. From retailers, it requires a partnership that extends the traditional transactional focus towards a relational, longer-term contract. It also requires cooperation from framers and acceptance by consumers, actors who are currently not part of the partnership (incomplete value network).

In the case of ECOR Friesland, a broad vision of a circular Friesland was agreed to by a wide group of actors, Roles and responsibilities were discussed together with complexities in the form of technical requirements for waste streams and applications, potential material flows, applications and markets, potential customer value propositions, appropriate business models (cooperation and community-building or individual business model development). Direct and indirect value using True Cost Modeling surfaced as a model for evaluating options and coordinating decisions. Ecor is in charge of this. NOM and Circular Friesland Foundation agreed to play role in searching for potential collaboration partners,

Brokering boundaries

Nijsen/Granico is in the lead for orchestrating the network of food waste for pigs. In principle, meetings are in groups, which the interviewees considered important in the early stages, but there are also informal, bilateral meetings between partners (for example between Nijsen/Granico and Kipster. All interviewees mentioned that they feel this way of collaborating is sufficient to express their interests and perspectives. However, the absence of farmers, traders, butchers, retailers and end-consumers means that their interests are being considered only through the eyes of the other actors. The boundary arrangement is incomplete, something which may jeopardise the SBMI process.

Implementing boundary change

Nijsen/Granico moved from a value chain to a value network focus, it considers societal and environmental values next to economic values and plays a strategic role as system coordinator, developing sustainable meat concepts. Novel activities on the instrumental dimension are to be implemented in concert with partners' boundary changes. To date, boundary change of key partners, several of which who show critical boundary dissonance, is absent. In the Ecor Friesland case, Ecor and NOM are actively engaged in activities in networking, facilitating and promoting. Supply and application partners are presently exploring value propositions and business model opportunities, as well as technical requirements. Both cases attest to the difficulty of achieving boundary change on multiple dimensions for a wide set of actors.

5. DISCUSSION & CONCLUSION

5.1 Discussion

This study explores the role of boundary work as a novel perspective on SBMI, consisting of

1) different types of organizational boundaries and boundary changes within and across organizations.
2) Three iterative boundary work phases as processes for multi-stakeholder alignment; exploring boundaries and boundary dissonances, brokering boundaries in spaces, texts, objects and people, and implementing boundary changes.
3) The role of boundary spanners and boundary arrangements.

As an agenda-setting paper, we make three contributions. First, we specify the different types of organizational boundaries and boundary changes relevant for SBMI. The literature falls short in a concrete definition of organizational boundaries for SBMI, or what these boundaries look like in practice. This study complements previous studies on the role of boundary spanning in SBMI (e.g. Brehmer et al, 2018) by demonstrating that organizations change boundaries of identity, competence and efficiency through normative, strategic and instrumental alignment, relating to dimensions known in SBMI literature (Breuer & Lüdeke-Freund, 2016; Stubbs & Cocklin, 2008). This is relevant as we found that boundary changes of network actors provides the opportunity to leverage or impede value creation as actors maintain, create and adapt organizational boundaries along the process. This was illustrated in DSM-Niaga, which requires boundary changes of producers and retailers in order to be able to return carpet streams and capture the envisioned value. The iterative character of boundary changes was illustrated in Kingspan's collaboration with their investor, whose boundaries changed multiple times, thereby affecting the implementation of the business model. Hence we contributed to the SBMI literature by exploring value propositions for a broad range of actors, consisting of immediate values such as cost reduction, unburdening and convenience (core-benefits) as well as

rather diffuse benefits such as long-term health, local production or environmental improvements (co-benefits) (Baldassarre et al., 2017; Patala et al., 2016). While this study is a first attempt to identify organizational boundaries and boundary changes in SBMI, further research could improve our understanding of organizational boundaries and search for patterns of boundary changes, as well as the impact of boundary changes on the SBMI process.

Second, the cases pointed at three phases of boundary work; exploring boundaries and boundary dissonances, brokering boundaries, and implementing boundary changes. The cases showed that these activities happen in collaboration with non-market actors, such as municipalities, NGOs and policy-makers. This confirms that SBMI requires alignment beyond the value chain, which is known from literature on innovation networks (Bouwman et al., 2008; Ojasalo, 2008) and networked enterprises (Solaimani & Bouwman, 2012). A boundary work perspective adds that non-market actors are sometimes involved only during the process of innovation, e.g. for brokering, accelerating or value enhancing purposes. The boundary work activities led to novel multi-stakeholder networks, based on a shared understanding of value rather than traditional sectors, as illustrated in DSM-Niaga bypassing carpet manufacturers, and Kingspan Futureproof bypassing asbestos removers. These findings contribute to the cross-sectoral collaboration literature by eliciting the (novel) positioning of partners, as well as the intersection of domains (Austin & Seitanidi, 2012b; Harrington & Srai, 2016). Particularly in the circular economy cases, the slowing and closing of resource loops requires a high dimension of value network reconfiguration. The literature confirms that in these processes, understandings of retained and destroyed value along the product lifespan should be transformed into new value opportunities, and reversed logistics and take-back systems should be incorporated as activities (Achterberg et al., 2016; Witjes & Lozano, 2016). As a result, collaboration with partners at the end of the value chain, such as retailers and consumers, becomes increasingly important (Fischer & Pascucci, 2017), as was visible in DSM-Niaga, Nijsen/Granico, Ecor and Philips New Karolinska. Circular economy models tend to focus on materials and resources (Geissdoerfer et al., 2017), while requiring boundary change throughout the value network including novel, roles, forms of partner contracting, legislation and knowledge generation (Kraaijenhagen et al., 2016). Additionally, further research is needed to investigate patterns of collaboration in the different boundary work phases, as well as the roles of different actors in these multi-stakeholder collaborations. Additionally, further research could inquire whether the boundary work perspective holds its relevance in circular business model innovation, as our research did not focus on circular economy specifically.

Third, a boundary work perspective led to the identification of boundary spanners, using objects and tools to learn about value creation, value appropriation and expectations of the actors involved, in order to ultimately align boundaries in their external network. This corresponds with the partnership

literature on value frame fusion (Le Ber & Branzei, 2010a, 2010b) and value appropriation (Covey, 2006; Garcia-Castro & Aguilera, 2015) in cross-sector interactions. The boundary spanner seems important because “people are bad at taking experiential worlds and other people’s incentives seriously and learning about them” (Diepenmaat, 2018, p. 954). Assumptions about needs and interests need to be checked and collectively ascertained, as related boundaries have been found to be diffuse, ambiguous, and changing along the innovation process, based on expectations and experiences. Boundary texts and tools helped to keep the actors committed but in the end all network actors need to obtain material gains fitting with their mandate (government), missions (NGOs) and commercial interests. The literature on cross-sector collaboration emphasizes the complexity of partnerships between businesses, NGOs and public actors; among others due to conflicting institutional logics, interests and values (Ashraf et al., 2017; Jay, 2017). This makes it pertinent to explore partners’ divergent interests, resources, motives and missions (Austin & Seitanidi, 2012a) and to fuse value frames to co-create value (Le Ber & Branzei, 2010; Lee et al., 2012; Oskam et al., 2018). Most cases show that the focal business takes the initiative for boundary work and conducts boundary brokering activities to capture envisioned value. In Philips New Karolinska, external actors facilitated boundary work, which corresponds to the findings of Boons et al. (2016), who describe third-party brokering and collective learning as strategies for knowledge production in industrial symbiosis, as well as Smink et al. (2015), who point at the importance of boundary spanners to increase mutual understanding in renewable energy production. We found that boundary brokering may be present in the transfer of knowledge (e.g. for exchange of materials and applications), but may also be needed on higher dimensions (e.g. to discuss interests and understandings of value). This corresponds with knowledge transformation and translation processes mentioned by Carlile (2002, 2004), who recognize the importance of negotiating actor interests and trade-offs with a prominent role for shared artifacts and methods as boundary objects of knowledge transformation, such as drawings and prototypes, to create willingness for boundary change. SBMI literature mentions participatory backcasting (Vergragt & Quist, 2011), joint visioning (Leising et al., 2018) and experimentation (Bocken et al., 2018; Bocken et al., 2019; Brown & Vergragt, 2008) as strategies for knowledge production. This points at future research avenues to investigate the governance and brokering processes of boundary spanners in the different boundary work phases of SBMI, as well as the relations between boundary brokering practices and organizational boundary change.

Based on the exploratory findings, we consider boundary work in SBMI a valuable perspective to understand organizational boundaries and the process of boundary alignment in multi-stakeholder collaborations. As this is an exploratory study, a deeper analysis is needed to analyse all elements of the framework in-depth (visualized in Figure 1). Wider applicability of the boundary work perspective could be useful in contexts where firm- and industry boundaries are increasingly blurred and boundary realignment is required, such as BMI for digital transformation. Finally, to make it useful

for practice, further operationalization and instrumentation is needed in the form of new tools and methods for boundary work in SBMI to assist organizations in the creation and management of value networks for a sustainable or circular economy. We also want to note that system change cannot be organized in an entirely bottom-up way, but requires actions from governments, citizen groups and knowledge intermediaries. New value networks and experiments involving different actors play an important role in better understanding system barriers, as the basis for coordinated action. Tools and methods can support this process of multi-stakeholder experimentation.

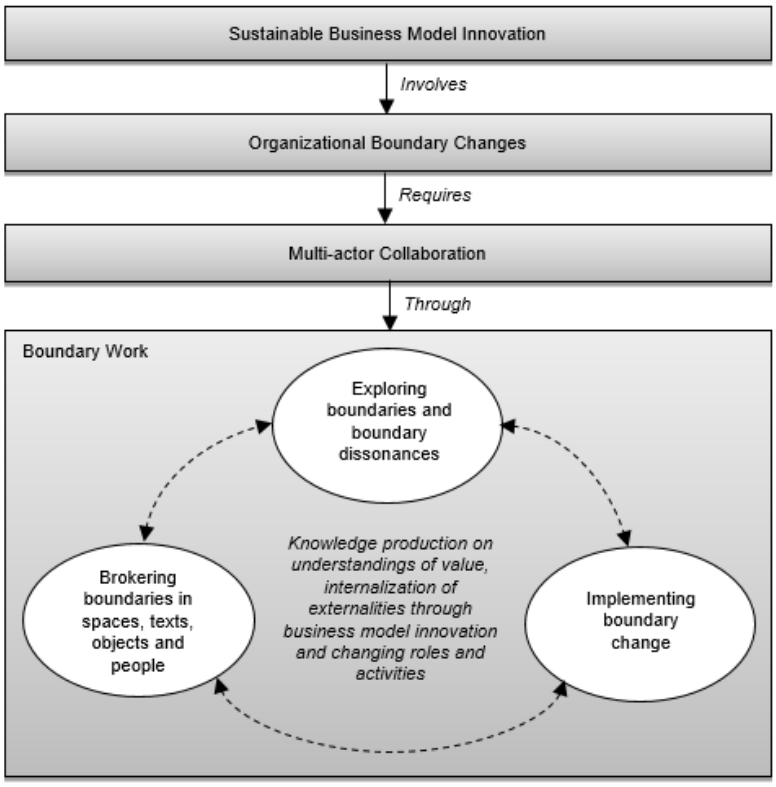

Figure 1: Conceptual framework for Boundary Work in SBMI

5.2 Conclusion

This paper explored the role of organizational boundaries and boundary work in SBMI. We have found that SBMI involves organizational boundary changes related to normative, strategic and instrumental alignment. Boundary alignment in the value network is required, however difficult, due to collaboration with unfamiliar actors, interaction between the different organizational boundaries as well as external boundary changes. Three phases of boundary work activities are relevant for multi-stakeholder alignment: *exploring boundaries and boundary dissonances*; *brokering boundaries*; and *implementing boundary change*. This study provides avenues for future research on boundary work for SBMI.

ACKNOWLEDGEMENTS

We would like to thank the interviewees for their support and time made available for interviews. We also want to thank Henk Diepenmaat for providing valuable insights on the multi-stakeholder perspective and Aimée Kyffin for her language expertise.

REFERENCES

Achterberg, E., Hinfelaar, J., & Bocken, N. (2016). *Master Circular Business with the Value Hill*. Retrieved from https://www.circle-economy.com/wp-content/uploads/2016/09/finance-white-paper-20160923.pdf

Al-Debei, M. M., & Avison, D. (2010). Developing a unified framework of the business model concept. *Eur. J. Inform. Syst., 19*(3), 359-376. doi:10.1057/ejis.2010.21

Ashraf, N., Ahmadsimab, A., & Pinkse, J. (2017). From Animosity to Affinity: The Interplay of Competing Logics and Interdependence in Cross-Sector Partnerships. *Journal of Management Studies*. 54, 793–822.

Austin, J., & Seitanidi, M. (2012a). Collaborative Value Creation: A Review of Partnering Between Nonprofits and Businesses. Part 2: Partnership Processes and Outcomes. *Nonprof. Volunt. Sec. Q, 41*(6), 929-968.

Austin, J., & Seitanidi, M. (2012b). Collaborative Value Creation: A Review of Partnering between Nonprofits and Businesses: Part 1. Value Creation Spectrum and Collaboration Stages. *Nonprof. Volunt. Sec. Q, 41 (5)*, 726-758.

Baldassarre, B., Calabretta, G., Bocken, N., & Jaskiewicz, T. (2017). Bridging Sustainable Business Model Innovation and User-driven Innovation: A Process for Sustainable Value Proposition Design. *J. Clean. Prod., 147*, doi:10.1016/j.jclepro.2017.01.081

Ballon, P. (2007). Business modelling revisited: the configuration of control and value. *J. Pol. Reg. Strat. Telec. Inf. Med., 9*(5), 6-19.

Barney, J., Wright, M., & Ketchen, D. J. (2001). The resource-based view of the firm: Ten years after 1991. *J. Manage., 27*, 625-641. doi:10.1177/014920630102700601

Berger, I. E., Cunningham, P. H., & Drumwright, M. E. (2004). Social Alliances: Company/Nonprofit Collaboration. *Cal. Manag. Review*, 47(1), 58–90. https://doi.org/10.2307/41166287

Berglund, H., & Sandström, C. (2013). Business model innovation from an open systems perspective: structural challenges and managerial solutions. *International Journal of Product Development*, 18(3-4), 274-285.

Bleicher, K. (1994). Integrative management in a time of transformation. *Longe Range Plann., 27*(5), 136-144.

Bocken, N., Boons, F., & Baldassarre, B. (2019). Sustainable business model experimentation by understanding ecologies of business models. *J. Clean. Prod.*, 208, 1498-1512.

Bocken, N., Rana, P., & Short, S. W. (2015). Value mapping for Sustainable Business Thinking. *J. Ind. Prod. Eng., 32* (1), 67-81. doi: 10.1080/21681015.2014.1000399

Bocken, N., Schuit, C., & Kraaijenhagen, C. (2018). Experimenting with a circular business model: Lessons from eight cases. *Environ. Innov. Soc. Transit, In press*. doi:https://doi.org/10.1016/j.eist.2018.02.001

Bocken, N., Short, S. W., Rana, P., & Evans, S. (2013). A Value Mapping Tool for Sustainable Business Modelling. *Corp. Gov., 13* (5), 482-497. doi:10.1108/CG-06-2013-0078

Bocken, N., Short, S. W., Rana, P., & Evans, S. (2014). A Literature and Practice Review to Develop Sustainable Business Model Archetypes. *J. Clean. Prod. 65*, 42-56. doi:https://doi.org/10.1016/j.jclepro.2013.11.039

Bocken, N., Weissbrod, I., & Tennant, M. (2016). *Business model experimentation for sustainability*. Paper presented at the Sustainable Design & Manufacturing Conference, Crete.

Bolton, D., & Landells, T. (2015). Reconceptualizing Power Relations as Sustainable Business Practice. *Business Strategy and the Environment*. 24, 604-616.

Boons, F., Chertow, M., Park, J., Spekkink, W., & Shi, H. (2016). Industrial Symbiosis Dynamics and the Problem of Equivalence: Proposal for a Comparative Framework. *J.Ind. Ecol., 21*(4), 938-952. doi:10.1111/jiec.12468

Boons, F., & Lüdeke-Freund, F. (2013). Business Models for Sustainable Innovation: State of the Art and Steps Towards a Research Agenda. *J. Clean. Prod., 45*, 9-19. doi:10.1016/j.jclepro.2012.07.007.

Bouwman, H., Faber, E., Haaker, T., Kijl, B., & De Reuver, M. (2008). Conceptualizing the STOF Model. In H. Bouwman, H. De Vos, & T. Haaker (Eds.), *Mobile Service Innovation and Business Models* (pp. 31-70). Berlin, Heidelberg: Springer Berlin Heidelberg.

Breckenridge, J. (2009). Demistifying Theoretical Sampling in Grounded Theory Research. *Grounded Theor. Rev. 08*(2). Retrieved from http://groundedtheoryreview.com/2009/06/30/847/

Brehmer, M., Podoynitsyna, K., & Langerak, F. (2018). Sustainable business models as boundary-spanning systems of value transfers. *J. Clean. Prod., 172*, 4514-4531. doi:https://doi.org/10.1016/j.jclepro.2017.11.083

Breuer, H., & Lüdeke-Freund, F. (2017). Values-based Network and Business Model Innovation. *Int. J. Innov. Mgt., 21*(03), 1750028. doi:10.1142/s1363919617500281

Brown, H., & Vergragt, P. (2008). Bounded socio-technical experiments as agents of systemic change: The case of a zero-energy residential building. *Technol. Forecast. Soc., 75*(1), 107-130. doi:10.1016/j.techfore.2006.05.014

Carlile, P. R. (2002). A Pragmatic View of Knowledge and Boundaries: Boundary Objects in New Product Development. *Organ. Sci., 13*(4), 442-455. doi:10.1287/orsc.13.4.442.2953

Charmaz, K. (2014). *Constructing Grounded Theory* (2nd Edition ed.) London: Sage Publications.

Chen, L., Zhao, X., Tang, O., Price, L., Zhang, S., & Zhu, W. (2017). Supply chain collaboration for sustainability: A literature review and future research agenda. *Int. J. Product. Econ.* doi:http://doi.org/10.1016/j.ijpe.2017.04.005

Chesbrough, H. (2010). Business Model Innovation: Opportunities and Barriers. *Long Range Plann., 43*(2), 354-363.

Chesbrough, H., & Schwartz, K. (2007). Innovating Business Models with Co-Development Partnerships. *Res. Technol. Manage.*, *50*(1), 55-59. doi:10.1080/08956308.2007.11657419

Covey, S. M. R. (2006). *The speed of trust: The one thing that changes everything*. New York, N.Y.: Free Press.

Crosby, B.C., & Bryson, J.M. (2010). Integrative Leadership and the Creation and Maintenance of CrossSector Collaborations. *Leadership Quarterly* 21(2), 211–30.

Dentchev, N., Rauter, R., Jóhannsdóttir, L., Snihur, Y., Rosano, M., Baumgartner, R., ... & Jonker, J. (2018). Embracing the variety of sustainable business models: A prolific field of research and a future research agenda. *J. Clean. Prod*, 194, 695-703.

Di Domenico, M., Tracey, P., & Haugh, H. (2009). The Dialectic of Social Exchange: Theorizing Corporate—Social Enterprise Collaboration. *Organization Studies*, 30(8), 887–907. doi:10.1177/0170840609334954

Diepenmaat, H. (2018). *The path of Humanity: Societal Innovation for the world of tomorrow*. Almere: Parthenon.

Dyer, H., & Sing, H. (1998). The Relational View: Cooperative Strategy and Sources of Interorganizational Competititive Advantage. *Acad. Manage. Rev.*, *23*(4), 660-679. doi:http://www.jstor.org/stable/259056

Dyllick, T., & Hockerts, K. (2002). Beyond the Business Case for Corporate Sustainability. *Bus. Strateg. Environ.*, *11*(2), 130-141. doi:10.1002/bse.323

Dyllick, T., & Muff, K. (2016). Clarifying the Meaning of Sustainable Business. *Organ. Environ.*, *29*(2), 156-174. doi:10.1177/1086026615575176

Eisenhardt, K. M. (1989). Building Theories from Case Study Research. *The Academy of Management Review, 14*(4), 532-550. doi:10.2307/258557

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: what are they? *Strat. Manag. J. , 21*(1105-1121). doi:10.1002/1097-0266(200010/11)21:10/11

Evans, S., Fernando, L., & Yang, M. (2017a). Sustainable Value Creation - From concept towards implementation *Sustain. Man.*, (pp. 203-220).

Evans, S., Vladimirova, D., Holgado, M., & Yang, M. (2017b). Business Model Innovation for Sustainability: Towards a Unified Perspective for Creation of Sustainable Business Models. *Bus. Strateg. Environ*. doi:10.1002/bse.1939

Fischer, A., & Pascucci, S. (2017). Institutional Incentives in Circular Economy Transition: The case of Material use in the Dutch Textile Industry. *J. Clean. Prod.*, *155*(Part 2), 17-32. doi:https://doi.org/10.1016/j.jclepro.2016.12.038

Fleming, L., & Waguespack, D. M. (2007). Brokerage, Boundary Spanning, and Leadership in Open Innovation Communities. Org. Sc., 18(2), 165-180. doi:10.1287/orsc.1060.0242

Foss, N. J., & Saebi, T. (2017). Fifteen years of research on business model innovation: how far have we come, and where should we go?. *J. Manag.*, 43(1), 200-227.

Freeman, R. (1984). *Strategic Management: a Stakeholder Approach*. Boston: Pitman Publishing.

Freudenreich, B., Lüdeke-Freund, F. & Schaltegger, S. (2019). A Stakeholder Theory Perspective on Business Models: Value Creation for Sustainability *J Bus Ethics*, 1-16. https://doi.org/10.1007/s10551-019-04112-z

Garcia-Castro, R., & Aguilera, R. V. (2015). Incremental value creation and appropriation in a world with multiple stakeholders. *Strateg. Manag. J.*, *36*(1), 137-147. doi:10.1002/smj.2241

Geissdoerfer, M., Savaget, P., Bocken, N., & Hultink, E. J. (2017). The Circular Economy –A New Sustainability Paradigm? *J. Clean. Prod., 143*, 757-768. doi:10.1016/j.jclepro.2016.12.048

Geissdoerfer, M., Vladimirova, D., & Evans, S. (2018). Sustainable business model innovation: A review. *J. Clean. Prod.*, 198, 401-416.

Gieryn, T. F. (1983). Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists. *Am. Sociol.l Rev.*, *48*(6), 781-795. doi:10.2307/2095325

Glaser, B. G. (1978). *Theoretical Sensitivity: advances in the methodology of grounded theory* Mill Valley, CA: Sociology Press.

Googins, B.,& Rochlin, S.A. (2002). Creating the Partnership Society: Understanding the Rhetoric and Reality of Cross-Sectoral Partnerships. *Business and Society Review*. 105. 127 - 144. 10.1111/0045-3609.00068.

Haaker, T., Bouwman, H., Janssen, W., & de Reuver, M. (2017). Business model stress testing: A practical approach to test the robustness of a business model. *Futures*, *89*, 14-25. doi:https://doi.org/10.1016/j.futures.2017.04.003

Halffman, W. (2003). Boundaries of Regulatory Science: Eco/toxicology and Aquatic Hazards of Chemicals in the US, England and the Netherlands *Sci. Dynam.* (pp. 439-477). Amsterdam: University of Amsterdam.

Harrington, T. S., & Srai, J. S. (2016). Designing a 'concept of operations' architecture for next-generation multi-organisational service networks. *Ai & Soc.*, doi:10.1007/s00146-016-0664-5

Heracleous, L. (2004). Boundaries in the Study of Organization. *Hum. Relat.*, *57*(1), 95-103. doi:10.1177/0018726704042716

Hoppe, R. (2010). From 'Knowledge Use' towards 'Boundary Work'. Sketch of an Emerging New Agenda for Inquiry into Science-policy Interaction *Knowledge Democracy. Consequences for Science, Politics and Media*: Heidelberg.

Joyce, A., & Paquin, R. L. (2016). The triple layered business model canvas: A tool to design more sustainable business models. *J. Clean. Prod.*,, 135, 1474-1486.

Jay, J.. (2017). Navigating paradox as a mechanism of change and innovation in hybrid organizations, *Ac. of Manag. J.*, 56, 137-159

Koschmann, M., Kuhn, T.,& Pfarrer, M. (2012). A Communicative Framework of Value in Cross-Sector Partnerships. The Ac. of Manag. R. 37, 332-354. 10.5465/amr.2010.0314.

Kraaijenhagen, C., Van Oppen, C., & Bocken, N. (2016). *Circular business. Collaborate & Circulate*. Amersfoort, The Netherlands: Circular Collaboration.

Krantz, R. (2010). A New Vision of Sustainable Consumption: The Business Challenge. *J. Ind. Ecol., 14* (1). doi:10.1111/j.1530-9290.2009.00220.x

Lamont, M., & Molnar, V. (2002). The Study of Boundaries in the Social Sciences. *Annu. Rev. Sociol., 28*, 167-195. doi:https://doi.org/10.1146/annurev.soc.28.110601.141107

Le Ber, M., & Branzei, O. (2010a). Towards a critical theory of value creation in cross-sector partnerships. *Org., 17*(599), 599-629. doi:10.1177/1350508410372621

Le Ber, M., & Branzei, O. (2010b). Value Frame Fusion in Cross Sector Interactions. *J. Bus. Ethics, 94*(1), 163-195. doi:10.1007/s10551-011-0785-1

Leising, E., Quist, J., & Bocken, N. (2018). Circular Economy in the Building Sector: Three cases and a collaboration tool. *J. Clean. Prod.*, doi:https://doi.org/10.1016/j.jclepro.2017.12.010

Lüdeke-Freund, F. (2010). *Towards a Conceptual Framework of Business Models for Sustainability*. Paper presented at the Knowledge Collaboration & Learning for Sustainable Innovation [Conference], Delft. http://ssrn.com/abstract=2189922

Madden, B. J. (2017). The Purpose of the Firm, Valuation, and the Management of Intangibles. *J. Appl. Corp. Finance, 29*(2), 76-86. doi:10.1111/jacf.12235

Matos, S., & Silvestre, B.. (2013). Managing stakeholder relations when developing sustainable business models: The case of the Brazilian energy sector. *J. of Clean. Prod. 45*, 61–73. 10.1016/j.jclepro.2012.04.023.

Noble Environmental Ecor. (2018, 20-09-2018). The Vision for Ecor. Retrieved from https://ecorglobal.com/ecor-vision/

Ojasalo, J. (2008). Management of innovation networks: a case study of different approaches. *Eur. J. Innov.Manage., 11*(1), 51-86. doi:10.1108/14601060810845222

O'Mahony, S., & Bechky, B.A. (2008). Boundary organizations: Enabling collaboration among unexpected allies. Adm. Science Q., *53(3)*, 422–459.

Oskam, I., Bossink, B., & de Man, A. P. (2018). The interaction between network ties and business modeling: Case studies of sustainability-oriented innovations. *J. Clean. Prod., 177*, 555-566. doi:10.1016/j.jclepro.2017.12.202

Osterwalder, A., & Pigneur, Y. (2010). *Business Model Generation: A handbook for visionaries, game changers and challengers*. Hoboken, New Jersey: John Wiley and Sons, Inc.

Patala, S., Jalkala, A., Keränen, J., Väisänen, S., Tuominen, V., & Soukka, R. (2016). Sustainable Value Propositions: Framework and Implications for Technology Suppliers. *Ind. Market. Manag., 59*, 144-156. doi:http://dx.doi.org/10.1016/j.indmarman.2016.03.001

Patton, M. (1990). *Qualitative evaluation and research methods*. Beverly Hills, CA: Sage.

Pieroni, M. P., McAloone, T., & Pigosso, D. A. (2019). Business model innovation for circular economy and sustainability: A review of approaches. *J. Clean. Prod., 215*, 198-216.

Powell, E., Hamann, R., Bitzer, V., & Baker, T. (2018). Bringing the elephant into the room? Enacting conflict in collective prosocial organizing. *J. Bus. Venturing, 33*(5), 623-642.

Quist, J., & Tukker, A. (2013). Knowledge collaboration and learning for sustainable innovation and consumption: introduction to the ERSCP portion of this special volume. *J. Clean. Prod, 48*, 167-175. doi:10.1016/j.jclepro.2013.03.051

Richardson, J. (2008). The Business Model: an integrative framework for strategy execution. *Strat. Change, 17*(5-6), 133-144. doi:10.1002/jsc.821

Rohrbeck, R., Konnertz, L., & Knab, S. (2013). Collaborative Business Modelling for Systemic and Sustainability Innovations. *Int. J. Tech. Man., 63*(1/2), 4-23. doi:https://ssrn.com/abstract=2197724

Rondinelli, D., & London, T. (2003). How Corporations and Environmental Groups Cooperate: Assessing Cross-Sector Alliances and Collaborations. *Ac. of Manag. Executive*. 17, 61-76. 10.5465/AME.2003.9474812.

Roome, N., & Louche, C. (2016). Journeying toward business models for sustainability: A conceptual model found inside the black box of organisational transformation. *Organ. Environ., 29(1)*, 11-35.

Santos, F. M., & Eisenhardt, K. M. (2005). Organizational Boundaries and Theories of Organization. *Organ. Sci., 16*(5), 491-508. Retrieved from http://www.jstor.org/stable/25145988

Schaltegger, S., Burritt, R., Zvezdov, D., Hörisch, J., & Tingey-Holyoak, J. (2015). Management Roles and Sustainability Information. Exploring Corporate Practice. *Aust. Account. Rev., 25*(4), 328-345. doi:doi:10.1111/auar.12102

Schaltegger, S., Hansen, E. G., & Lüdeke-Freund, F. (2016). Business Models for Sustainability: Origins, Present Research and Future Avenues. *Organ. Environ., 29*(1), 3-10. doi:10.1177/1086026615599806

Smink, M., Negro, S.O., Niesten, E., & Hekkert, M.P. (2015). How mismatching institutional logics hinder niche–regime interaction and how boundary spanners intervene, *Technol. Forecasting and Social Change, 100, issue C,* 225-237

Solaimani, S., & Bouwman, H. (2012). A framework for the alignment of business model and business processes: A generic model for trans-sector innovation. *Bus. Process Man. J., 18*(4), 655-679. doi:10.1108/14637151211253783

Teece, D. J. (2010). Business models, business strategy and innovation. *Longe Range Plann, 43(2-3),* 172-194.

Upward, A., & Jones, P. (2016). An ontology for strongly sustainable business models: Defining an enterprise framework compatible with natural and social science. *Organ. Environ, 29(1),* 97-123.

Vurro, C., Dacin, M.T. & Perrini, F. J Bus Ethics (2010). Institutional Antecedents of Partnering for Social Change: How Institutional Logics Shape Cross-Sector Social Partnerships, 94(Suppl 1): 39. https://doi.org/10.1007/s10551-011-0778-0

Witjes, S., & Lozano, R. (2016). Towards a more Circular Economy: Proposing a framework linking sustainable public procurement and sustainable business models. *Resour., Conserv. Rec., 112,* 37-44. doi:10.1016/j.resconrec.2016.04.015

Zietsma, C. Lawrence, T.B. (2010) Institutional Work in the Transformation of an Organizational Field: The Interplay of Boundary Work and Practice Work, *Admin. Science Q*, 55: 189–221

Zott, C., & Amit, R. (2010). Business model design: an activity system perspective. *Longe Range Plann., 43(2-3),* 216-226.

549 **APPENDIX A: Review of interlinkage between sustainable business models and value creation**

	Business Model	**Sustainable business model**
Value form	Value created and captured	Value created and captured plus value absence, destroyed, missed or surplus, new value opportunities
Bocken et al. (2013)	Value created and captured	Value created and captured plus value destroyed, missed or surplus, new value opportunities
Bocken et al. (2015)		Value forms; social, economic, ethical
Evans, Fernando, et al. (2017)	Value created and captured	Value created and captured plus value absence, surplus, destroyed, missed, new value opportunities
Value priority	Economic first	Societal & environmental value first or equal to economic value
Freeman (1984)	Economic first	Economic through societal & environmental first
Schaltegger et al. (2016)	Economic first	Economic through societal & environmental first
Stubbs and Cocklin (2008)	Maximize shareholder value	No prioritizing of stakeholders
Value horizon	Direct, short- or medium-term	Direct, short- or medium- term plus indirect, long-term
Freeman (1984)		Long-term
Krantz (2010)		The entire life cycle
Madden (2017)	Direct, short- or medium-term	Direct- short- or medium- term plus long-term, future generations
Stubbs and Cocklin (2008)		Longer-term
Value created	(refined) shareholder value	Value for the common good
Dyllick and Muff (2016)	(refined) shareholder value and/or triple bottom line	Value for the common good
Lüdeke-Freund (2010)		Private/customer and public benefits
Madden (2017)		Environment
Stubbs and Cocklin (2008)	Maximize (refined) shareholder value	All stakeholders on the organizational & socioeconomic level
Schaltegger et al. (2016)	Organizational value	Organizational + Social and ecological value
Value proposition	Customer value	Sustainable customer value and co-benefits through value for society & environment
Bocken et al. (2013)	Customer	Customer, other stakeholders, society, environment
Chesbrough (2010)	Users	
Osterwalder and Pigneur (2010)	Customer	
Richardson (2008)	Customer	
Teece (2010)	Customer, business	
Customer value proposition		
Bocken and Allwood (2012)	Customer value	Sustainable customer value through offering and value for society & environment

Boons and Lüdeke-Freund (2013)	Customer interface	Customer's sustainable value through transparency about production and consumption systems. Ecological and social value through customer value / measurable ecological and/or social value in concert with economic value.
Krantz (2010)		Better value; customer's sustainable value through transparency about co-benefits
Lüdeke-Freund (2010)		Superior/extended customer value, company and society & environment/public customer value/public value propositions
Patala et al. (2016)		Customer's sustainable value through co-benefits such as health, design, energy savings. Sustainable value proposition: economic, environmental, social
Schaltegger et al. (2016)		Sustainable customer value through value for broad stakeholder network including natural environment
Zott and Amit (2010)	Customer value	
Value creation & delivery	Business, value chain, relevant value network partners	Business and interlinked value chains plus stakeholder network including new and possibly unusual partners
Bocken et al. (2013)		Wider set of stakeholders
Boons and Lüdeke-Freund (2013)		Sustainable supply chain management and responsibility for stakeholders
Chen et al. (2017)		Internal, value chain and competitor/other organizations
Chesbrough and Schwartz (2007)	Value chain and value network of suppliers, customers and rivals	
Evans, Vladimirova, et al. (2017)	Business and value chain	Business and value chain plus stakeholder network including new and possibly unusual partners
Freeman (1984)		Value network instead of value chain
Krantz (2010)		Interlinked value chains
Lüdeke-Freund (2010)		Network of partners
Richardson (2008)	Value chain, activity system, business processes, value network of suppliers, partners and customers	
Stubbs and Cocklin (2008)		Stakeholders in the network; for example, non-government organizations (NGOs), the media, upstream and downstream supply chain players, financial markets, and investors.
Zott and Amit (2010)		Firm in concert with its partners
Value capture	Economic business value (monetary & non-monetary)	Societal, environmental and economic value

Boons and Lüdeke-Freund (2013)		Appropriate distribution of economic costs and benefits, and ecological and social value capture
Chesbrough (2010)	Firm revenue	
Dyllick and Hockerts (2002)		Natural, societal and business
Evans, Vladimirova, et al. (2017)	Economic value	Societal, environmental and economic value
Madden (2017)		Environment, local communities, other 'public interest' representatives next to customers and employees
Richardson (2008)	Revenue and business economics	
Schaltegger et al. (2016)		Economic value capture through societal and environmental value capture
Stubbs and Cocklin (2008)		Financial, Environmental, Social outcomes
Teece (2010)	Business value (monetary & non-monetary)	
Zott and Amit (2010)	Business profit through revenue model	

550

551 **APPENDIX B: Main collaboration partners, partner novelty and targeted value creation**

Case	Main Collaboration Partners	Partner Novelty	Societal Value Propositions	Environmental Value Propositions	Partner Value Propositions	Consumer Value Propositions
One (initiator: Heijmans)	Public housing agency Private investment fund Municipalities Local citizens Private energy / utilities company Leasing Corporations Producer	Familiar Familiar Familiar New Familiar New New	• Affordable high-quality housing for young, single professionals • Positive contribution to empty areas by attracting new cash flows, community binding, improving safety *Emerged* • Housing for asylum seekers (new market)	• Resource recovery through circularity • High energy efficiency • All-electric	*Intermediaries* (investors, housing corporations, leasing companies): • Innovative product with a good return • Moveable housing • Long-term investment *Housing corporations* • Temporary housing *Municipalities* • Temporary design housing to improve urban quality	*Immediate*: • Flexible, independent, qualitative and affordable rental housing *Long-term:* • (Dutch) Design • Socially and environmentally sustainable municipalities
Niaga (initiator: DSM-Niaga)	MNE (chemical / material producer) Carpet producer	New New	• Improve population health through less allergy and asthma • Radically decrease polyester pollution	• Full resource recovery • Elimination of raw resource extraction • Elimination of waste • 90% less energy usage during production and recycling	*Manufacturer* • Proud to produce Niaga • New market opportunity through (limited) exclusivity • Future sustainability *Retailer* • Cost savings through easy application and replacement	*Immediate:* • Buy an experience • No smoke in case of fire • Lightweight & no smell • Easy use; replaceable • Return value *Long-term:* • Improved health • Pure material • No waste
Futureproof (initiator: Kingspan)	Farmer Energy cooperation (Regional) banks Regional builders Asbestos removers Solar installers	Familiar New New Familiar New Familiar	• Discard hazardous substances to improve health	• Discard hazardous substances • Renewable energy (solar panels) • Energy efficiency (intelligent lighting and isolation)	*Insurance company* • Decreased risk asbestos *Banks* • Investment opportunity / cash flow • Risk sharing, decreased risk of having loan on asbestos *Energy company* • Long-term cash flow • Risk sharing	*Immediate:* • Safe asbestos removal without moving supplies and animals • Cost-neutral: monthly fee based on solar revenue • Less administration; better maintenance, warranty & insurance • Overcome investment barrier *Long-term:*

						• Incentive for sustainable certification • Increased fire safety • Increased business premises; property and sales value, access to finance and insurance
Ecor Circular Friesland (initiator: Noble Environmental)	Public regional Investment & Development Circular Friesland (public) Local industry Private waste collector and processor	New New New New	• Regional cohesion through circularity • Regional job creation • Elimination of harmful VOCs	• Elimination of cellulose waste, harmful VOCs & waste in production • Reduced transport • 100% certified bio-based • 100% resource recovery (urban, farm and forest waste materials), reducing incineration and landfill • Alternative for traditional wood, plywood, corrugated and plastics • 99% water reuse in production • Zero impact factories	*Provinces / municipalities / regional public investors:* • Circular region, sustainability performance • Job creation • Regional cohesion *Private investors* • Good investment • Global elimination MDFs • Fair material use *Sourcing & application potentials* • Sales • Part of circular movement • Sustainability performance	*Immediate*: • Avoiding waste costs • Advanced design and performance • 100% non-toxic and recycled • Contribution to LEED credits *Long-term:* • Community creation: designers, craftsmen
Food-for-Feed-for-Food (initiator: Nijsen-Granico)	Municipality Environmental NGO	New Familiar	• Increased public space • Increased food availability, elimination of human-animal competition for land • Contribute to solving manure problem • Decrease smell and improve air quality in areas surrounding stables	• No additional need for resources & agricultural land (forests, soy, wheat) • Radical carbon emission reduction through local sourcing & production process • Less phosphate pig manure	*Pig farmers* • Decrease manure problem • Price/volume certainty • Improved image *Retailer* • Circularity • Avoid waste costs • Improved image & avoid NGO campaigns *Butchers* • No value identified *NGO* • No additional resource need & agricultural land	*Immediate:* • Certified meat • Improved taste and structure • Improved animal welfare • Improved environmental performance *Long-term:* • Improved environmental performance

					• Reduced CO2 emission through regional sourcing & production • Less phosphate pig manure	
Kipster (initiator: Kipster)	Boundary workers Retailer NGO Builders Food suppliers	New Familiar Familiar Familiar New	• Chicken food from waste streams does not impede with food for human consumption • Esthetic and functional design • Transparency: visitor and education center • Suitable for urban agriculture • Sell rooster meat to help meeting food demands	• Radically lowering ammonia & particulate matter • Chicken food from waste streams • Energy-positive through solar panels • No fossil fuel use • Local packaging and direct distribution limits transport • Sell rooster meat instead producing extra chicken	*Retailer* • Three-star certified egg from Animal Protection • Environmental certification • Energy-neutral • Exclusivity *Farmer* • New market • Fair pricing *NGOs* • Contribution to sustainable egg production	*Immediate:* • 'The best farm with the best egg for the best price' • Human, animal, and environmentally friendly egg
New Karolinska partnership (initiator: Philips Healthcare)	County Council (initiator) Competitor 1 (private healthcare) Competitor 2 (private healthcare) Hospital (semi-public) Users Private construction company	Familiar New New Familiar Familiar New	• Increase affordable healthcare • Increase access to healthcare	• Energy efficiency, material and chemical declarations, waste disposals • Less need for raw materials through circularity	*Hospital* • Uptime warranty • Freedom of product choice (also competitor's) • Fixed price • Access to latest technology • Unburdening responsibility equipment	*Immediate:* • More affordable, convenient and high quality healthcare
BeeBanking (initiator: Stroom The Hague)	Artist Beekeepers (association) Crowd Retailer Private investors NGOs Sustainability fund Politicians	New New New New New Familiar Familiar New	• Increased awareness of food production and bee mortality	• Increased awareness of food production and bee mortality	*Artist* • Project sale *Beekeepers* • Promotion for craft • Contribute to environmental goal *Private investors / citizens* • Contribute to life • Honey package as return for financial support	*Immediate:* • Contribute to life • Honey package • Co-benefit • Taste of urban honey

					Retail • Honey sales	
Urgenda (initiator: Thuisbaas)	House owners (association) Solar installers Heath pump installers Infrared installers Municipality	Familiar New New New New	• Contribution to mitigate climate change through energy-neutral home	• Contribution to mitigate climate change through energy-neutral home	*Suppliers & consultants* • Market entrance opportunity • Opportunity for scale-up	*Immediate:* • Zero-on-the-meter warranty • Cost-friendly investment with co-funding municipality • Customized 8 step plan • Eliminate CO2 emissions • Self-sufficiency • Financial assistance: subsidies, loans, savings *Long-term:* • Increased house value • House sold faster

552