Journal of Business Models (2021), Vol. 9, No. 4, pp. 36-66

JOURNAL OF BUSINESS MODELS

Boundary Work for Collaborative Sustainable Business Model Innovation: The Journey of a Dutch SME

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Abstract

Purpose: How does a small business engage in boundary work to innovate its business model towards sustainability? We employ a boundary work lens to trace the endeavors of a small company to explore, negotiate and (re)align organizational boundaries in its multi-stakeholder network around new, sustainable value propositions.

Design/Methodology/Approach: We engaged in longitudinal research of a company's endeavors for multi-stakeholder alignment in sustainable business model innovation (SBMI). By means of thick description, this paper offers rich empirical insights on the processes of interaction between a small company and its stakeholders in the Dutch pork sector, with special attention to boundary spanners, boundary objects and the mutual organizational boundary changes.

Findings: We find that the shaping and shifting of organizational boundaries highly influences the process and content of the business model innovation. During the phases of boundary exploration, brokering and boundary changes, there is a pivotal role for boundary objects to deal with uncertainties, to facilitate strategic discussions and to find solutions to different valuation frames, power tensions and role divisions between stakeholders.

Research implications: SBMI can benefit from boundary work, as it helps companies to find value opportunities in the organizational boundaries of their external stakeholders, addressing challenges that emerge from existing organizational boundaries, and establishing boundary arrangements to facilitate this process.

Originality/Value: Boundary work interlinks concepts of identity, power, competences and efficiency in entrepreneurial processes of collaborative SBMI. The framework and methods of this study further our understanding of the co-evolutionary processes of SBMI.

Keywords: Thick Description; Longitudinal Research; Boundary Work; Sustainable Business Model Innovation; Circular Business Model Innovation; Multi-Stakeholder Collaboration

Please cite this paper as: Velter et al. (2021) Boundary Work for Collaborative Sustainable Business Model Innovation: The Journey of a Dutch SME, Vol. 9, No. 4, pp. 36-66

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DOI: https://doi.org/10.5278/jbm.v9i4.6267
ISSN:2246-2465

Introduction

Sustainable business model innovation (SBMI) involves changes in how a company does business to address societal and environmental challenges and has gained increasing attention in the last two decades as a means for sustainable development. To reach its sustainability potential, SBMI necessitates engagement with external stakeholders to develop multi-stakeholder value propositions and value capture mechanisms, making these external stakeholders fundamentally part of a (future) functioning business model (Bocken, 2019; Bocken and Ritala, 2021; Powell, Hamann, Bitzer, and Baker, 2018). SBMI therefore structurally transcends the organizational boundaries of the firm, and requires a redesign and re-alignment of the organizational boundaries of the respective organizations involved (Paulsen and Hernes, 2003; Velter, Bitzer, Bocken, and Kemp, 2020). For example, to address environmental and societal challenges, businesses and their partner organizations may need to develop new competences and activities; constrain or shift their position in the value chain; or even adjust their organizational purpose (Gauthier and Gilomen, 2016; Hahn et al., 2018; Tykkyläinen and Ritala, 2020). All these alterations are changes to what is inside (or part) of an organization – and what is outside (or not part) of an organization. This is subsumed under the concept of organizational boundaries, operationalized in the activities, competences, external relations and identity of an organization (Keränen et al., 2020; Santos and Eisenhardt, 2005).

Research to understand the processes of organizational boundary alignment in SBMI is only in its infancy (Boons and Lüdeke-Freund, 2013; Geissdoerfer, Vladimirova, and Evans, 2018; Schaltegger, Lüdeke-Freund, and Hansen, 2016). It is generally recognized that these processes are highly challenging for businesses: not only do they need to navigate organizational boundary alignment with relevant external stakeholders, but they also need to find new value creation opportunities by actively working on these boundaries (Keränen et al., 2020; Santos and Eisenhardt, 2005). Yet, beyond these insights, it remains unclear how companies engage in such a challenging process that requires openness, interaction, and resolving of conflicts.

Recent studies propose that boundary work theory offers an apt lens to further deconstruct boundary alignment processes in SBMI (Velter et al., 2020). Traditionally, boundary work addresses the interdependencies and interactions between stakeholders of different institutional contexts (Gieryn, 1983; Hoppe, 2010). In the context of SBMI, Velter et al. (2020) frame boundary work as the activity of exploring, negotiating, and re-aligning organizational boundaries around new value propositions. This offers a promising starting point to shed light on how businesses engage in boundary alignment processes in pursuit of SBMI (Breuer et al., 2018; Geissdoerfer et al., 2018; Pieroni et al., 2019). We therefore employ a boundary work lens to empirically trace and analyze the endeavors of a company to align organizational boundaries in its multi-stakeholder network. We pose the following research question: How can boundary work theory help explain SBMI?

To answer this question, we engaged in longitudinal research over a timespan of two years. Our case study is a small Dutch enterprise that seeks to establish a sustainable business model in the Dutch pork sector. This sector, as many industrialized livestock sectors worldwide, has come under intense legal, economic, and public pressure to transform into a more sustainable sector. Our case study portrays a company's idea for innovation, which is dependent on a collaborative reconfiguration of stakeholders in the value network. In contrast to retrospective case studies, we observed the unfolding of the innovation process initiated by the SME, while its outcomes were still unknown at the time of research and publication.

Our case study shows how boundary work is crucial for developing and implementing multi-stakeholder SBMI, with a pivotal role for boundary objects to deal with uncertainties, to facilitate strategic discussions and to find solutions to different valuation frames, power tensions and role divisions between stakeholders. We conclude that SBMI can benefit from boundary work by finding value creation opportunities in the organizational boundaries of their external stakeholders, addressing challenges that emerge from existing organizational boundaries, and by offering a frame for boundary arrangements to facilitate this process.

Theoretical framework

SBMI as a multi-stakeholder process

SBMI fosters the creation of significant positive, and significantly reduced negative impacts for the environment and society, through changes in the way the organization and its external stakeholders create, deliver and capture value (Bocken and Geradts, 2020; Bocken, Short, Rana, and Evans, 2014; Geissdoerfer et al., 2018). In contrast to conventional business model innovation, which focuses on economic value creation for customers and direct stakeholders, SBMI ties the concerns of a broad spectrum of stakeholders and multiple forms of value together in reorganizing their business models (Chesbrough, 2010; Pedersen, Lüdeke-Freund, Henriques, and Seitanidi, 2021; Pieroni, McAloone, and Pigosso, 2019). As the adoption of long-term strategies that create value for all key stakeholders is fundamental for the success of SBMI, knowledge, resources and capabilities need to be shared across organizational boundaries (Bocken, Boons, and Baldassarre, 2019; Boons and Lüdeke-Freund, 2013; Breuer, Fichter, Lüdeke-Freund, and Tiemann, 2018). Not only the initiating business, but also external stakeholders may be forced to structurally change their business model (Boldrini and Antheaume, 2021; Velter et al., 2020). This necessitates a collaborative, multi-stakeholder business modelling process to structurally align normative, strategic and instrumental dimensions of the various stakeholders. For example, alignment is required on organizations' understanding and prioritization of the envisioned value creation, and with regard to the activities, competences, resources between interdependent stakeholders (Breuer and Lüdeke-Freund, 2017; Velter et al., 2020). This multi-stakeholder process for SBMI poses significant challenges for the engaged business(es), as the process is full of tensions and clashes with existing business model configurations which should somehow be dealt with (Bocken et al., 2019; Gorissen, Vrancken, and Manshoven, 2016; Meijer, Schipper, and Huijben, 2019; Sarasini and Linder, 2017). As a result, businesses often seek to collaborate with well-known business partners to reduce complexity, which, however, constrains the potential value creation and radical forms of innovation (Bocken and Ritala, 2021; Brown, Bocken, and Balkenende, 2020). Studies have identified the failure of successful stakeholder collaboration as an important barrier to SBMI (Geissdoerfer et al., 2018). Ultimately, this contributes to the dearth of theoretical and empirical examples of successful, collaborative SBMI processes (Pedersen et al., 2021; Pieroni et al., 2019). There is thus a need to improve our understanding of components and processes of stakeholder alignment for SBMI.

SBMI as a process of reconfiguring organizational boundaries

Organizational boundaries denote who or what is inside, and who or what is outside the organization (Dumez and Jeunemaître, 2010; Gieryn, 1983; Santos and Eisenhardt, 2005). Boundaries have been dominantly studied in social sciences, where they are symbolic distinctions which actors "agree upon and use to define reality" (Dumez and Jeunemaître, 2010, p. 153; Lamont and Molnar, 2002). In management theory, organizational boundaries are often studied in the context of make-or-buy decisions and alliances, merges and acquisitions (Araujo, Dubois, and Gadde, 2003; Poppo and Zenger, 1998). In innovation management specifically, organizational boundaries are the intersections where knowledge is shared and crossed, (e.g. Brown and Duguid, 2001; Miller, Fern, and Cardinal, 2007) and value exchanges take place (e.g. Brehmer, Podoynitsyna, and Langerak, 2018; Keränen, Salonen, and Terho, 2020). Santos and Eisenhardt (2005) offer a comprehensive conception of organizational boundaries by distinguishing organizational boundaries of identity, power, competence and efficiency. These boundary conceptions address alignment on normative, strategic and instrumental levels as needed for SBMI (Breuer and Lüdeke-Freund, 2017; Stubbs and Cocklin, 2008; Velter et al., 2020).

The *boundary of identity* concerns the mind-set and culture of the organization. It emerges from organizational members' work values, attitudes, behaviors and actions, and is typically formalized in the mission, vision and expressed values of an organization (Mdletye, Coetzee, and Ukpere, 2014; Santos and Eisenhardt, 2005). Boundary setting on identity deals with issues of coherence between the organizational identity, its business model strategy and the activities it conducts (Bojovic, Sabatier, and Coblence, 2019; Mdletye et al., 2014; Santos and

Eisenhardt, 2005). The boundary of identity can develop 'grounded' through experimentation with novel activities and business models, but also through 'releasing', where the boundary of identity sets the scope for strategic and instrumental decisions (Berends, Smits, Reymen, and Podoynitsyna, 2016; Bojovic et al., 2019; Breuer and Lüdeke-Freund, 2017). In SBMI, the boundary of identity should be based on sustainable value creation and multi-stakeholder responsiveness (Breuer et al., 2018; Geissdoerfer et al., 2018). An organizational identity which is set on a narrow perception of value and stakeholders leads to a constrained framing of the problem and its subsequent strategic opportunities, which may result in shifting negative externalities to other stakeholders in the value chain or the societal context (Diepenmaat, Kemp, and Velter, 2020). This coherence between a boundary of identity set for SBMI with its strategic and instrumental practices potentially avoids issues as 'green washing' (Delmas and Burbano, 2011; Tinne, 2013).

The *boundary of power* deals with issues of autonomy and is set at the point where the organization can maximize strategic control over its crucial stakeholders. SBMI typically requires a focus on network performance instead of power accumulation of individual organizations and sharing or retaining ownership of materials to enable service-based business models (Curtis and Mont, 2020; Yang and Evans, 2019). This might result in the need to constrain the influence of one organization towards empowering other organizations that are crucial to the sustainability of the innovation (Avelino and Wittmayer, 2016; Bolton and Landells, 2015; Köhler, Geels, Kern, Markard, Onsongo, Wieczorek, Alkemade, Avelino, Bergek, Boons, Fünfschilling, Hess, Holtz, Hyysalo, Jenkins, Kivimaa, Martiskainen, McMeekin, Mühlemeier, Nykvist, Pel, Raven, Rohracher, Sandén, Schot, Sovacool, Turnheim, Welch, and Wells, 2019).
The *boundary of competence* deals with the optimizing an organizations resource portfolio vis-à-vis market opportunities. Resources consist of intangible knowledge, skills and network relationships, but also of tangible materials and machinery that can be possessed or deployed by an organization (Barney, Wright, and Ketchen, 2001). The boundary of competence can be managed through dynamic capabilities, defined as the ability to "integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Eisenhardt and Martin, 2000; Teece, Pisano, and Shuen, 1997, p. 516). SBMI requires deployment of resources such as sustainable product design (Bocken, de Pauw, Bakker, and van der Grinten, 2016; Whalen and Peck, 2014), cross-sectoral collaboration (Luzzini, Brandon-Jones, Brandon-Jones, and Spina, 2015; Patala, Albareda, and Halme, 2018), remanufacturing and repair skills and facilities (Jensen, Prendeville, Bocken, and Peck, 2019; Lüdeke-Freund, Gold, and Bocken, 2018), the installation of take-back systems (Bocken et al., 2014; Ranta, Aarikka-Stenroos, and Mäkinen, 2018) and the ability to measure environmental and social performance (Bradley, Parry, and O'Regan, 2020; Luzzini et al., 2015). SBMI studies point at the need to strengthen dynamic capabilities as a way to integrate societal and environmental opportunities into processes of SBMI (Antikainen and Bocken, 2019; Bocken and Geradts, 2020; Inigo, Albareda, and Ritala, 2017).

Finally, the *boundary of efficiency* deals with the distribution of activities in the value network as a means to create, deliver and capture value (Tykkyläinen and Ritala, 2020; Zott and Amit, 2010). Choices of efficiency are typically in 'make or buy decisions', in the extent to which the value of an offering can be measured, and in differences in knowledge that create coordination costs despite best intentions of the different actors (Nickerson and Silverman, 2002; Poppo and Zenger, 1998; Santos and Eisenhardt, 2005; Williamson, 1975, 1981). While SBMI does not take a stance on where efficiency boundaries ought to be set by individual organizations, it does require the adoption and alignment of novel activities such as reversed logistics, repair and remanufacture, and the tracing of materials in the value network (Bocken et al., 2014; Brown, Bocken, and Balkenende, 2019; Evans, Vladimirova, Holgado, and Yang, 2017).

Empirical examples of SBMI have shown that organizational boundary alignment leverages or impedes value creation (Velter et al., 2020). SBMI thus requires actors to engage in processes to de-stabilize and re-stabilize organizational boundaries (Depeyre and Dumez, 2009), but organizational boundaries are

ambiguous, hard to specify, and subject to change as a result of interaction of the firm with its external environment (Abbott, 1995). In addition, organizational boundary change is accompanied by high uncertainties about the potential captured value, and conflicts with existing configurations of assets, processes and activities (Amit and Zott, 2012; Chesbrough, 2010; Linder and Williander, 2015). This complicates organizational boundary alignment between stakeholders (Bocken et al., 2019; Schaltegger, Lüdeke-Freund, and Hansen, 2012; Velter et al., 2020). When aiming for multi-stakeholder engagement, this complexity enhances synchronically (Powell et al., 2018). We therefore expect that boundary work in SBMI helps to investigate and address the challenges for stakeholder alignment (Table 1).

Boundary work for SBMI

Boundary work approaches SBMI as a highly iterative and continuous process full of tensions among stakeholders rather than a linear, consensus model of collaboration (Hargrave and Ven, 2009). Destabilizing and re-stabilizing strategies occur intertwined as some actors challenge existing boundaries while others defend existing boundaries (Depeyre and Dumez, 2009; Dumez and Jeunemaître, 2010). Previous research has identified boundary work as an analytical lens to understand processes of organizational boundary reconfigurations in pursuit of SBMI, and has specified three iterative phases (Velter et al., 2020; Aka, 2019):

1. *Exploring boundaries and boundary changes*. This phase includes the first activities an organization undertakes in response to a triggering event or problem (Roome and Louche, 2016). In this phase, the organization attempts to define the problem(s) at hand, and explores potential opportunities to respond to this problem. This includes initial stakeholder engagement. Rather than searching for the solutions closest at hand, the challenge lies in creating ambitions for fundamental and systemic change in both the boundaries of the organization and its external stakeholders based on novel conceptions of value creation (Bresman and Zellmer-Bruhn, 2013; Evans, Fernando, and Yang, 2017; Roome and Louche, 2016). Such a process draws on experiences from within as well as from outside the organization (Roome and Louche, 2016).
2. *Brokering boundaries*. This phase is about negotiating and reconciling critical boundaries through the creation of incentives for critical stakeholders. Boundary brokering can adjust the understanding of the innovation, such as rhetorical closure, use and functionality adjustments (Bijker et al., 2012), but it can also comprise a shared effort to strengthen the value proposition for critical stakeholders. Brokering activities can be conducted by companies themselves, but often this is done by intermediary actors (Aspeteg and Bergek, 2019).
3. *Implementing boundary changes*. This phase involves the agreement on, experimentation with and embedding of boundary reconfigurations (Velter et al, 2020). Formal and informal agreement might lead to the formulation of experiments, an innovation strategy that is increasingly adopted in SBMI (Baldassarre, Konietzko, Brown, Calabretta, Bocken, Karpen, and Hultink, 2020; Bocken and Antikainen, 2019). Experimentation might lead to the actual implementation of boundary changes in SBMI; for example, by adopting a novel organizational purpose, contracting with external partners, developing novel competences, and implementing novel actions and material flows (Roome and Louche, 2016; Salvador, Barros, Mendes da Luz, Piekarski, and Carlos de Francisco, 2019).

Boundary work can be conducted by individuals or organizations that take an active role in reaching out to stakeholders and help attain a common understanding of specific problems or solutions as a basis for boundary reconfigurations. These individuals or organizations can be seen as 'boundary spanners' who often use 'boundary objects' (Fleming and Waguespack, 2007; Lee, 2007). Boundary objects are working arrangements that facilitate (inter-)action, reflection, tailoring and 'backstage work' as a means for collaboration, knowledge production and creative congruence across multiple stakeholders (Benn and Rusinko, 2013; Carlile, 2002; Leigh Star, 2010; Parker and Crona, 2012). Boundary objects do not necessarily have a material character – they can also be concepts

Table 1.

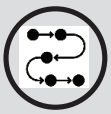
		ORGANIZATIONAL BOUNDARY THEORY			SUSTAINABLE BUSINESS MODEL INNOVATION		
		Demarcation of	Boundary setting	Organizational issue	Typical reconfigurations in SBMI	Typical tensions for reconfiguration in SBMI	Boundary indicators defined for this study
	Boundary of Identity	The dominant mind-set of "who we are"	At the point that maintains coherence with organizational activities	Coherence: conscious versus unconscious	Based on sustainable value creation, for-profit to inclusion for-benefit	Existing business logics, diverging value frames, mind-sets, cultural differences	Values, vision, mission, purpose, mind-set
	Boundary of Power	Sphere of influence of the organization	At the point that maximizes strategic control over crucial relationships	Autonomy: ownership versus control	(Re)alignment in network context, empowerment of particular actors	Compromising current power division, competitiveness	(Access to) resources, external relationships, material ownership and contracting
	Boundary of Competence	Resources possessed by the organization	At the point that maximizes the value of the organization's resources	Growth: possession versus deployment	Development of novel competencies and external relations	Lack of capabilities, financial trade-offs, lengthy experimentation, technology innovation	Capabilities (e.g. patching, product development), machinery, network relationships, roles
	Boundary of Efficiency	Activity distribution for efficiency	At the point that minimizes the governing cost of activities	Costs: market versus hierarchy	Adoption of novel processes and activities	Division of material interests, resource division, information flows and transaction- and coordination costs	Processes, activities, information flows

Table 1: Interlinkage between organizational boundary theory and sustainable business model innovation. Based on Berger et al. (2004); Bocken & Geradts,(2020); Breuer et al. (2018); Breuer and Lüdeke-Freund (2017); Evans et al. (2017); Geissdoerfer et al. (2018); Gieryn (1983); Hörisch et al. (2014); Powell et al. (2018); Santos and Eisenhardt (2005)

(ill-structured or well-structured) depending on the required knowledge production. Well-structured objects shape knowledge production according to the elements of the object, such as quality standards, whilst ill-structured objects invite users to contribute to the knowledge production in a more open way. Whether or not a phenomenon functions as a boundary object depends on its scope and scale of analysis. A boundary object comprises a certain functionality for guided action on a certain level (e.g., organizational), but could also spark controversies (Aka, 2009; Stark, 2010).

Research gap

SBMI faces the challenge of exploring, brokering and re-aligning organizational boundaries of different stakeholders. However, the processes through which businesses navigate such boundary work for SBMI remains little explored. We address this gap by providing an empirical, detailed description of the boundary work processes for SBMI as a basis for further theoretical and practical work.

Methods

Approach

The aim of this study is to further the theoretical understanding on boundary work processes for SBMI through a rich description of a qualitative case study (Eisenhardt, 1989; Geertz, 1973; Stake, 1995). We analyze the actions and perceptions of a Dutch small-sized enterprise (SME) engaging in SBMI over a timespan of two years. Following phenomenological inquiry, we explore and describe the activities of boundary exploration, brokering and change in multi-stakeholder collaboration for SBMI. We observed the unfolding of the innovation process while its outcomes were still unknown at the time of research. This approach avoids post hoc rationalization through a rich description based on the stories of the stakeholders involved, offering a more detailed understanding of the activities and influences of boundary work for SBMI (Geertz, 1973; Ven and Poole, 1990).

Data collection

Nijsen/Granico – a Dutch SME in the pork sector – was chosen as our case study because the company's innovation is dependent on a collaborative reconfiguration of stakeholders in its value network. Despite many organized attempts to reconcile stakeholders in the past, the Dutch pork sector is still highly fragmented and under great legal, economic and public pressure to move towards sustainable practices. This led Nijsen/Granico to conduct boundary work with different stakeholders. Due to this particular character, a single case study design is considered appropriate (Yin, 2013).

We attended and recorded meetings and strategic sessions between the company and its stakeholders, and we interviewed the stakeholders involved in the innovation process to collect data (Table 2). We also drew on personal correspondences shared with us, internal documents concerning the company and its sector, web sites, annual reports and other publicly available reports. The interviews were semi-structured and aimed to elicit the participants' perspectives on the business model, the required boundary shifts and the collaboration process, including topics of negotiations, and whether and how they found some kind of common ground. We used these a priori concepts (of business model innovation, boundary work, boundary objects and organizational boundaries) to write discovery memos, and included 'in vivo' codes of related quotes and terms used by the participants to enhance and detail their grounding (Corbin and Strauss, 2013; Creswell, 1998). We subsequently applied axial coding to categorize the codes into subcategories of theory-related concepts, for example, the idea of 'boundary challengers' (Corbin and Strauss, 2013; Creswell, 1998; Glaser and Strauss, 1967).

Data analysis

Following Ven and Poole (1990), we started with developing track codes as sensitizing codes based on the literature. As this study aims to deepen our understanding of the manifestation of the track codes in the process of SBMI, we empirically derived indicators of the three different boundary work phases using inductive coding (Table 3). The manifestations of these indicators are called 'incidents' and functioned as coding elements for the phases.

Per phase we discerned topics relating to the boundary work activities. We subsequently coded

Table 2.

Data sources		Amount	Length	Collection method and data preparation	Data analysis
Semi-structured interviews:				Recorded and transcribed	Discovery memos, coding exercises
NG1	*Nijsen/Granico – General Director*	*1*	*75 min*	*Face to face 19-05-2017*	
NG2a NG2b	*Nijsen/Granico – Business Development Manager*	*2*	*110 min*	*Face to face 6-5-2019 Face to face 20-9-2019*	
MPM	*Municipality Peel & Maas – Policymaker Strategy & Development*	*1*	*61 min*	*Face to face 3-5-2018*	
NGO	*NGO Nature & Environment – Project employee*	*1*	*45 min*	*Phone 3-5-2018*	
KI	*Kipster – General director*	*1*	*60 min*	*Face to face 19-05-2017*	
Bilateral meetings, including multi-actor modelling sessions		4	550 min	Recording, field notes, participatory observation	Multi-actor model, discovery memos, coding exercises
Multi-lateral project meetings		3	300 min	Recordings, field notes, observation	Discovery memos, coding exercises
Phone calls		9	165 min	Notes	Discovery memos, coding exercises
E-mail correspondences		20	n.a.	Notes	Discovery memos, coding exercises
Case study reports		14	n.a.	Notes	Discovery memos, coding exercises
Partner websites		12	n.a.	Notes	Discovery memos

Table 2: Overview of empirical data-collection and analysis

Table 3.		
Exploring boundaries and boundary reconfigurations	**Brokering boundaries**	**Implementing boundary changes**
inventing, conversing, discovering, investigating, drawing, exploring, sketching,	creation of choices, discussion, distribution, setting priorities, confronting, proposing	agreeing on, experimenting with, determining, changing, shifting, embedding

Table 3: Phases and examples of their indicators

and classified the data descriptively as incidents, e.g. 'inventing' and its elements of information, e.g. 'value creation'. Afterwards, we interpreted the data according to its theoretical event from boundary work, e.g., 'future boundary setting', its organizational boundary, e.g., 'power', and its business model elements, e.g. 'value creation and delivery'. This led to a 'qualitative datum', i.e., a string of words capturing the basic information about an occurrence and integrated these as a unique record into the data file. All data strings have related quotes, such as "We are in a process of collaboratively inventing the highest possible creation of value". In the next step, we integrated the inductive qualitative datum into the different phases to be able to find patterns of incidents. Finally, we returned to the track codes framework and redesigned the framework according to the findings of the data. As a result, we did not just include the manifesting organizational boundaries, but also integrated the drivers and tensions for boundary reconfigurations from within the organization, between organizations and from wider contextual factors such as consumer demands as perceived by the case study companies. To enhance the rigor of the study, we returned the description of the paper to the participants of the case study. This helped to empirically assess whether our classifications and constructed meaning corresponded to the focal case study's perceptions of the process.

Case study: SME-driven SBMI in the Dutch pork sector

The Dutch pork sector produces over 1.38 million tons of meat annually, of which 60% are exported (Berger, 2016). This makes it the fourth biggest livestock producer in the European Union. The pork sector is

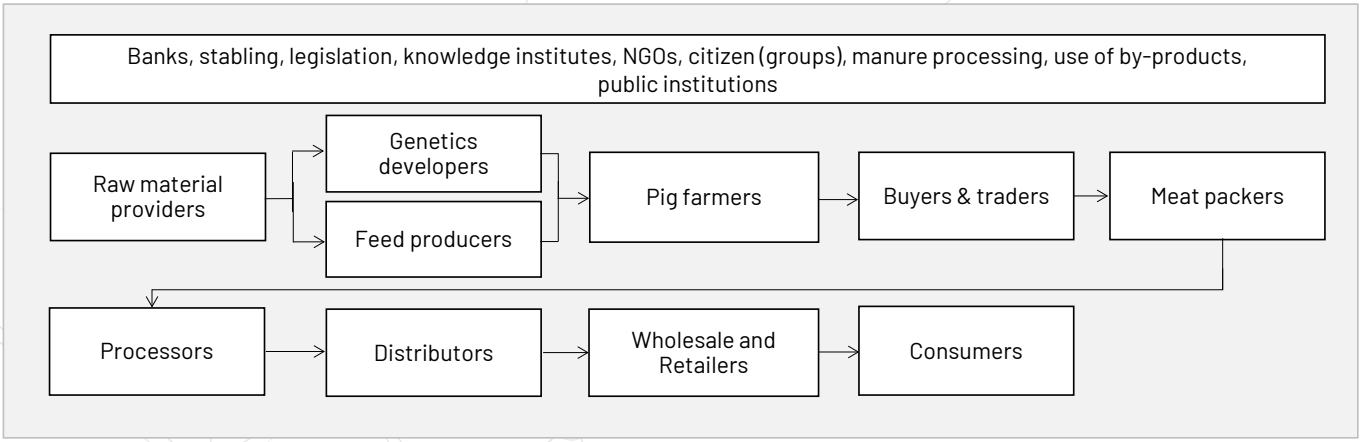


Figure 1: Configuration of the Dutch pork sector

organized as follows: suppliers of raw materials (e.g., soy scrap, cereals, wheat middling, rape seed meal, and additives such as vitamins and minerals) deliver to pig feed producers such as Nijsen/Granico, who sell the produced pig feed to pig farmers. The farmers sell their pigs for processing and distribution to wholesale and retail businesses (the latter are often governed by (conglomerates of) supermarkets, such as SuperUnie in the Netherlands). Surrounding this chain there are several NGOs, public institutions, banks and knowledge institutes (Figure 1).

The pork sector is known for its efficiency, but the associated economic gains come with downsides and the sector faces major challenges in maintaining its 'license to produce'. The main pressures are an increasing human demand for food and protein, standards for food safety, public demand for animal welfare, sustainable production, a circular bioeconomy and less pollution of water sources, soil, and air, as well as land use competition between humans and animals (Nijsen/Granico, 2017). As a result, calls for transformation are mounting. However, large sector stakeholders in particular, such as supermarkets and meat processors, have been rather unresponsive and have attempted to keep prices low while posing higher demands on pig farmers and feeding companies.

Nijsen/Granico is a regional SME which collects residual products (from bakeries, food production factories, and primary sources such as cereals and co-products from the food and biofuel industry) to produce pig feed, which they then sell pig farmers. Annually, Nijsen/Granico brings over 100,000 tons of residual products back into the food cycle (Nijsen/Granico, 2019). This strategy has recently gained attention as a means for improving the sustainability and 'license to produce' of the pork sector. At the same time, residual products are increasingly popular for biomass, and Nijsen/Granico's customers - the pig farmers - are facing increased public and legislative pressure on animal welfare, environmental restrictions, food safety, and intense pricing competition from retailers. It is within this context that Nijsen/Granico realized that further scale-up of production and efficiency was insufficient to provide a long-term outlook for the pork sector, and that there was a dire need for novel approaches to pork production.

A direction for this novel approach emerged in 2014, when a sustainable poultry company called 'Kipster' approached Nijsen/Granico with the request to produce 'circular' chicken feed. Nijsen/Granico had not made chicken feed for over thirty years, and they wondered why Kipster approached specifically them. Kipster answered that that they could only imagine Nijsen/Granico as a potential partner to deliver sustainable feed, as Nijsen/Granico collects residual waste. This brought Nijsen/Granico to the idea to for a similar business model in the pork sector, which they called 'Food for Feed for Food' (FFF). In this model, the firm aimed to collect residual products from retailers, process this to pig feed for Nijsen/Granico's customers, from which the meat would be sold in the same retail stores that delivered the residual products. As a small actor in a large value chain, Nijsen/Granico has realized that they are dependent on external stakeholders to co-create FFF, making it necessary for them to engage in collaboration in the early stages of the innovation.

Results

This section describes and elaborates on the boundary work processes by which Nijsen/Granico's FFF business model was innovated over six years (2014-2020). The boundary work processes were characterized by phases of exploration, brokering and implementation, based on indicators from Table 3. For each phase, we describe the dominating boundary work processes, organizational boundary changes and the boundary spanners and objects used in interactions between Nijsen/Granico and their external stakeholders. The different phases were not fully sequential, as some implementation and brokering activities interacted with exploration activities and vice versa. We therefore included a visualized timeline of the full SBMI process in Appendix B and synthesized the boundary work processes in Figure 2.

Exploration phase

Boundary work processes

Nijsen/Granico's trajectory for a circular pork model began with an emphasis on exploration. Together with Kipster, Nijsen/Granico's managing director and business development manager started with

Boundary work processes in the Nijsen/Granico case

Exploration phase	Brokering phase	Implementation phase
Exploring stakeholders, reconfigurations and tensions	Negotiating reconfigurations	Agreeing on reconfigurations
Exploring value propositions and potential partnerships	Negotiating value propositions	Experimentation with new reconfigurations
Setting-up first partnerships	Setting-up critical partnerships	Embedding reconfigurations

an initial value proposition idea from which they sketched their current multi-stakeholder network, changes required and points of tension that could help or impede the idea. On the one hand, pressure on the pork sector was high and NGOs were campaigning against the scale and ways of pork production. On the other hand, the pork sector was characterized by price-focused actors, such as retailers and processors. *"The meat price is a very sensitive item in the sector, and also an important element for retailers. If Aldi changes the meat price, Lidl will follow within 4 hours." (NG2b).* Simultaneously, Nijsen/Granico expected others to be searching for added value to strengthen their position. Particularly pig farmers were producing a non-distinguishable product in a global, competitive market, leading to thin margins and uncertainty about the selling price of pigs. Nijsen/Granico envisioned a novel role for their farmers: *"Our customer used to be the pig farmer. We just sold pig feed to the pig farmer, who made pork out of it, which goes to the meat processor. Now, the retailer, the consumer is my customer, and my current customer becomes my customer-oriented partner" (NG1).* With this as a basis, Nijsen/Granico's managing director started to think about potential value propositions for the different stakeholders. *"I offer a solution to a retailer's problem. The retailer wants to be circular, he feels the heat of NGOs, that is my interpretation for the moment, he is tired of those advertisements of cut-price meat and the lame pig. Well, I can solve that problem, and I can do it circular. [...] I can tell the retailer, if you supply certain raw materials, then I can ensure that they are made into Feed, which in turn comes to you as Food. Then, we have a circular food concept" (NG1).* Initial success in finding value propositions spurred further conversations with their external stakeholders: *"Through conversations, we increasingly discover the design of the value chain, which seems to be more rigid than we thought it was, and should be" (NG2b).* Nijsen/Granico realized they were not in the position to align all stakeholders by themselves, and that they needed to explore potential partnerships to develop FFF. Such network building activities were new to them, so they asked Kipster for assistance.

The identification of potential partners was a search process. Nijsen/Granico scanned many actors on their position in the value chain and their ambitions for sustainability: *"It is very important to investigate the position of actors in the chain. Who is really interchangeable? Who shows some sort of ambition for sustainability?" (NG2b).* Around that time, a business partner introduced Nijsen/Granico to SuperUnie, a large-scale purchasing conglomeration for retail in the Netherlands. Nijsen/Granico tried to convince SuperUnie to join the collaboration. While SuperUnie supported the idea, they wanted Nijsen/Granico to organize the process. As Nijsen/Granico had hoped and expected that SuperUnie would use its powerful position in the market to align other stakeholders, they were disappointed by the rather passive support that they received: *"That [the value] was seen by SuperUnie, but the reproach I have for retail is*

that eventually, they don't take any responsibility. SuperUnie said 'fine, just take care of it'. But I told him, 'you should take responsibility because you must use your position in the market to steer the processor, you determine the positioning, the price and the appearance of the product. That is your responsibility, you cannot put that on us' (NG1). As a result, Nijsen/Granico searched for alternative stakeholders to engage with.

This is where we see Nijsen/Granico contacting stakeholders with less prominent economic interests. Nijsen/Granico reached out to the regional municipality and an environmental NGO. They envisioned that the NGO would function as an intermediary towards retailers, which the NGO was willing to do. At the same time, Nijsen/Granico learned that the municipality had experienced pressures from its citizens to help the local pork sector as they faced severe continuation problems. They found that every farmer discussed sustainability in isolation based on their individual interests (e.g., on improving specific aspects of animal welfare such as tail cutting). This made them realize that the sector required structural rearrangements in which the municipality played a crucial role. The municipality stated that FFF would enable them to achieve their ambition for a sustainable pork sector in their region in a way that creates a sense of ownership of market actors towards sustainability.

After these conversations, Nijsen/Granico set up initial partnerships with these stakeholders. They established a project group with the environmental NGO, the municipality and Kipster, in which research, development, as well as involvement of a retailer (which is not yet involved at this stage) was planned. The project team established a WhatsApp chat group for small updates regarding new insights, connections, meetings etc. The boundary work processes in the exploration phase thus developed from internal explorations towards joint explorations with external stakeholders.

Organizational boundaries

During the boundary work processes, we have seen Nijsen/Granico touching upon changes in their own organizational boundaries. On the boundaries of identity and power, Nijsen/Granico wants to change their role from 'feed producer' to a strategic partner for sustainable feed concepts. *"We want to sell good behavior in the pig meat sector to the retailer, while strengthening our supply and demand network" (BG2b)*. When Nijsen/Granico started to engage in network building and partnerships, they were conducting novel activities on the efficiency boundary while developing their competences to sell added value in a new, sustainability-minded stakeholder network (Figure 3).

When Nijsen/Granico engaged in external boundary work to initiate partnerships, we have seen that boundary issues became more prominent and visible. The emerging boundary work issues were particularly focused on the boundaries of power and the distribution of roles and activities between the external partners. When potential partners refused to utilize or change their boundaries – as was the case with SuperUnie – Nijsen/Granico discontinued the cooperation.

Boundary spanners and objects

Initial boundary work processes took place internally in Nijsen/Granico through conversations and actor modelling activities, where they physically drew the multi-actor field on an A3 sheet. When reaching out to external stakeholders, Nijsen/Granico's managing director and business development manager acted as the main boundary spanners, assisted by Kipster. Nijsen/Granico's business development manager pointed out that non-verbal communication was very important to discover the true perspectives of external stakeholders; *"I refuse to speak by phone, I want to be able to see non-verbal communication, I want to see how others react" (NG2b).* At this stage, ill-structured language was used in external communication with stakeholders, such as, 'circular pig', 'banquet pig', 'circular food concept', and 'back door, front door'. The importance of using 'circular pig' was mentioned explicitly in the project meeting with the municipality and the NGO.

Brokering phase

Boundary work processes

With a project team in place, the team members started to discuss the ambitions of FFF and the

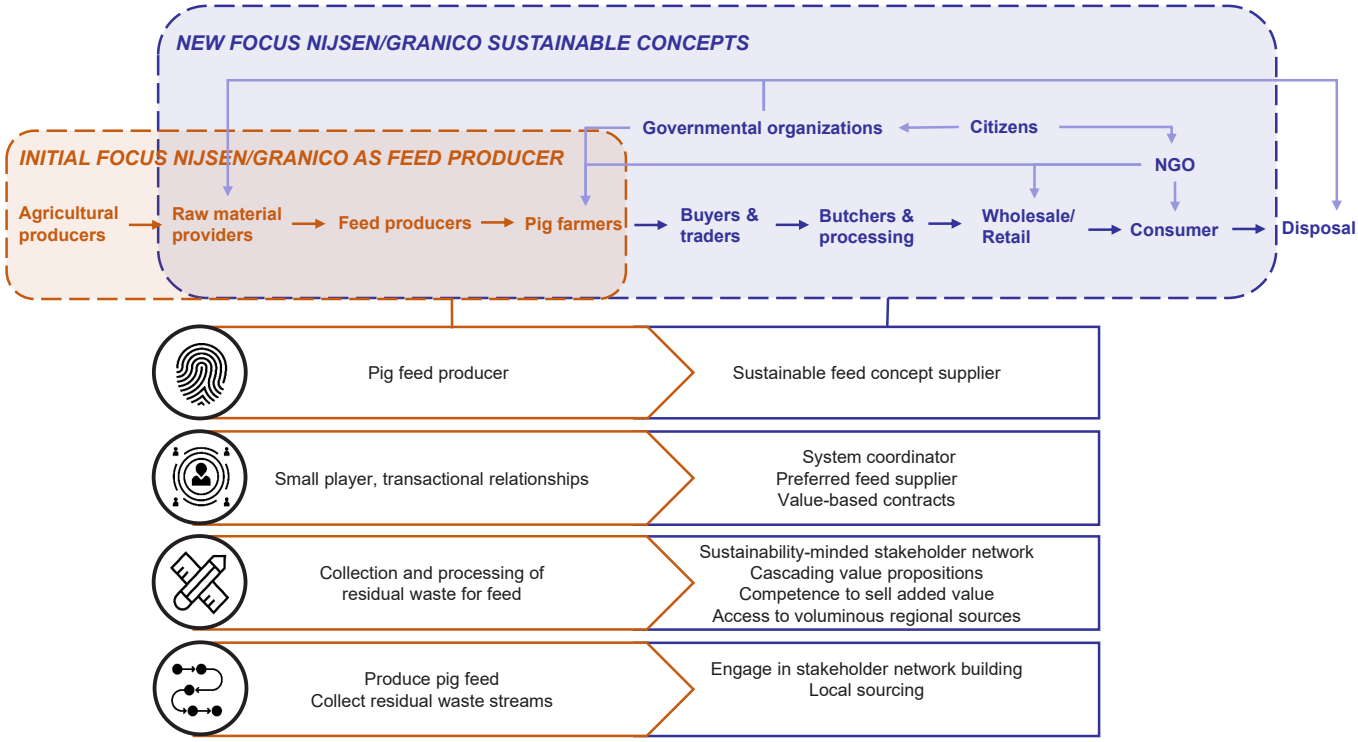


Figure 3: Organizational boundary changes of Nijsen/Granico

implications for the different stakeholders. The team members agreed that ultimately, FFF should aim to eliminate the 'feed-food competition' as regards to be able to feed the world's population in 2050. They expressed the need for research to avoid making sustainability claims that were not (fully) true, for which they decided to involve a Dutch university. The discussion continued towards the question of how the pork sector could look like once sustainable meat was the standard. They reasoned that, due to the available waste-feed resources, the meat sector would have to shrink by forcing the consumer to eat less meat or pay a higher price. They discussed that this would be a task for retail, which would have to establish long-term contracts with a fixed price based on the added value of FFF and supply their waste materials to Nijsen/Granico. In return, they stated that FFF enabled the retailer to offer their consumers good behavior in the production of pork, including transparency about animal welfare and environmental benefits. This would mean that the retailer could improve its image, get rid of NGO campaigns, and offer a distinguishable product at a higher price. The project partners found that the NGO would have to play a major role through certification and promotion of FFF. The NGO had preferred to eliminate meat production altogether, but realized that they had to compromise on their ambitions to a level that was acceptable for the other partners. As such, they demanded local sourcing from Nijsen/Granico, and significant environmental and welfare improvements from the farmers: *"It is possible that choices are being made, which could us say - well guys, if we do it this way, we will no longer be able to attach our name to it" (NGO).* Upon discussion, the partners decided to aim for a one-star ranking (out of three stars) on a Dutch animal welfare certification scheme, within a sourcing radius of 30 km around participating farms.

The discussion on the consequences of FFF also revealed major complications for farmers. The municipality expressed that *"The project will not deliver a sustainable future for all pig farmers. Perhaps for some" (MPM).* Nijsen/Granico explicitly accepted this consequence and was aware that these actors could try to oppose the situation. They had seen this happening before when farmers boycotted Kipster suppliers after Kipster had published a column in which they pleaded for largely abolishing livestock farming in the Netherlands due to its animal-unfriendly way of farming and its negative impacts on the natural environment. While the partners agreed on many

aspects, such as that the priority should be on empowering farmers through increased margins on their selling price, there was discussion about the involvement of farmers. The NGO stated that they aimed to collaborate only with farmers who were willing to improve their environmental performance and animal welfare. Kipster proposed to involve farmers only once the project partners had established a contract with a retailer so they would be in a better position to align these farmers, stating: *"If you aim for an inhibiting factor, you should ask a farmer to join the table" (KI).* They decided that as first steps, Kipster and the NGO would reach out to their retailer network to discuss potential partnerships. The partners also drafted a project proposal on FFF as means of communication to internal and external stakeholders.

Via Kipster, Nijsen/Granico learned that Van Loon, a meatpacker, was the only pork supplier for Lidl, a large-scale retail discounter. They pitched the FFF model to Van Loon. Although Van Loon's managing director told Nijsen/Granico that sustainable pig feed was an interesting story, he saw several barriers; Nijsen/Granico was a (very) small player in the sector; not a single Nijsen/Granico customer supplied pigs to Van Loon; and it would be difficult to 'force' pig farmers to purchase Nijsen/Granico feed. Also, Van Loon's director said: *"I would like to join, but I do not have any money".* Still, they became involved over a longer period of time, in a corrugated process. Van Loon arranged that Nijsen/Granico could present the FFF idea to Lidl, under the condition that Nijsen/Granico would not mention specific numbers and costs. However, Nijsen/Granico was convinced that specific numbers on economic and non-economic parameters would help to convey the value proposition. Hence, Nijsen/Granico presented to Lidl: *"Imagine if 520.000 pigs are being fed with circular Nijsen/Granico feed, this saves 20.000 soccer fields of agricultural land, prevents carbon emissions of 7650 cars, and saves as much energy as could be generated with about 752.000 solar panels, which equals 71.000 households"* (NG2b). Nijsen/Granico indicated that this was all possible for a small increase in the price of the meat, so that feed producers and farmers would receive a better margin to improve their sustainability. *"That was the straw that broke the camel's back for Van Loon, who found Nijsen/Granico untrustworthy, stepping out of line, and stated 'know your position'!"* (NG2b). After this confrontation, it remained silent for a while.

Several months later, Van Loon returned to Nijsen/Granico with the question: *"Can you provide circular feed for the same costs?"* (NG2b). Nijsen/Granico responded to that they could, Nijsen/Granico, Kipster and Van Loon jointly developed a (second) presentation to Lidl. When Van Loon saw the draft, he became angry as Nijsen/Granico had again included slightly higher prices for fully circular feed. Nijsen/Granico had found an inventive way to deal with this by reframing the proposal into cascading value propositions, providing the retailer choices on the degree of sustainability and related costs: *"For the same costs, you can get a part of the feed circular. For more investment, we can increase the circularity. By presenting it this way, the choice lies with the retailer"(NG2b).* During the presentation to the retailer, Nijsen/Granico mentioned *"We want the entire value chain to benefit, and that has the consequence of an X amount of costs per pig" (NG2b).* Afterwards, Van Loon indicated that Nijsen/Granico's model could help Van Loon to become "preferred supplier" of feed and to date, Van Loon is in further discussion about the possibilities of FFF within Lidl.

Organizational boundaries

The boundary work processes in the brokering phase elicited boundary issues that were previously unexplored. We have seen that the organizational boundaries of the project partners were partly aligned for the model; for example, by utilizing existing networks, knowledge about environmental issues, and certification skills within the competence boundary of the NGO. This made the brokering phase relatively uncomplicated with only a few issues to be negotiated, such as the NGO who was defending the credibility of the model to maintain their identity. The partners also identified the needed changes in the organizational boundaries of their external stakeholders. For instance, they identified a needed shift in the boundary of power between the retailer and their suppliers, and a shift in farmers' activities on the boundary of efficiency (see Table 4 for a full overview). They subsequently developed a strategy

Table 3

		Needed boundary reconfigurations	Tensions for boundary reconfigurations (internal and external)	Drivers for boundary reconfigurations (internal and external)	Value propositions	Brokering on	Reconfiguration implemented?*
Farmers (not yet involved)		Sustainable farmer	Willingness to become sustainable			n.a.	n.a.
						n.a.	n.a.
		Strategic partner of Nijsen/Granico	Called for a boycott of Kipster and its suppliers	Current global market competition	Eliminate global competition Enable long-term value contract Receive increased margin	n.a.	n.a.
		Use Nijsen/Granico feed Improve stable sustainability and animal welfare Less farmers needed	Financial implications		Municipality funds improvements and alternative for dropouts	n.a.	n.a.
Van Loon		Rethink position in pork sector					yes
		Access to Lidl					yes
		Nijsen/Granico preferred supplier for Van Loon Van Loon in more powerful position to retailer	Current price-focus NG is a very small player Van Loon cannot 'force' their farmers to buy NG feed Van Loon determines pricing, not NG	Current price-focused contracts with retailer on non-distinguishable product, putting margins under pressure	Ability for value-based contracting with retail Remain preferred supplier for Lidl	Position, volumes, pricing	no
		Separate NG farmers from other suppliers	No NG farmers supply Van Loon Costs for separate handling		Possible use of block chain	Processes	no

Table 4: Identified needed organizational boundary reconfigurations, emerging tensions and drivers for reconfiguration and its potential value propositions in the multi-stakeholder network

Table 3

		Needed boundary reconfigurations	Tensions for boundary reconfigurations (internal and external)	Drivers for boundary reconfigurations (internal and external)	Value propositions	Brokering on	Reconfiguration implemented?*
Retail		Ambition to become more sustainable and circular			Enable a sustainable corporate positioning		yes
		Sell good behavior and offer transparency to the customer		Current NGO campaigns Customers demanding good behavior	Getting rid of NGO campaigns		no
		Value-focused contracting to empower value chain actors Adjust pricing to consumer & promote less meat consumption	Current price-focused contracting		Enable offering distinguishable product and concept to customers at increased pricing	Value propositions and contracting	no
		Supply certain raw materials			Eliminate certain raw material waste streams	Activity	yes
Municipality		A sustainable and diverse municipal organization	Avoid sustainability claims that cannot be made (fully) true	Current pressures on the regional pig sector	Enable addressing the current pressures on regional pig sector		yes
		Help farmers to adjust financially Provide novel outlook for farmers		Enable self-management of market actors			yes
							n.a.
		From individual, isolated talks to integrated approach					yes

Table 4: Identified needed organizational boundary reconfigurations, emerging tensions and drivers for reconfiguration and its potential value propositions in the multi-stakeholder network

Table 3

		Needed boundary reconfigurations	Tensions for boundary reconfigurations (internal and external)	Drivers for boundary reconfigurations (internal and external)	Value propositions	Brokering on	Reconfiguration implemented?*
NGO		Strengthen identity	Avoid sustainability claims that cannot be made (fully) true		Strengthen NGO's purpose	On value proposition	yes
		Organize certification Provide access to retail and consumers					yes
		Remain credible to external partners	Collaborate only with parties willing to align Demands on sourcing and sustainability		Sourcing as local as possible	On value proposition	yes
		Influence retail, consumer attitude and behaviour through certification and campaigns Conduct research					not yet yes
SuperUnie		Ambition for a more sustainable sector					yes
							
		Use powerful position to align partners				On power	no
							

* At the time of research (November, 2020)

Table 4: Identified needed organizational boundary reconfigurations, emerging tensions and drivers for reconfiguration and its potential value propositions in the multi-stakeholder network

to align these stakeholders, which was focused on the ability to shift the power of the retailer and subsequently, the competences of the farmers.

Stronger boundary issues were displayed in the brokering processes with meatpacker Van Loon. Van Loon mentioned barriers that were situated on their own organizational boundaries (the influence on their own farmers), and of Nijsen/Granico (their limited power position and supply network). We consider the conflict over the use of numbers to be positioned on the boundaries of power between Lidl, Van Loon and Nijsen/Granico, as these numbers would affect contracts and price agreements between these stakeholders. Nijsen/Granico addressed these boundary issues by coupling elements of power (the required monetary commitments) to elements of the identity (the responsiveness of retail to the added sustainability value). Interestingly, Van Loon became more engaged after understanding the consequences of this model for their own power boundary.

Boundary spanners and objects

In the brokering phase, Nijsen/Granico remained the main boundary spanner, although the project partners now also conducted boundary-spanning activities (e.g., reaching out to potential partners). The project proposal functioned as a semi-structured boundary object in which the project partners could attribute their perspectives to and distribute internally. They discussed frames of evaluation of the project in terms of values, ambitions and rating schemes, but addressed the costs and benefits only qualitatively. Between the project partners, ill-structured language was used as a means to guide communication and distinguish business model options, such as 'Pigster', 'Food for Feed for Food', 'Food, Feed, Future', 'new pig farming'. The representative from the municipality perceived the talks between the partners as open and informal: *"Because we entered this challenge together and didn't focus on the solution of a pre-defined problem, we created space for each other to create new values" (MPM).*

Nijsen/Granico tailored their language to the purpose of the negotiation, and comprised words representing a novel, collective paradigm, such as using 'the whole chain' rather than 'us', and 'both' and 'share'. In negotiations with Van Loon and Lidl, Nijsen/Granico favored concrete language and quantitative elements, whereas Van Loon preferred avoiding any talk of prices and costs. In the first presentation, Nijsen/Granico did not have a way to deal with these issues of power yet. In preparation of the second presentation, we observe Nijsen/Granico tailoring their language by coupling qualitative elements (perceptions, feelings, and ambitions) to quantitative elements (monetary investments, volumes). In these brokering activities, the language was much more concrete and closer to stakeholders' boundaries in terms of frames of evaluation (values, schemes, ratings, costs and benefits).

Implementing phase

Boundary work processes

After the period of predominantly negotiating activities, we observe Nijsen/Granico agreeing on, and testing aspects of the model, as well as embedding changes in their own organization. For example, despite the negotiations with the NGO on the region of sourcing, there appeared to be a tension in establishing a steady supply, and the NGO needed to compromise further on their ambitions: *"Nature and Environment is expanding their perspective [on a local circular cycle]. First they wanted to source 30km around the farm. Then it became the Netherlands. Now they say, as close as possible and as far as they need to" (NG2b).*

In addition, the presentations to Lidl triggered a series of experimentation. The director of Kipster explained to Lidl that the availability of residual flows was a limiting factor for the Kipster model, and that not all residual flows from Lidl's stores and suppliers were going to Nijsen/Granico. As a result, Lidl invited Nijsen/Granico to provide a list of their products which could function as input for feed, stating that they had to help Nijsen/Granico to make Kipster feed. This was previously out of scope for the retailer and considered to be Nijsen/Granico's problem, and Nijsen/Granico hoped that this would open avenues for the FFF model as well.

Nijsen/Granico also explained that they struggled with issues of legitimacy of their new role. The

general director of Nijsen/Granco expressed that *"Nijsen/Granico wants to change their role from 'feed producer' to a strategic partner for sustainable feed concepts. This is still a struggle, as we are often introduced as the feed supplier" (personal communication, 22-3-2018).* To address this issue, Nijsen/Granico named their new identity 'Nijsen Concepts' and embedded this in their mission and vision statement, logo, website, and other communications.

Organizational boundaries

In the implementing phase, we see Nijsen/Granico shifting their boundary of identity as a follow-up to their changing boundaries of efficiency and competences. Nijsen/Granico started to conduct network-building activities at the very start of FFF, which shifted their boundary of efficiency. After the exploring and brokering phases, a preliminary sustainability-minded network was set up, and experimentation with taking back the waste streams from Lidl further developed Nijsen/Granico's boundary of competence in terms of network relationships. These seeds ultimately resulted in a change of their boundary of identity, by redefining their purpose as a pig feed producer into a provider of sustainable, circular meat concepts. Nijsen/Granico had hoped that this would change their power position as well so that they would be able to become preferred supplier for value-based models.

Boundary spanners and objects

Nijsen/Granico functioned as the main boundary spanner in the implementing phase. As one of the earliest partners, Kipster played an important role in aligning Lidl too. Although the other partners were still involved in this phase, we did not observe boundary-spanning actions from their side at the time of the research. The project partners used more definite and well-structured versions to come to agreements and experimentations. For example, the project proposal developed earlier now contained the agreed upon vision and numbers of impact, Nijsen/Granico updated their website with their novel name, mission and vision, and the concrete list of resources created by Lidl and Nijsen/Granico served as means for experimentation.

Discussion

This study provides a detailed story of how a firm has engaged in boundary work to develop and negotiate new value propositions, and create a value creation and delivery system in a multi-stakeholder setting. By means of the study, we make four contributions to the literature on SBMI.

First, a boundary work lens clarifies the interaction process between an initiating firm and its external stakeholders needed for SBMI. In this way, it further develops emerging theory on boundary work for SBMI introduced by Velter et al. (2020) by detailing the processes through which a business navigates its boundary work for SBMI and by identifying typical boundary reconfigurations for SBMI. The boundary work lens is particularly important for the search for new value propositions and value capture mechanisms for all stakeholders involved. Our case shows that boundary alignment is required from the initiating firm and from external stakeholders, including non-business partners such as a local municipality and an environmental NGO. The breakdown into phases of exploring, brokering, implementing helps to better understand the process and reduces the complexities of boundary work for SBMI. Specifically, it helps to elicit less tangible aspects that affect stakeholder alignment, such as power issues (Avelino and Wittmayer, 2016; Eweje, Bolton, and Landells, 2015; Hawkins, Pye, and Correia, 2016), development of capabilities (Bocken and Geradts, 2020; Inigo et al., 2017; Luzzini et al., 2015), and changing values and identity (Bojovic et al., 2019; Breuer and Lüdeke-Freund, 2017). This assists in grasping the complexities, tensions and interdependencies in a multi-stakeholder system, which are known to be overwhelming (Oskam, Bossink, and de Man, 2020; Rohrbeck, Konnertz, and Knab, 2013).

Second, a boundary work lens helps to illuminate the required organizational boundary changes (e.g., changes in activities, competences, external relations and identity of an organization) as well revealing underlying issues of nonalignment. This may be particular important in sectors where unsustainable business models are highly institutionalized and

exacerbated by price pressures such as the food sector (Bocken and Short, 2021; Reinecke et al., 2019). Boundary work with partners is necessary to develop new propositions and break down unsustainable business models (Bocken and Short, 2021). For example, between Van Loon and Nijssen/Granico, the discussions first centered around price, but, becoming more aware of the ingrained problems and possibilities of SBMI Van Loon turned to helping Nijssen/Granico to become "preferred supplier" of feed. Boundary work might help companies to see the bigger picture of the change, and where they could (positively) be positioned in a future competitive landscape.

Third, and related to the above, reconfigurations on the *power* boundary proved crucial in the studied SBMI case, for which the initiating business engaged in cross-sectoral collaboration (Pedersen et al., 2021; Rohrbeck et al., 2013), identity work (Bojovic et al., 2019; Mdletye et al., 2014), and adapting boundary objects (Carlile, 2002; Hawkins et al., 2016) as strategic actions for reaching alignment. The boundary work perspective enables the development of strategies to deal with boundary issues. However, the results also suggest that the entrepreneur can only offer a piece of the solution and might need support from other actors to reach agreement on boundary alignment, such as intermediaries or institutional actors (Kivimaa, 2014; Kivimaa, Boon, Hyysalo, and Klerkx, 2019; Zietsma and Lawrence, 2010).

Fourth, for practice, the boundary framework can support businesses in developing the required strategies for boundary alignment. The case study showed how alignment was required across (a) different stakeholders and (b) across different types of organizational boundaries, which suggests the need for a holistic alignment approach when pursuing SBMI. It also reveals partners' position on sustainability and who needs to be involved the SBMI process. Space to create new values with value chain partners is necessary. Boundary objects can help to deal with uncertainties, to facilitate strategic discussions and to find solutions to different valuation frames, power tensions and role divisions between stakeholders. In our case, a project proposal functioned as a semi-structured boundary object in which the project partners could attribute their perspectives to and distribute internally. They discussed frames of evaluation of the project in terms of values, ambitions and rating schemes, but addressed the costs and benefits only qualitatively. The complexity of the topic requires a boundary object such as a vision or project plan which everyone can relate to; which is not too specific and leaves room for differing perspectives; and which is adjustable to facilitate joint experimentation and solution-finding.

Limitations and implications

This study and the boundary work perspective has its limitations. First, the company studied in this research was in early and mid-level phases of innovating its sustainable business model. Further research could select a case study where the critical boundaries have been reconfigured (implementation phase) and where value capture is also integrated to assess the feasibility of the sustainable business model, and its strategic actions for boundary reconfigurations (Lepak, Smith, and Taylor, 2007). Second, as this study comprises a single case design, alternative cases initiated by different type of actors (e.g., an intermediary or an NGO) and/or cases of international corporations conducting boundary work in global networks can be inquired and compared to one another. This can advance theory development on boundary work processes, strategies, and potential other boundary conceptions relevant for successful SBMI (Kivamaa et al, 2019; Van de Ven, 2007). Third, this work focused on organizational boundaries, but this can be extended to include physical and geographical boundaries. For instance, one of the case discussions centered around what was still considered to be 'local' in the circular economy, which resulted in a joint view focused on: 'as close as possible and as far as they need to'. An extension of boundaries beyond those of the organizational context (e.g., physical, regional) but related to strategic joint decision-making in SBMI may be an interesting source for future research. Finally, for practice, the framework of this study can function as a basis for developing a practical tool that assists companies in starting multi-stakeholder SBMI (Geissdoerfer et al., 2018; Rohrbeck et al., 2013).

Conclusion

This paper traced the efforts of a small firm engaging with strategic partners and non-traditional stakeholders in the daunting task of transforming the Dutch pork industry. The endurance and creativity of the firm suggests that there is no blueprint for SBMI, but rather requires a process of boundary work to collaboratively explore and negotiate value opportunities in the organizational boundaries of each stakeholder. The case makes transparent and nameable the intrinsic complexities of projects which are neither purely transactional nor relational.

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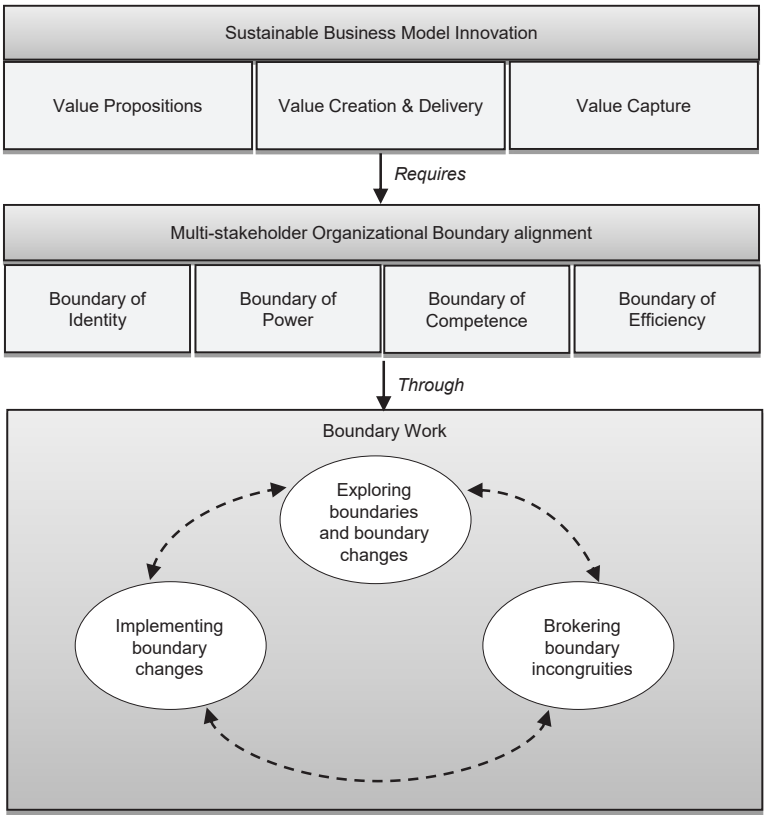
Appendix A: Theoretical framework of boundary work in SBMI, as developed in Velter et al, 2020



Appendix B: Timeline of the SBMI process

2014

- Traditional business model Nijsen/Granico under pressure due to small margins, commodity position and scarce supply of residual flows.
- Kipster asks Nijsen/Granico for circular chicken feed

2015

- Coincidental connection SuperUnie
- Value-research feed i.c.w. Wageningen University
- Sketch businesscase Kipster
- Idea Food for Feed for Food

2016

- Exploratory meetings Kipster, to align retail and NGOs
- Exploratory meetings NGOs Natuur & Milieu, Milieudefensie and Dierenbescherming
- Initial exploring critical stakeholders and barriers: SuperUnie required to align butchers as butchers cannot work in badges
- Conflict SuperUnie on responsibilities

2017

- Novel roles and activities, particularly for retailer and pig entrepreneur
- Barriers for alignment critical stakeholders
- Prioritizing collaboration partners
- Financers show interest
- Start Kipster

2018

- Modelling stakeholder network as-is and to-be, in collaboration with the focal researcher and a consultant
- Define key-stakeholders, their characteristics and envisioned barriers for alignment
- Define potential partners and defenders (Knowhouse, Municipality, pig farmers)
- Development of three business model strategies and preferred strategy
- Envisioning future role Nijsen/Granico: from 'feed producer' to 'circular concept provider'

2018

- Project proposal drafted by NGO's, Ruud Zanders and Municipality.
- Realisation that company growth is limited when sticking to the societal value proposition
- Discussion about certification schemes
- Realisation of dropouts (limited amount of pig farmers)
- NG requests the independent consultant to be an external broker

2018

- Process split up in 3 projects:

1. The Pigster consortium, about circular pig farming. Participants: 1 customer (Albron), BOM, Kees Schepers. Experiment with pigs "the Duke of Berkshire"
2. The Banquet Pig, a project aimed at large retailers
3. The Circular Pig, project of offering the concept to other retailers

- Acceleration Banquet Pig due to meetings Lidl and Van Loon
- Nijsen/Granico proposes its new role as a strategic partner for circular food concepts in addition to pig feed producer to Lidl

2019

- Kipster opens 3rd stable
- Supply problems Nijsen/Granico for Kipster, Lidl helps with list of potential residual products

Circular Pig:

- Negotiate priorities value creation
- NGO agrees on sourcing process
- Exploring structure and sensitivities in the sector: pricing, feed-farmer relations
- Conflict over concreteness pricing
- Improved understanding power and position of Nijsen/Granico's new role
- NGO makes explainer Circular Pig

Banquet Pig:

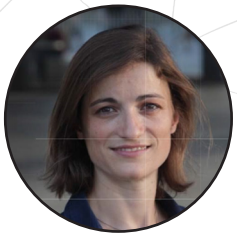
- Presentation Nijsen/Granico to Lidl and butcher, mentioning specific numbers pricing, value propositions, costs
- Critical publication Kipster, revealing emerging discontent existing farmers

2020

- Nijsen/Granico starts talking to international partners
- Conversations with Van Loon and Lidl continue
- Lidl continues to supply residual products for Kipster

About the Authors

Myrthe Velter is a PhD researcher on Boundary Work for Sustainable Business Innovation. She integrates a transition management approach into business model innovation for sustainability and circularity. In addition, she conducts applied research at the multidisciplinary Fontys Centre of Expertise on Circular Transitions, combining technical, social and economic research as a basis to deliver applied solutions for accelerating circular transitions. She formerly worked as a business consultant and independent entrepreneur.



Dr. Verena Bitzer is an interdisciplinary social scientist working on the nexus of transnational governance and international development. She specializes in the governance of agricultural value chains, which includes research on public-private (or cross-sector) partnerships, sustainability standards, and responsible business conduct. Her work focuses specifically on questions of inclusive rural transformation, referring to dedicated efforts to promote the socio-economic inclusion of small-scale and vulnerable rural actors through strengthening their agency and creating livelihood opportunities. Verena holds research positions at KIT Royal Tropical Institute, Amsterdam, and the Maastricht Sustainability Institute of Maastricht University, the Netherlands.

Nancy Bocken is Professor in Sustainable Business at Maastricht University, Maastricht Sustainability Institute (MSI). Nancy has coordinated various European and national research projects with a focus on business as the driver for sustainability transitions. Her research topics include sustainable business models, business experiments for sustainability, Circular Economy, sufficiency and closing the 'idea-action' gap for sustainability through novel tools, methods and approaches. Her work involves collaboration directly with business and other actors like cities. Nancy's most recent research project is Circular X, an ambitious €1.5m, five-year research project funded by the ERC, which is about experimentation with circular business models in different country contexts. Nancy is also Fellow at Cambridge Institute for Sustainability Leadership, advisor to TNO (Dutch association for applied scientific research) and the Forest Stewardship Council (FSC). She co-founded her own circular and sustainable business called HOMIE.

About the Authors

Prof. Dr. Rene Kemp is an innovation researcher with a background in econometrics and an interest in policy, history, society, theory and research methodology. He is multidisciplinary researcher who has published on eco-innovation and sustainability transitions in innovation journals, environmental and ecological economics journals, policy journals, transport journals, and sustainable development journals. As a professor of innovation and sustainable development Rene tries to do socially relevant research and offer policy advice to create a better world.