

Collaborative sustainability in a shipbuilding network

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1. Introduction

In this paper, we present the preliminary conceptual framework and empirical findings of research, where we study the collaborative actions taken in shipbuilding industry to improve its sustainability practices. We use a case study approach to analyse the current practices of one shipbuilding network to promote sustainability, and propose collaborative business modelling to improve future actions. Traditionally, the concept of sustainability in shipping has focused to controlling the environmental impacts during the vessel's operation. In addition, methods for collecting and pooling operational data have been developed for the use of the shipowner. Moreover, greater emphasis has been recently put to the systemic nature of the sustainability questions in the shipbuilding industry as the actions and actors are increasingly interconnected in complex project-based networks. Even though sustainability practices are often characterized by incremental enhancements within one organisation, it is increasingly recognized that “sustainability innovations are characterized by a systemic nature and require that multiple organizations act in an orchestrated fashion” (Rohrbeck et al. 2013).

We follow Aguinis' (2011) definition of sustainability as ‘context-specific organisational actions and policies that take into account stakeholders’ expectations and the triple bottom line of economic, social, and environmental performance’. However, to better adapt the concept of sustainability to the project and network-based organisation of shipbuilding industry, we introduce the concept of collaborative sustainability to describe the recent sustainability actions taken in the studied shipbuilding network (cf. Wettstein 2012; Üstündağlı et al. 2015). We claim that collective action for sustainability – defined as collaborative sustainability – becomes increasingly important in contemporary business environment, as companies can no longer act in isolation to solve sustainability challenges but need the support and collaboration of business partners, especially from the supply chain (e.g. Rohrbeck et al. 2013).

In the article, we utilise the framework of ‘collaborative responsibility’ proposed by Wettstein (2012) to reframe the role of collaboration and collective action in the traditional shipbuilding industry, in which the systemic nature is generating pressure to view sustainability issues from the perspective of collective action. We develop the conceptual framework of collaborative sustainability to analyse the role of collaboration in the different individual and collective attempts to tackle the sustainability-related challenges and possibilities. While here restricted to shipbuilding industry, we claim that collaborative sustainability is a concept that will become increasingly relevant for many other industries.

The structure of the paper is as follows. In the next section, we review the previous literature on collaboration for sustainability. The next section presents business model literature to positions sustainability questions in terms of collective action. In the fourth section, we introduce our materials and methods. In the fifth section, we present our preliminary results regarding the sustainability collaboration in a shipbuilding network. Finally, we discuss the significance of the research results and propose collaborative business modelling to promote collective agency for sustainability.

2. Theoretical Framework: Collaboration for sustainability

Literature on collaboration for sustainability is rich and reflects practical preoccupations for developing sustainability practices beyond organizational boundaries to include the entire upstream and downstream chain within which an organization operates (see the recent literature review from Chen et al. 2017). Traditionally, this literature has been concerned mostly with organizational collaborations with the supply chain, i.e. in the upstream, but recent scholarly developments point the necessity to have a broader approach that would integrate customers as part of the sustainability efforts (Blome et al. 2014; Chen et al. 2017).

To advance sustainability in the supply chain, two basic mechanisms have been investigated: suppliers’ assessment and collaborations (Lee and Klassen 2009; Gimenez and Sierra 2013; Blome et al. 2014). The first one is monitoring-based, consisting of an evaluation of sustainability performance of suppliers, which is then used to filter the business partners with which a firm will eventually choose to work. By selecting only suppliers with developed sustainability practices, an organization can ensure that the sustainability of its products will enhance. The second mechanism is a softer one, being used by the buying company to assist suppliers in developing their sustainability performance. An organization does not proceed to an exclusion of unsustainable suppliers, but rather work with them in order to assist them to develop their own sustainability practices. Training, communication, development of shared responsibilities are among the means used to support suppliers. The two mechanisms are not mutually exclusive, on the contrary, Lee and Klassen (2009) found that they complement each other and the simultaneous use of both has synergetic effects. However, Gimenez et al. (2012) found collaborations to be more effective than the monitoring of suppliers and pointed out the vital role of collaborations in order to make monitoring mechanism work. Gimenez and Sierra (2013) in turn acknowledge the role of suppliers’ monitoring as an enabler for collaborations.

A recent literature review from Chen et al. (2017) identified a development in organizational practices from the coercive forms of enhancing sustainability in the supply chain (suppliers' assessment) to the softer form of collaboration and dialogue between business partners. The same study shows a preponderance of environmentally-focused studies to the detriment of research that would examine social sustainability (see also Hollos et al. 2012). It is unclear though whether this is triggered by prevailing practices in organizations (i.e. more attention being paid to environmental issues than to the social ones) or whether this is simply due to scholars being interested more in the environmental practices.

Much of the literature in the field has focused on the effects of sustainability-related collaborations on firm performance. Different forms of performance have been in the attention of scholarly research. Economic effects have triggered much research but recently outcomes from social and environmental perspective have also received some attention (Chen et al. 2017). Chin et al. (2015) hypothesize that collaboration acts as a mediating force in the relationship between green supply chain management and sustainability performance. They expect that collaboration will lead to better social, environmental and economic performance. While intuitively this relationship should hold true, mixed results have been obtained in empirical studies. Klassen and Vachon (2003) found that collaboration increases the level of environmental investments and leads to resources being allocated for pollution prevention rather than pollution control, which is a good development in terms of environmental performance. Similarly, some studies document improvements in environmental performance as a result of collaborations with suppliers (Lee and Klassen 2008; Vachon and Klassen 2008). For instance, better delivery and improved flexibility was achieved in collaborations with suppliers, while collaborations with customers brought benefits such as better quality of products (Vachon and Klassen 2008). Gimenez et al. (2012) found that collaborations have positive impacts on all the three aspects of triple bottom line. Vachon and Klassen (2006) also found a positive link between environmental collaboration and technological integration. However, Hollos et al. (2012) find positive effects of cooperation on social and environmental performance but no direct effect on economic performance (costs and operational performance) of the buying firm. Blome et al. (2014) nuance the relationship between collaboration and environmental performance, as they found that it is mostly in cases when companies have already implemented sustainability practices that collaboration brings most benefits.

Even though sustainability practices and benefits are often characterized by incremental enhancements instead of radical changes in working procedures, it is increasingly recognized that "sustainability innovations are characterized by a systemic nature and require that multiple organizations act in an orchestrated fashion" (Rohrbeck et al. 2013). Therefore, collaborative business modelling (CBM) has been proposed as a way to enhance sustainability innovations in the future (see Rohrbeck et al. 2013).

As can be observed from the above literature review, the focus has been on the role of collaboration in bringing up benefits especially in terms of improved performance, either economic, social or environmental. Much of the prior work is statistical in nature and does not really describe how collaborations are used in organizations and what kind of real-life

organizational challenges have to be faced. We therefore aim to bring insights precisely on how collaboration is organised and promoted in a network setting in order to render this concept more meaningful in managerial practice. Therefore, we introduce the concept of collaborative sustainability to describe the recent sustainability actions taken in a shipbuilding network. We claim that collaborative sustainability becomes increasingly important in contemporary business environment, as companies can no longer act in isolation to solve sustainability challenges but need the support and collaboration of business partners, especially from the supply chain (e.g. Rohrbeck et al. 2013).

In the article, we utilise the framework of ‘collaborative responsibility’ proposed by Wettstein (2012) to reframe the role of collaboration and collective action in the traditional shipbuilding industry. According to Wettstein, corporate responsibility ought to be reframed as a conception of collaborative responsibility due to the mismatch between individual actions causing sustainability related challenges and the need for collective agency to tackle such global problems. The concept of collaborative responsibility is composed of following five elements (Wettstein 2012):

1. it is based on the moral imperative for collaboration
2. it shifts emphasis from commission to omission
3. it is essentially positive responsibility
4. it is political responsibility
5. it is, most basically, human rights responsibility.

According to Wettstein (2012: 158), “corporate legitimacy must increasingly be thought of in terms of a corporation’s contribution to collective efforts”, and in terms of what they are not doing for society. In the paper we will develop this argument in the context of shipbuilding industry, and analyse its implications for business modelling.

3. Business models for sustainability

In general terms, business models are used to define and communicate how a company creates and captures value and how it differentiates itself from its competitors. There are many definitions and frameworks for business models, but despite differences in various definitions, some common characteristics in most types can be identified. In general, the core elements a business model should have are strategic choices related to the business venture in question, value creation mechanisms, description of a value network that shows material and information flows, and finally the ways the actual monetary value is captured (Shafer et al. 2005, 200-202). Significance of a business model is that it draws attention to crucial activities and resources. Without a clear business model, company risks failing to deliver or capture value from their innovations (Teece 2010, 172).

In addition, business models are becoming a new field of research in corporate sustainability research (Schaltegger et al. 2016). Schaltegger et al. (2016, 6) see that business model for sustainability assist in “describing, analysing, managing, and communicating (i) a company’s sustainable value proposition to its customers, and all other stakeholders, (ii) how it creates and

delivers this value, (iii) and how it captures economic value while maintaining or regenerating natural, social, and economic capital beyond its organizational boundaries.”

Osterwalder and Pigneur (2009) use “Business Model Canvas” to describe the content of a business model. Their model consists of nine building blocks listed in the Table 1. The building blocks cover the company’s key operations, value proposition, customer aspects, cost structure and revenue streams. Contents of these areas are shortly opened in the table (Osterwalder and Pigneur 2009).

Table 1. The business model canvas (Osterwalder and Pigneur 2009)

Building blocks	Content
Customer segments	For whom are we creating value? Who are our most important customers?
Value proposition	What value do we deliver to the customers? Which one of our customer’s problems are we helping to solve? Which customer needs are we satisfying? What bundles of products and services are we offering to each customer segment?
Channels	Through which channels do our customer segments want to be reached? How are be reaching them now? How are our channels integrated? Which ones work best? Which ones are most cost-efficient? How are we integrating them with customer routines?
Customer relations	What type of relationship does each of our customer segments expect us to establish and maintain with them? Which ones we have established? How costly are they? How are they integrated with the rest of our business model?
Revenue streams	For what value are our customers really willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each revenue stream contribute to overall revenues?

Key resources	What key resources do our value propositions require? Our distribution channels? Customer relationships? Revenue Streams?
Key activities	What key activities do our value propositions require? Our distribution channels? Customer relationships? Revenue stream?
Key partners	Who are our key partners? Who are our key suppliers? Which key resources we acquire from partners? Which key activities do partners perform?
Cost structure	What are the most important costs inherent in our business model? Which key resources are most expensive? Which key activities are most expensive?

Key operations consist of key partners, key activities and key resources which are most vital for the business. Key resources are needed to make the business model work and they can be physical, financial, intellectual and/or human. Key activities are the actions company does in order to make the business model work. Depending on the business, the needed actions relate with production, problem-solving and/or the needed platform or network. Key partners quite literally consist of the needed suppliers and partners in order to do business. (Osterwalder and Pigneur 2009)

Value proposition describes the products and/or services that the company provides for its customers. Products or services either solve customer's problems or satisfy customer's needs. In business model canvas, customer aspects cover customer relationships, channels and customer segments. Customer relationships describe the types of relationship the company has with its customer segments. Channels consist of communication, distribution and sales with the customers. Customer segments refer to company's ability to identify which type of customers it wants to serve. Customer segments can be mass, niche or multi-sided markets, and they can also be segmented or diversified. Lastly, cost structure and revenue streams define the costs needed to operate the business and the cash flow from the customers respectively. (Osterwalder and Pigneur 2009)

Rohrbeck et al. (2013) have analysed collaborative business modelling in the context of one case study, where 8 firms have collaborated to envision and create new business models in the energy industry. According to the authors (2013: 1), collaborative business modelling "creates a powerful platform for (1) jointly identifying economic and societal value, (2) defining value

creation/value capture systems, and (3) planning of complex and uncertain future markets". In our article, we will apply the framework of collaborative business modelling and relate it to our empirical findings describing the current situation in collaboration for sustainability in the context of shipbuilding industry. Thus the idea of collaborative business modelling is used here to mostly explore future potentials in collaboration.

4. Materials and methods

4.1 Case study

The research context is a shipbuilding network located in Europe. The anchor company produces luxury cruise ships, and retains about 1500 employees. The nature of its complex products necessitates the use of a vast network of suppliers. The case company became a part of a larger, family-owned company in 2014, whereas it previously was owned by international investors. The company has only recently started to organise its sustainability efforts. The different aspects of sustainability have gained different amount of attention throughout the history of the company, but a comprehensive mapping of them has been lacking. Occupational health and safety, environmental issues, and social responsibility have been the focus of the company's sustainability efforts during the recent years.

4.2 Materials

Our main materials are interviews and workshop discussions. We have interviewed persons working in different positions in the shipbuilding network as follows. First, we conducted 11 interviews with 19 employees of the shipyard, representing all the major departments of the company, including procurement, sales and design, human resources, environmental management, administration, HSE (health, safety and environment) and risk management, investments, ICT, and top management. Then we focused on the representatives of the suppliers: We interviewed 23 persons representing six suppliers. We also conducted four interviews with eight interviewees among the stakeholders (two customer companies, one consulting company and one lobbying organization of the industry) of the shipbuilding network. To sum up, we conducted 32 interviews with 50 interviewees. Then we organized two future-oriented workshops, which both had approximately 20 participants.

4.3 Analysis

Interviews and the workshops were transcribed and the transcriptions were thematically analysed. The actual coding phase included multiple rounds of reading and interpretation of the transcribed research material. The software NVivo 11 was used in the analysis process. The transcription parts were coded where the subjects were discussing collaboration in sustainability. For example, the parts were coded where the subjects mentioned different stakeholders and their sustainability needs. No predetermined list of codes was used.

We used the following questions to analyse our data: how are sustainability objectives framed in a shipbuilding network (firm vs. network level); what kind of collaboration there exists in promoting sustainability; what kind of sustainability challenges need collective problem solving and what kind of challenges can be solved by individual actors such as firms or governmental bodies; which factors promote and challenge collaboration for sustainability in a shipbuilding network, and; what kind of potentials and challenges are seen in the future?

5. Preliminary findings

In this results section, we first describe shortly the case study network. Second, we focus on how sustainability is currently addressed in the network. Third, we highlight the sustainability challenges of the network.

We studied a network of shipbuilding industry (see Figure 1 for the structure of the case). The key actor of the network is the shipyard that coordinates the construction of the ships and the shipowner that first orders the ships from the shipyard and then operates the ships. The shipyard is not able to construct the ships without the help of the network of suppliers. The first tier suppliers work at the shipyard's location to finish the product. However, the suppliers each operate their own chain or network of suppliers that are needed to complete supplier's task. The shipowner sells the cruises to private customers. Sustainability-wise important stakeholders of this network are the end-customers, NGOs (typically environmental NGOs), authorities and the neighbors of the shipyard.

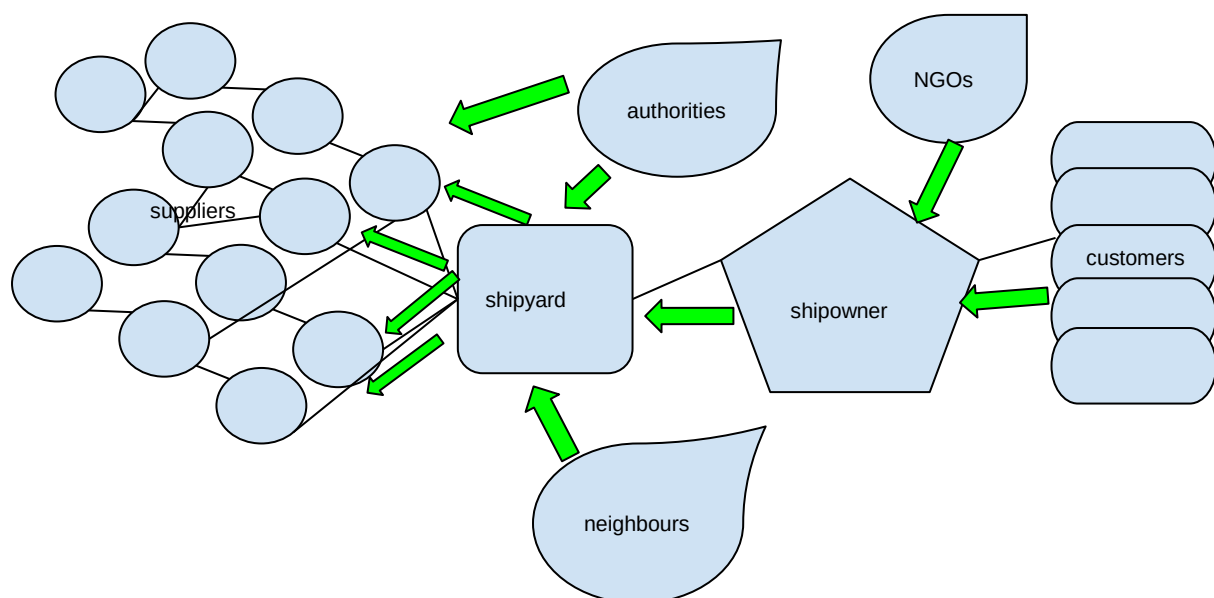


Figure 1. The studied network of shipbuilding industry where the green arrows show the demand of sustainability information.

The main demand to improve sustainability in the current network comes from the shipowner. The shipowner currently feels the pressure to develop and show the sustainability of their

service (i.e. cruise). This pressure arises from environmental NGOs and also from the end-customers. The pressure for sustainability is then filtered in the network by the shipyard to its first-tier suppliers. The shipyard itself has promoted several aspects of sustainability (e.g. environmental management, occupational health and safety) for years of its own production. Also in the area of social responsibility, the shipyard has bared its responsibility by for example, training the employees of suppliers in environmental and safety issues. The shipyard also has surveyed the first tier suppliers sustainability performance in its own site. The survey has not yielded any exclusions of suppliers. Also, the shipyard has not asked the first tier suppliers to review the sustainability performance of their suppliers.

Authorities are an important stakeholder for the shipyard and its suppliers. The authorities' requirements (e.g. for fire safety) exceed those of sustainability. This means that although certain material choices would be better in terms of sustainability if these choices do not meet the fire safety requirements these materials cannot be used. Currently, the sustainability requirements are passed along the network of companies in the contracts asking to take the sustainability issues into consideration while working to complete the task specified in the contract. An early steps of sustainability collaboration have been taken in the network, when the shipyard has started to train the first tier suppliers of how they understand sustainability in the network.

The sustainability challenges of the network are numerous. First, the diverse origin of sustainability requirements cause challenges. The NGOs and customers ask and require specific sustainability actions from the shipowner, but they are too specific with their requests. Therefore, also the requests that the shipowner places on shipyard are somewhat vague. Second, there are stakeholders that are able to dismiss the sustainability criteria. For example the designer of the ship plays an important role as he/she has a vision what different parts of the ship should look like. If the vision is not fulfilled with the sustainable option then unsustainable option is selected. Third, a major challenge in this network is the network structure. Although the shipowner cooperates only with the shipyard, the shipyard itself operates the network of suppliers and those, as said, operate themselves a network of suppliers each. As project based shipbuilding industry is *per se* a collective effort, sustainability practices should be increasingly reviewed at the network level instead of just concentrating of the sustainability efforts of individual network members.

6. Discussion

In this paper, we present the preliminary conceptual framework and empirical findings of research, where we study the collaborative actions taken in shipbuilding industry to improve its sustainability practices. The previous literature showed that companies have two main ways to promote sustainability in a network. The first way is the soft supplier collaboration and the second strict supplier assessment (Lee and Klassen, 2009; Gimenez & Sierra, 2013; Blome et al., 2014). The studied network expresses the first steps of supplier collaboration as the discussion of understanding sustainability practices at the network level has recently begun.

Based on our preliminary results concerning the relatively weak level of collaboration in the case network, we develop the business model framework towards collaborative business modelling that can be utilised to develop collective sustainability action in project based industries (see Table 2).

Business modelling starts with the customer segments: One needs to identify which sustainability aspects interest the customers. In our case study, currently the main interest is on environmental sustainability. Regarding value proposition, one needs to be able to define what kind of sustainability value one is able to deliver. This relates with the sustainability data one is able to gather from the network. One needs to be able to show, preferably with figures, how sustainable the operations in the network are. This aspect is closely linked to the channels and communication. The key question here is how to communicate sustainability in the most cost-efficient manner. In other words, it is not enough just to collect the sustainability data from the network but one needs to communicate the data along the network and especially to the stakeholders.

Regarding the cost structure, one needs to identify the costs of sustainability-related actions. One needs to find out whether the required sustainability improvements yield some additional costs, and whether the customers are willing to pay for sustainability. In other words, one would need to be able to make a business case of sustainability. The last point in the business model are the key resources, activities and partners. Resources are needed in order to promote sustainability in the network, typically referring to the intellectual resources of the personnel. Also, one needs to identify the key activities of the network that promote sustainability. Activities here can mean, for example, purchasing processes that take sustainability aspects into consideration or working procedures that promote occupational health and safety. Lastly, key partners equal not only suppliers but other stakeholders that enable to fulfil the needed sustainability requirements.

Table 2. The building blocks of collaborative sustainability business model

Building blocks	Content
Customer segments	Which sustainability aspects interest the customers?
Value proposition	What kind of sustainability value is delivered?
Channels / communication	How sustainability is communicated cost-efficiently?
Revenue streams	How much are customers willing to pay for sustainability?
Key resources	Which resources are needed to promote sustainability?
Key activities	What key activities promote sustainability?

Key partners	Who are the key stakeholders in sustainability? Who are the key suppliers in sustainability? How the suppliers promote / hinder sustainability?
Cost structure	How much sustainability efforts cost?

7. Concluding remarks

In this paper, we develop the conceptual framework of collaborative sustainability to analyse the role of collaboration in the different individual and collective attempts to tackle the sustainability-related challenges and possibilities. While here restricted to shipbuilding industry, we claim that collaborative sustainability is a concept that will become increasingly relevant for many other industries. Based on our preliminary empirical analysis of collaborative practices in shipbuilding industry we propose further actions for the industry based on the collaborative business modelling experiences of other industries. In the conference paper we present the tentative analysis and discussion of our data regarding the role of collaboration in sustainability efforts in the case of one shipbuilding network. Our analysis needs to be further developed with the connection to the business model literature and Wettstein's idea of collaborative responsibility.

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