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AN OVERVIEW OF BUSINESS MODELS IN THE CZECH CHEMICAL INDUSTRY: A SUSTAINABLE MULTIPLE VALUE CREATION PERSPECTIVE*

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Abstract. The article presents results of empirical research conducted on companies in the Czech chemical industry, namely CZ NACE 20.1 manufacture of basic chemicals, fertilizers, and plastics. The main goal of the research was to describe novel business models based on sustainable multiple customer value creation. The article's objective is to present some of the findings from this research to provide an overview of utilized business model elements and characteristics of the industry within the scope of its business models. The original research design combines theoretical concepts of business models, sustainable value creation and multiple customer value to answer the later mentioned research questions. The article states the theoretical background of the research, research design and methods, results, and concludes by stating insights concerning the industry and the respective theory.

Keywords: sustainable value creation; business models; chemical industry; multiple value; research results; majority business models; minority business models

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JEL Classifications: M21, Q01

1. Introduction

The scope of sustainability and novel value creation is connected to novel business model conception. These business models widen the very narrow focus on the economic aspect of value creation by integrating environmental, social aspects into them. Current knowledge in this area points at business model innovation as a means of gaining a competitive advantage through sustainable multiple customer value creation. This is underlined by the rise of novel competitive forces on the global market can disrupt the business models of companies that fail to adapt. In this regard, the chemical industry represents one of the largest industries in the

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Czech Republic. By nature the chemical industry has the ability to gauge its impact precisely and transform environmental and social challenges into sources for novel value creation opportunities. The article focuses on searching for novel approaches in business models of the Czech chemical industry which could promote a novel value proposition in the context of sustainability and social responsibility as a result of multiple customer value creation.

The paper's objective is to present some research results which provide some insights an overview of the utilized business models in the Czech chemical industry, specifically section 20.1 according to CZ NACE, in connection to novel business models based on sustainable multiple customer value creation. The aims of the underlying research are to provide a methodology to study an industry through the scope of its business models and utilize it on a specific industry to identify novel business models. Specifically, the research was conducted to identify the specific elements (or features) of novel business models based on sustainable multiple customer value creation within the context of the chosen industry.

The research design is based on the works of different authors. Based on these methodologies and research a questionnaire was developed to fit the specific goal. The questionnaire's relevance was tested during semi-structured interviews with 9 industry representatives from various companies belonging in the sample. The sample consists of all 38 companies falling into section 20.1 CZ NACE. These representatives evaluated the relevance of suggested business model elements from a set based on literature retrievals. The result was a questionnaire consisting of 32 questions tied to the most relevant business model elements. The questionnaire was primarily targeted at commercial directors or production directors and the elements served as a foundation to provide an overview of the business models for the selected industry.

In a capital-intensive industry, such as the chemical industry, under the spotlight of many external audits and under heavy legislation, following the issued legislation becomes a competitive advantage. The majority (Slávik, 2014) and minority business model constructs state the business model elements utilized by most of companies and vice versa. In effect the legislation and constant audits pushes companies towards more industrial safety and meeting environmental customer expectation while social expectations are being met by a smaller number of companies.

2. Theoretical background

The theoretical foundation of the research is based on two theoretical bodies. First, sustainable multiple customer value creation and new business models. By incorporating the notion of sustainability and multiple value creation into a company's strategy it is forced to change the narrative of how it creates, delivers, and captures diverse types of value, i.e. the business model changes. The following part presents a literature review to frame sustainability, novel business models and multiple customer value creation.

2.1. The scope of sustainability

The scope of sustainability is not limited just to environmental issues, but also the sustainability of economic growth and social cohesion. According to the European commission, the flexibility of sustainability's principal is exercised through social responsibility. Corporate social responsibility represents a voluntary integration of social and ecological interests into corporate strategy and into day-to-day operations and relations with stakeholders (Livre Verte, 2003; Tvaroviciene, 2018). In the future, there is only going to be more customers, employees, board members, banks, suppliers etc. monitoring corporate operations (Záležaková, 2014). In other words, the company has to ensure that achieving economic efficiency is aligned with social and environmental protection standards (Chabi, 2016; Lankauskiene, Tvaroviciene 2012). Liikanen (2004) describes this form of governance as

such increasing the positive contribution of the company to society and also minimizing the negative impact on citizens and their environment. The company is confronted by numerous challenges, whether economic, environmental, or social which include various influences and consequences for corporate operations. The compounding of these challenges can enact a chain reaction endangering the company's business model but also serve as incentives for novel business model design. The main priority for current company management is to create institutional and cultural conditions for business model development based on corporate flexibility and learning mechanisms. In this regard, Schaltegger et al. (2012) present the term sustainable business model innovation. Sustainable innovation is viewed as key to creating a sustainable company (Girotra, Netessine, 2013). It has a significant positive impact or significantly decrease the impact on the environment and society through the change of how the company and its value network create, deliver and capture value or by changing the value proposition (Bocken, Short, Rana, Evans, 2014). This ensures the company's competitiveness in the future and cause changes in the current business model. Radical and disruptive business model innovation changes the business model in its essence and provides a significantly greater value than that of the industry's standard. At the same time, these business models share this value among the company, its customers and value network partners, i.e. the ecosystem.

2.2. Novel business models

The issue of novel business models and multiple value creation is partially mentioned by numerous authors as are Boons, Lüdeke-Freund (2013); Schaltegger, Hansen, Lüdeke-Freund (2016), and others. The interest of academia and practitioners in the field of novel business models is ever-increasing. This is testified by the numerous definitions provided in scientific journals as Journal of Cleaner production, Long Range planning, Journal of business models, Organization and the Environment, etc. Several Czech authors also deal with this issue mainly in regard to business model innovation (Chwaszcz, 2010), sustainable development and corporate social responsibility (Kašparová, 2006; Prskavcová, Maršiková, Řehoříková, Zbránková, 2008; Zdražilová et al., 2010, 2011; Pavlík, Bělčík et al., 2010; Kunz, 2012; Dalíková, 2013; Kocmanová, Šimberová, 2014), as well as other related issues (Švejda, 2002; Basl, 2002; Koráb, Mihalisko, 2005; Jakubíková, 2008; Pilný, 2016; etc.).

The notion of a novel business model (Bocken, Short, Rana, Evans, 2014) comprises three dimensions which individually possess a different meaning:

- "business" in the sense of entrepreneurship (Slavinska, 2010; Freeman, Wicks, Parmar, 2004) means economic activity of providing good and services which includes financial, commercial, and production aspects;
- "model" as a simplified representation of a process or system (Jensen, 2013). As with other terms in social sciences, models are not physical object. They possess an abstract character and are the result of modelling, i.e. the business model is societal construct. The term model relates to the notion of a company's unique nature, i.e. the competitive strength of a system is related to the ability to innovate. Innovation in this regard is the center point for strategic changes, i. e. designing and redesigning the business model with social responsibility incorporated into its value proposition. The term "business model" infers a graphical representation of the entrepreneurial process (Léon, 2014-15; Beattie, Smith, 2013). In its simplest form, the business model is a way of generating profit. This is due to fact that the business model is a basic entrepreneurial structure of which services are provided or which goods are produced in order to generate a profit (Muelhlhausen, 2018).
- the adjective "novel" is rooted in the support of a creative approach to strategy. The term is relates to searching for other solutions than the current model (Lehman-Ortega, Misikas, Schoettl, 2007). At the same time the term underlines that the novel business model is a significant non-technological innovation, although the model provides connection between technology and corporate performance by mobilizing the company's resources and competences. It includes novel business operations or formulates novel approaches to current business operations which result into creating a different type of company. More

and more managers believe that business model innovation will become more and more significant for corporate sustainability and development than product innovation.

Novel business models described as innovative business models (Laifi, 2012; Buchere, Eisert, Gassman, 2012). Since these business models relates to a novel system of operation (Amit, Zott, 2012) and innovative structures of creating and capturing value (Chesbrough, 2007) and alliances with partners and customer (Cortimiglia, Chezzi, Franck, 2016). Amit and Zott (2001) describe networks and alliances as basic frameworks for conception of innovative business models. Teece (2010) states that traditional business models focus merely on how to create, produce, sell a product and generate a profit from its production and sale. Novel business models resolve the same problems but in a innovative way which disrupt the seemingly undisputable business heuristics. Creating a novel business model in the widest sense does not necessarily means the development of a new product, change of processes or change of resources needed for production. The necessary effects are achievable though faster operations, customer solution provision, additional services provision, cooperation with communities, stimulating customer with pricing, breaking down barriers of access to products, new payment options or subscription, etc.

2.3. Multiple value creation

The notion of multiple value (Freeman, Wicks, Parmar, 2004) has been coined during sustainability reporting efforts (Marberg, Jonker, 2007). The theoretical framework of multiple value creation as a business foundation was formulated by McVea and Freeman in stakeholder theory (McVea, Freeman, 2005). The notion is based on the “triple bottom line” concept (Elkington, 1998). Thus, multiple customer value applies the principals of sustainable development. In this respect, assessing the choice of production technologies, production processes, and distribution channels, i.e. the business model, to promote eco-efficiency ensuring that the product/service exceeds customer expectations (Nidomolu, Prahalad, Rangaswami, 2009; Červený et al., 2013).

Multiple customer value is an incremental and differentiating part of the value proposition. It is manifested in business decision leading to the satisfaction of environmental and social expectations of both customers as well as the stakeholders partaking in the company’s success. In this respect, partaking stakeholders aid the understanding of customer expectations. Sustainability in this sense underlines activities which can be repeated in the long run opposed to one-time actions. Sustainable multiple customer value, thus, supposes a long-term relationship emphasizing mainly customers and other stakeholders. The relationship is described by two trends which are heavily supported by technology (Le Vely, 2015). The first trend (push strategy) integrates sustainable multiple customer value creation in regard to market differentiation in developing and pushing products/services aiding the customer’s eco-efficiency (water usage, energy storage, etc.). In the context of Industry 4.0 the exchange of information is reliant on information technologies. This sets the business model into a context described by its customer and stakeholders (the collected) and their expectations which will impact its business model configuration and thus its performance. On the other hand, a pull strategy aids the understating of customer expectations which leads to lowering opportunity costs. This relationship serves to contribute to the company’s economic success, such as cost savings, competitiveness or sales increase, risk reduction, improved profitability, customer retention, reputation, etc. In conclusion the integration of sustainable multiple customer value creation into the business model presupposes that it is (Schaltegger, Lüdeke-Freund, Hansen, 2012):

- voluntarily with the intention to contribute to the solution of societal or environmental problems;
- creating a positive business effect or a positive economic contribution to corporate success which can be measured or argued for in a convincing way;
- clearly and convincingly argument that it lead to both, the intended or environmental effects, and the economic effect.

Novel business models in the context of sustainability is based on a marketing concept, i.e. the value proposition, leaning on positive environmental and social impacts in the core concept of the business model. Sustainable

development offers space for the creation of a unique value proposition. It defines what the company can realize better than competitors and describes how the innovation serves the targeted market. It determines the customer-centric focus leading to innovation, stimulating corporate flexibility. Innovating provided value is the first phase of reevaluating the business model (Dauchy, 2013). Conception of a unique value proposition enables concentration on the main aspects of multiple value creation for the target customer. This requires defining the target market, criteria of multiple value, proposition description (Chanal, 2011). The conception of a unique value proposition has to take into account the competitive space, since it is the customer's main argument why to engage and prefer a certain company over another when searching for a solution to meet their need.

In a novel business model the criteria of multiple value are founded in three dimensions comprised in the "triple bottom line" concept, i.e. environmental, social and economic value. It is expected that a novel business model based on sustainable multiple value creation will maximize and synergize all three dimensions.

3. Methodology and research design

The presented research is based on the stated theoretical background and presupposes that the dynamic of business model development forces companies to ponder the reasons and conditions of their existence. The business model Canvas is used as a visualization tool as it is sufficiently complex, analytical, flexible and general. Thus, suitable for research of novel business models aimed at multiple value creation in any industry. Frequency of occurrence of elements in the fields of the business model canvas enables the creation of a majority and minority business model construct (Slávik et al., 2014) which represents the basis of the research.

The majority business model construct. Competitors in a certain industry operate based on shared cognitive processes and achieve a consensus in suitable and viable strategies within the industry's context (Deephouse, 1999; Rhee, Kim, Han, 2006). The consensus is based on the narrow relations among the members in the competitive field. This, consequentially, influences the corporate vision and business model. This way, the cognitive consensus leads companies to ignore alternative business models over the dominant business model in the sector. Thus, a strategic change often comes from a subject from another sector which results in change of policy and competitive rules.

The majority business model aims to create a representation of a complete image of the prevalent business model, i.e. the majoritarian company comprising the most frequently used business model elements within the nine fields of the business model canvas. Hence, the majority business model is a referential model to identify trend changes and business model innovation. The majority business model possesses the most prevalent features in the industry and describe the mainstream of business model based on multiple value creation.

The minority business model represents the less frequently used elements in the industry. It is an array of experimental, little-used or fringe elements. It may possess rarely implemented but very perspective sustainable innovation in the industry. In general, the elements in the minority business model are still experimented with and are not standardized for widespread use, i.e. typical for certain companies.

Based on the theoretical background the following research questions were formulated:

- [1] What type of customer do companies create multiple value in the industry for?
- [2] Which elements are significant for the industry in terms of multiple customer value creation?
- [3] Which elements compose novel business model design within the industry's context?
- [4] How are minority business model elements distributed in the sample?
- [5] How related are the business models in the industry?

To answer these questions a methodology was developed to match the theoretical background and the specific context of the industry, CZ NACE 20.1 manufacture of basic chemicals, fertilizers, and plastics. The chemical industry is among the most capital-intensive ones where business model innovations are tied to technological improvements and incremental. The choice of the mentioned industry is due to its narrow context, i.e. companies within the industry share similar, they fall under the same regulation, and notably share the same business model framework. In this case, all companies manufacture basic chemicals, fertilizers, or plastics; share common stakeholders; and are influenced by European and national regulation.

Data collection methods include content analysis, semi-structured interviews and a survey. To answer the stated research questions. Other methods include Pearson's correlation coefficient (Slávik et al, 2014), and cluster analysis. To aid comprehension, data was visualized using tables, figures, and the visualization tool Business model canvas (Osterwalder, Pigneur, 2010).

The set of 52 elements provided in the work of Chen and Chiu (2015) served as the basis for the research. In the first phase, the exact elements were used during the content analysis of websites, reports, articles, etc. of all the companies within the sample. After reviewing the results, the set was reduced to 38, due to no relevance to the industry's context.

Lastly, a questionnaire was developed to accommodate the 32 elements into 32 statements about the company to which respondents true or false. This is possible through the nature of business model elements, which represent a narrative of the company's activities. An activity is either present in the narrative or not. The survey was mainly aimed commercial or marketing directors, if not present in the company's structure, then production managers were contacted. All participants were contacted via phone for consent in participation in the survey and the questionnaire was sent via e-mail subsequently.

3.1. Sample

The sample consists of medium and large enterprises which belong into the CZ NACE group 20.1 manufacture of basic chemicals, fertilizers, and plastics. The companies were found using the database Amadeus and triaged based on the following criteria:

- active status;
- has headquarters or branch in the Czech republic;
- employee count greater than 75 employees;
- must belong to group 20.1 manufacture of basic chemicals, fertilizers, and plastics.

First results stated 49 companies in total, after reviewing, double entries and false entries were deleted leaving 42 companies. After, contacting each individual company during the distribution of the questionnaire commercial outlets and wholesalers were almost eliminated from the sample, leaving a final number of 38 companies. This sample of 38 companies is composed of 25 large and 13 medium-sized companies. Table 1 indicates the companies included in the research, their reference numbers, participation in the research, and business model structure. All of the 38 companies in the sample were contacted and 22 questionnaires were obtained, which represents a 57, 89% response rate (Table 1).

Table 1. Sample structure

Reference number	Company name	Company size	Participation in research	Number of business model elements	Majority business model elements	Minority business model elements
1	Aerosol - service, a.s.	L	X	18	13	5
2	Agra group, a.s.	L	X	21	15	6
3	Agro cs, a.s.	L	X	21	15	6
4	Akzo nobel coatings cz, a.s.	L	X	17	13	4
5	Aroma praha, a.s.	L	X	18	11	7
6	Bioferm - lihovar kolín, a.s.	L		2	2	0
7	Borsodchem mchz, s.r.o.	M		5	5	0
8	Contipro, a.s.	L	X	32	16	16
9	Cs cabot, s.r.o.	L	X	28	15	13
10	Deza, a.s.	M	X	21	11	10
11	Ethanol energy, a.s.	M	X	20	14	6
12	Farmak, a.s.	M	X	20	14	6
13	Fosfa, a.s.	M		8	6	2
14	Global tungsten & powders, s.r.o.	L	X	20	15	5
15	Gs caltex czech, s.r.o.	L	X	13	10	3
16	Ing. Petr Švec - penta, s.r.o.	L	X	23	13	10
17	Jsp international, s.r.o.	L		4	4	0
18	Kordplast, s.r.o.	L	X	14	9	5
19	Linde gas, a.s.	M		13	9	4
20	Linde vítkovice a. S.	L		10	7	3
21	Lovochemie, a.s.	M	X	15	11	4
22	Lucební závody draslovka, a.s. Kolín	M	X	26	14	12
23	Lučební závody, a.s. kolín	L	X	26	14	12
24	Macco organiques, s.r.o.	L	X	19	13	6
25	Mg odra gas, s.r.o.	L	X	14	8	6
26	Norbrook, s.r.o.	L		2	2	0
27	Precheza, a.s.	L	X	21	14	7
28	Proseat Mladá Boleslav, s.r.o.	M		4	3	1
29	Shadows - šedivec, s.r.o.	L		0	0	0
30	Siad czech, s.r.o.	L	X	27	15	12
31	Silon, s.r.o.	M		6	3	3
32	Spolana, a.s.	L		3	3	0
33	Spolek pro chemickou a hutní výrobu, a.s.	M		15	12	3
34	Synthesia, a.s.	L		19	13	6
35	Synthon, s.r.o.	L		5	4	1
36	Synthos kralupy, a.s.	M		14	9	5
37	Unipetrol rpa, s.r.o.	M		18	14	4
38	Vodní sklo, a.s.	L	X	21	14	7

Source: Authors' own research

4. Research results

The following chapter states some of the findings of a larger research focused on describing novel business models based on sustainable multiple customer value creation. The research questions have been organized in a logical manner so that the answer to one question aids the answering of the following. The results provide an overview of the industry's business model structures and their characteristics in terms of sustainable multiple customer value creation.

4.1. What type of customer do companies create multiple value in the industry for?

The first research question answers the need to identify for what kind of customer the industry creates, deliver, and capture value. Within the scope of the theoretical background, to what kind of customer do the companies in the industry gear their business models in order to meet their environmental and social expectations? Table 1 indicated the results, where the most prevalent customer for which companies create value for is a B2B customer (70.22%).

Table 1. Sample structure

Type of customer	Subsidiary	B2B customer	B2C customer
Percentage	17.56%	70.22%	12.22%

Source: Authors' own research

4.2. Which elements are significant for the industry in terms of multiple customer value creation?

Two semi-structured interviews were further conducted to test the relevance on the remaining elements. The interviews were conducted with the production and commercial direction of Synthon, AS and the general director of the research and education center of Unipetrol, AS. Both interviews lasted around 60 minutes. In result, the set of elements was modified and reduced to 32, displayed in Table 2. The resulting elements had to be formulated in a wide enough sense to cover each company's specific context and narrow enough to portray the activity and its implications in the business model's narrative.

The elements in Table 2 were distributed according to the fields of the business model canvas for improved comprehension and visualization purposes. Table 2 also states the frequency of the elements in the sample which will is relevant to the following question.

Table 2. Significant business model elements in terms of multiple customer value creation

Business model canvas field	Business model element	Absolute frequency	Frequency (%)	Minority model
Value proposition	Multiple product variants on offer	32	84.21	
	Alternatives to products on offer	17	44.74	X
	Environmentally friendly products	24	63.16	
	Related products on offer	16	42.11	X
	Individual planning	23	60.53	
	Limiting use of dangerous substances in production	23	60.53	
Key partners	Suppliers of support services	22	57.89	
	Local suppliers	16	42.11	X
	Emphasis on industrial safety	27	71.05	
	Cooperation with public and non-profit organizations	11	28.95	X
Key activities	B2B resource sharing	4	10.53	X
	Commercial support for B2B customers	21	55.26	
	Use of sustainable feedstocks	18	47.37	X
	Use of energy saving equipment	21	55.26	
Key resources	Centralized waste treatment	25	65.79	
	Take-back agreement	10	26.32	X
Stakeholder relations	Consulting	27	71.05	
	Information and report sharing	23	60.53	X
	Sharing experiences with customer and suppliers	16	42.11	X
	Research cooperation	18	47.37	
	Provision of internships	20	52.63	
Channels	Online platform	13	34.21	X

Cost structure	Waste as an energy resource	15	39.47	X
	Centralized waste treatment	25	65.79	
	Waste recycling	23	60.53	
	Financial support and sponsorships	24	63.16	
	Education fund	5	13.16	X
Revenue streams	Rental of production facilities and equipment	7	18.42	X
	Specialized services (R&D)	21	55.26	
	Full product-service solutions	3	7.89	X
	Maintenance	24	63.16	X
	Byproducts available as energy source or resource	11	28.95	X

Source: Authors' own research

4.3. Which elements compose novel business model design within the industry's context?

To answer this research, question the business models, the set of significant business model elements in Table 2 must be divided into two subsets. A subset which represents elements which are not novel in the context of the industry and a subset representing the novel elements. The research bases this division on the assumption that novel business model elements will be the ones less represented in the overall set of elements. Thus, the division in this case is based on an elements frequency (Table 2) and the subsets are represented as the majority business model and the minority business model. If the frequency of an element is greater than 51% it is attributed to the majority business model and vice versa.

The majority business model construct (Fig. 1) represents the most prevalent business model elements. Thus, a business model employed by most of companies in the industry and which would be needed to follow if a new competitor entered the market. In terms of a narrative approach (Margretta, 2011), the majority business model represents the general narrative of the industry.

Figure 1. Majority business model construct

Key partners <ul style="list-style-type: none"> Provide support services with other companies 	Key activities <ul style="list-style-type: none"> B2B resource sharing Centralized waste treatment 	Value proposition <ul style="list-style-type: none"> Availability of different product variants Environmentally safe products Avoid hazardous substance in production Emphasis on industrial safety Provide individual planning 	Stakeholder relationships <ul style="list-style-type: none"> Share information (also with the public) Consulting Provide internships for university students 	Stakeholders <ul style="list-style-type: none"> Subsidiaries (17.56%) B2B Customers (70.22%) B2C Customers (12.22%) Suppliers Universities Environment
	Key resources <ul style="list-style-type: none"> Use of energy saving equipment 		Channels	
Cost structure <ul style="list-style-type: none"> Reduce waste Waste recycling Money donations/Sponsorships 			Revenue streams <ul style="list-style-type: none"> Specialized services (R&D) Provide full product-service solutions 	

Source: Author's own research, modified according to Osterwalder et al., 2015

The minority business model construct (Fig. 2) represents, according to the definition of sustainable multiple value creation, a subset of differentiating elements which are geared towards satisfying the environmental and

social expectations. The minority model construct displays the orientation towards a larger number of stakeholders, new income streams and opportunities to reduce opportunity costs and drive eco-efficiency. Notably, in the “channels” field where distribution is also ensured through an online platform connecting local suppliers and offering waste materials as a resource or energy source. It also shows greater openness to a larger number of stakeholders by sharing experiences with customer or suppliers, participating in academic research, and cooperation with public and non-profit organizations.

From the perspective of a narrative approach the minority model serves as a range of elements which modify the company’s narrative business model. The construct, as it stands, cannot be applied to the whole industry due to its nature of being a collection of less frequently utilized elements. Companies are likely to utilize the full extent of elements of the majority model and only some from the minority model. Thus, minority model can serve as a tool to gauge whether a company engages in creating multiple customer value or not and follow the evolution of the industry through shifts of elements from and to the minority business construct.

Figure 2. Minority business model construct

Key partners <ul style="list-style-type: none"> • Procurement from local suppliers • Cooperation with public/non-profit organizations 	Key activities <ul style="list-style-type: none"> • B2B resource sharing • Provide take back agreement 	Value proposition <ul style="list-style-type: none"> • Availability of product alternatives • Availability of related products 	Stakeholder relationships <ul style="list-style-type: none"> • Assist/participation in academic research • Share experiences (with customers and suppliers) 	Stakeholders <ul style="list-style-type: none"> • Subsidiaries (17.56%) • B2B Customers (70.22%) • B2C Customers (12.22%) • Suppliers • Local government • Public/non-profit organizations • Environment
	Key resources <ul style="list-style-type: none"> • Sustainable feedstocks 		Channels <ul style="list-style-type: none"> • Online platform for reservation 	
Cost structure <ul style="list-style-type: none"> • Waste to energy • Set up education fund 			Revenue streams <ul style="list-style-type: none"> • Provision of maintenance • B2B Leasing • Sale of waste materials e as a resource or energy 	

Source: Author’s own research, modified according to Osterwalder et al., 2015

4.4. How are minority business model elements distributed in the sample?

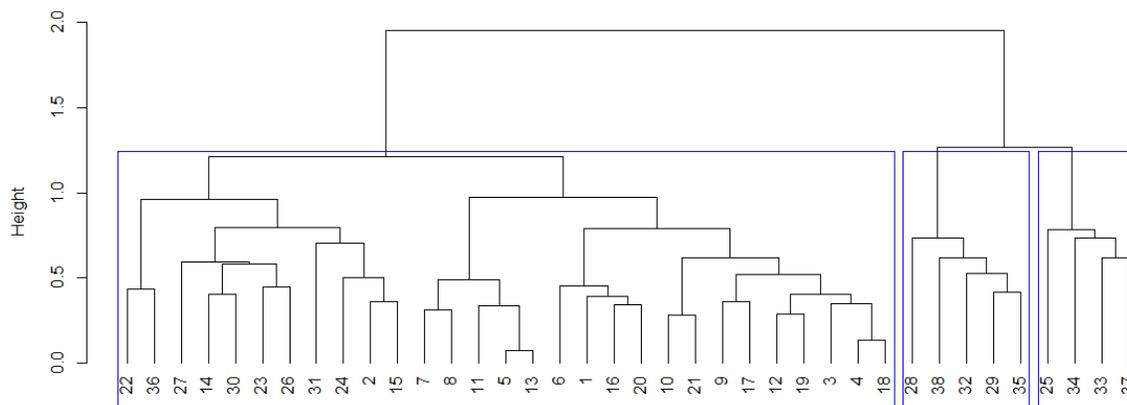
Assuming that majority business model elements are present in every company’s business model. The question aims at the distribution of minority business model elements (figure 3), whether they are distributed randomly throughout the industry’s business models or are they concentrated.

To answer this question the range of companies according to the number of majority and minority business model elements (Table 1) were compared using Spearman’s correlation coefficient. For the chosen significance level of $\alpha = 0,05$ the resulting value of the coefficient is 0.813, and the null hypothesis is rejected. Thus, there is a strong positive correlation between the range of companies according to the number of majority and minority business model elements. Hence, companies with a large number of majority business model elements in the business model also have a large number of minority business model elements.

4.5. How related are the business models in the industry?

Cluster analysis of the industry's business models reveals that there are 3 major groups. The cluster dendrogram represents these groups (Figure 3). Companies are represented in figure 3 by their reference number from table 1. Cluster 1 is composed of 20 large-sized companies and 9 medium sized companies, for a total of 29. Cluster 2 is composed of 5 companies, all of which are large-sized. Finally, cluster 3 comprises 2 medium-sized companies and 2 large-sized companies. The structures of the clusters show that, although, companies are similar in terms of the business model their scale varies.

Figure 3. Results of Cluster analysis
Cluster Dendrogram



Source: Authors' own research

Conclusions

Business model research is often limited to case studies of one or a few companies. Few works have focused on studying an industry through the lens of its business models. Moreover, few works have studied the connection of specific business model elements and sustainability multiple value creation. Due to the narrow orientation of the research the results are very specific for these companies. Based on the minority business model construct, it is visible that the contained elements point to that novel business models shift to more of an open system through a service-based logic which aims to lower environmental impact. Although, the majority and minority constructs may seem similar in some terms, it is necessary to note that they represent narratives. The majority business model represents a meta narrative for the whole industry, whereas the minority model represents a collection of odd elements which fit into specific narratives of individuals companies and represent vast effort for implementation. Results portray the industry in terms specific business model elements connected to this theoretical construct. These elements served to formulate the industry's narrative in terms of sustainable multiple customer value creation. The narrative of the industry is as follows (figure 2):

The industry's prevalent narrative in terms of sustainable multiple customer value creation is as follows: Companies provide different product variants and individual planning solutions for their customers while emphasizing environmental safety of their products, industrial safety, and avoidance of hazardous substances in their production. This is achieved by providing support services to their customer with other companies, B2B resource sharing, centralized waste treatment, and usage of energy saving equipment. To provide this value proposition companies cooperate with their customers (subsidiaries 17,56 %, B2B customers 70,22%, B2C

customers (12,22%), suppliers, universities and taking the environment into consideration also as a stakeholder. Relationships with these stakeholders are upheld via sharing information about the company's functioning, providing consulting, and providing internships for university students. The cost structure includes promoting cost savings from reducing waste and recycling it, as well as carrying the costs of a fund for money donations and sponsorships. Revenue streams include providing specialized services like research and development and full-service product solutions.

This narrative is modified by elements which serve as differentiating parts (figure 3). But, research showed that companies which employ a large number of majority business model elements also employ a large number of business model elements. Which could point at that the adoption of minority business model elements would be a function of scale, i.e., larger companies are able to differentiate more effectively due to having more resources available. But, cluster analysis showed that 2 out of 3 cluster were composed of companies of different size which support the claim that changing or adapting the business model is a significant non-technological innovation.

Future research involves the creation of specific concepts based on individual elements contained in the minority business model. These concepts can be acquired through statistical correlation of the existing data, to see exactly which elements correlate to specific elements. Other efforts will be focused on gaining access to specific performance data to pair it with the specific business models, thus providing evidence on how different configurations of elements in the business model affect social, environmental, and economic performance.

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