

TOWARDS INCREASED BUSINESS MODEL COMPREHENSION – PRINCIPLES FOR AN ADVANCED BUSINESS MODEL TOOL

Research in Progress

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Abstract

Business modelling is recognized as an important concept to make company strategies more explicit and to compare alternatives combined with their translation to the operational layer. Typically, business modelling is performed by a group of experts building on established frameworks like the Business Model Canvas. In a subsequent step, different stakeholders in a company should build upon and work with the defined business models, thus, comprehension is critical. However, this is challenging from a practical point of view and existing research has not addressed the issue of business model comprehension. In order to close this research gap and to increase users' business model comprehension, we propose an advanced business model tool and an experimental design in this research-in-progress paper. Following the design science approach, we derive a first set of meta-requirements and design principles and present an advanced business model tool instantiation. The presented tool should contribute to an increased business model comprehension by providing semantic relationships and extended business performance indicators. Finally, we present a set of testable hypotheses and the research design for an experimental tool evaluation. With this research we intend to provide a solution to the problem of business model comprehension and contribute to the design knowledge base of business model tools.

Keywords: Business Model, Business Model Canvas, Business Model Comprehension, Design Science.

1 Introduction

Globalization, increasing competition and digitalization are driving forces that require companies to adapt existing business models (BM) in shorter time frames (Teece, 2010) as well as to develop entirely new BMs. Understanding the existing BMs of a company and developing new BM has become necessary in order to remain competitive (Magretta, 2002; Chesbrough, 2007). Different BM frameworks and corresponding tools have been developed (Ebel *et al.*, 2016). Specifically, the Business Model Canvas (BMC) by Osterwalder (2004) has been widely adopted in practice. There, the BMC is typically filled out in a workshop format involving a group of experts and subsequently presented and used by many different stakeholders in a company. BM comprehension is important, as different stakeholders make use of a BM from a strategic, tactical and operational point of view.

However, the focus of some BMs is mainly on the strategic level (Osterwalder, 2004). As a consequence, tactical and operational points of view are not represented fully in these approaches. Lindgren and Rasmussen (2013) state the need to “fully understand the levels, dimensions and components of the business models thoroughly” and to be “able to communicate, work and innovate with business models at these levels” (Lindgren and Rasmussen, 2013, p. 158). As a result, a BM framework should support the comprehension of the user throughout all levels of the organization and give a common model about the value creation (Osterwalder and Pigneur, 2010). In the past, different advancements of the BMC and new frameworks tried to increase the comprehension between different company levels with more detailed information about the value creation (such as Lindgren and Rasmussen, 2013; Ebel *et al.*, 2016). However, this research topic is initially with “huge unexplored possibilities” (Lindgren and Rasmussen, 2013, p. 158). We tie up here and focus on the demand of an increased comprehension of BMs. As mentioned, existing BMs focusing mainly on strategic views (Osterwalder, 2004) and provide limited transparency between the specific business elements (Reuver *et al.*, 2013). To reduce complexity, we focus on the company perspective of a business model at first. Thus, we focus on the following key research question:

Which design principles for advanced business model tools contribute to increase users’ business model comprehension?

To answer this question, we propose a design science research (DSR) project (Vaishnavi and Kuechler, 2004). Research in the field of BM comprehension is still in an early stage. We build upon the BMC, because it is often used in practice and highly cited in research. Extending the BMC concept we articulate meta-requirements and design principles for advancing BM Tools to enhance users’ BM comprehension (Alt and Zimmermann, 2001; Doz and Kosonen, 2010; Zott *et al.*, 2011; Veit *et al.*, 2014). From a scientific point of view, we contribute to the design knowledge base for building BM tools. When building BM tools according to our identified principles, practitioners should be able to understand the individual way of value creation of a company better, make decisions based on this enlarged knowledge.

The remainder of this paper is as follows: First, we provide an overview of the related work and conceptual foundations on comprehension in chapter 2. Second, we describe our research methodology and the planned cycles in the design science research project in chapter 3. We also derive meta-requirements and design principles in this chapter. In chapter 4, we describe the research design for the experimental evaluation of the prototype more detailed. Finally, we provide a short summary and an outlook on future work in chapter 5.

2 Related Work and Conceptual Foundations

In this section, we introduce the conceptual foundations of our work. We present a short overview on BM frameworks and tools as well as provide an overview on the concept of comprehension.

2.1 Business Model Frameworks and Tools

Several researchers like Gordijn *et al.* (2000), Petrovic *et al.* (2001) or Veit *et al.* (2014) provide a definition of BMs. The definition of Timmers (1998) is appropriate to describe BMs with focus on the comprehension of the value creation. For him, a BM is “an architecture for the product, service and information flows, including a description of the various business actors and their roles; and a description of the potential benefits for the various actors; and description of the sources of revenue”.

More than twenty BM frameworks with various purposes of use and field of study have been proposed in the past (Lambert, 2010; Wirtz, 2011). The frameworks have in common six key decision areas (Morris *et al.*, 2005) as well as 17 evaluation criteria for classification of the BMs (Burkhart *et al.*, 2011). The introduction of Osterwalder’s ontology for BMs (Osterwalder, 2004) and the related work (Osterwalder and Pigneur, 2010) changed this situation. The extension of the balanced scorecard builds a base, which was used for such long-term strategy implementations in the past (Bourne *et al.*, 2003; Speckbacher *et al.*, 2003; Norreklit, 2000). He and other scientists also focus on ontologies to arrange relations between the BM elements (Osterwalder, 2004; Osterwalder and Pigneur, 2004; Osterwalder *et al.*, 2005; Ilayperuma, 2007). With his work, he changed the way of business modelling, as his BMC is cited hundreds of times (Lucassen *et al.*, 2012; Pigneur and Fritscher, 2015). Recently, some scholars proposed to add further dimensions to transform the one-dimensional BMC to a multi-dimensional cube. In this cube, the categories of the BMC are reorganized in a way, that they show relations and should inter alia support BM implementations (Lindgren and Rasmussen, 2013). Practical tools, which are using this BM cube, are for example the one of “VDMBee” (*Value Management Platform - VDMbee*) or the “NEFFICS platform” (*NEFFICS Platform | NEFFICS*). These tools have different views on the value creation, as there are for example role collaborations, activity networks or value proposition exchanges (*NEFFICS Platform | NEFFICS*). This reflects the value creation logic more specific, but also with higher effort (Lindgren and Rasmussen, 2013). The developers of the tools see the advantage of making the models more operational and link the different elements of the model (*Value Management Platform - VDMbee*). Next to these, specific representations focus on concrete industries or actions and provide therefore a customized representation (Peters *et al.*, 2015). However, these representations are limited to these specific tasks and therefore hard to generalize. In contrast, the BMC builds a core standard because it is easy to use and to understand. Thus, it builds a suitable starting point for an improvement of BM tools in a way to increase the comprehension of BMs.

2.2 Comprehension

Conceptual models are known as important artefacts to help individuals to better understand domains (Burton-Jones and Meso (2009)) and are therefore often seen to support a learning process (Recker *et al.*, 2014). Out of such a learning process, the construction of new knowledge results (Mayer, 2009). In general, “model comprehension is a primary measure of pragmatic model quality, as distinguished from syntactic quality, which refers to how a model corresponds to a particular notation, and semantic quality, which refers to how a model corresponds to a domain.” (Figl, 2017, p. 42; Lindland *et al.*, 1994; Overhage *et al.*, 2012) Past research activities thereby focus on the content and the representation as directly influence on the understanding of the user (Recker *et al.*, 2014). Research in business process management has been examining an increase of comprehension for many years (for example Recker *et al.* (2014); Zimoch *et al.* (2017); Figl (2017)). Figl *et al.* (2013) underlined the role of visual models when analysing complex organizational correlations at the example of business processes. Comprehension research is not only focusing only on process comprehension (e.g. Majozi *et al.*, 2017), but is widespread across various fields and disciplines (e.g. Chiang *et al.*, 2017; Wang *et al.*, 2017; Cohen-Mansfield *et al.*, 2017). What can be seen in all this research is that comprehension of a model is typically supported through a clear semantic and comprehensive view of the domain (Moody, 2009). This represents also the foundation for our research on BM comprehension. Hereby, the information, provided for the user as well as the structure of the information is important. Thus, an ade-

quate approach should also consider principles of simplicity and transparency (Zott and Amit, 2010). One focus of comprehension in the area of BMs is comprehending the current BM of a company. Without a comprehension of the current value creation, e.g. the success of a transformation is decreased (Osterwalder and Pigneur, 2010). As a result, in our research we want to increase the comprehension of BMs.

3 Design Science Research Project

Achieving higher comprehension of BMs is the main objective of our research. We want to propose design principles, which can help to increase users' BM comprehension. Therefore, we use the design science paradigm following the approach suggested by Vaishnavi and Kuechler (2004).

3.1 Overview of the DSR Project

Comprehension of BMs is a real-world problem. To develop a tool, which supports the comprehension of BM, we proceed in cycle one with a comprehensive literature review, the analysis of 15 case studies and with interviews of industry partners (Bosch, Siemens, Blanc and Fischer). The interviewees are decision makers of different departments in the organization. We focus specifically on the experiences in several transformation projects related to the work with tools and methods to support a transformation. As we have seen in previous projects (e.g. Augenstein *et al.*, 2016; Augenstein and Madche, 2017), it makes sense to do these interviews in small rounds of 1 and 2 participants, we derive information about the challenges of transformation, the usage of methods and tools and their limitations. Interviewees are mainly decision makers from the middle and upper part of the management, who have knowledge in transformation projects. Additionally, we have a look at 15 real-world industry cases, which focused on the transformation of their BM. The background of the studies is either an introduction of lean management or of a smart factory. We have a deeper look on the way of proceeding, the initial position of the organization as well as the success of the transformation. The organizations are all related to the manufacturing industry. Combining a literature review, interviews and case studies, allows deriving requirements from theory and practice.

General Cycle	First Design Cycle	Second Design Cycle	Third Design Cycle
Problem Awareness	<ul style="list-style-type: none"> Literature Review Interviews with Industry Partners 	<ul style="list-style-type: none"> Analyzing the results of Evaluation Cycle 1 Update Problem Awareness 	<ul style="list-style-type: none"> Analyzing the results of Evaluation Cycle 2 Update Problem Awareness
Suggestion	<ul style="list-style-type: none"> Design Principles (DPs) for a better comprehension of BMs 	<ul style="list-style-type: none"> More detailed specification of DPs based on the results of Cycle 1 	<ul style="list-style-type: none"> More detailed specification of DPs based on the results of Cycle 2
Development	<ul style="list-style-type: none"> BM Extension (BME) Mockup 	<ul style="list-style-type: none"> BME Running Experimental Prototype 	<ul style="list-style-type: none"> BME Running Prototype (focus on transformation status quo -> target)
Evaluation	<ul style="list-style-type: none"> Qualitative Evaluation: BMT Mockup -> several small scale evaluations 	<ul style="list-style-type: none"> Experimental Lab Evaluation (Focus on status quo model comprehension) 	<ul style="list-style-type: none"> Field Evaluation (qualitative + quantitative)
Conclusion			<ul style="list-style-type: none"> Design Knowledge Extended BM Tool

Table 1. Design Science Research Approach based on Vaishnavi and Kuechler (2004)

Through the information we get from the literature review, case studies and interviews, we formulated specific requirements for an increased comprehension of BMs. As mentioned earlier, we want to stick here to the BMC. However, there are many extensions of the canvas, which fulfil different purposes (Lindgren and Rasmussen, 2013). Through the literature review of existing representations of BMs,

we derive design principles, which extend the BMC in an appropriate way. We therefore investigate existing different BM representations and focus on different characteristics like transparency or way of representation. This results in a set of design principles, which together with the requirements should enable a higher comprehension of a BM.

In this paper we present a first mock-up of an experimental prototype of the proposed tool. It will be used to evaluate the proposed design principles. We will evaluate the mock-up in pre-tests and will use these insights for design science cycle two. On this basis we will build a running experimental prototype. We will then evaluate this prototype as described in detail in the following. The insights we get from this evaluation we inform the third design cycle. There we will build a running tool and evaluate it in a field experiment with our partners from practice. The outcome of the entire DSR project will be design knowledge for BM tools in general and an instantiation of an advanced BMC tool.

3.2 Design Requirements and Design Principles

In our interviews, we discovered that peoples' understanding of the initial situation of the company is not always guaranteed. This means, that they do not fully understand how value is created and what the current BM of the company actually looks like. Thus, there is a need to increase users' BM comprehension and to extend existing business modelling approaches to enable a better understanding for the users. Richardson (2008) claims, that a BM is neither a strategy nor a table of actions to execute the strategy (see also Morris *et al.* (2005); Di Valentin *et al.* (2012)). Al-Debei and Avison (2010) aim to mediate between different company levels and show, how they work together. They underline the necessity of BMs, to be understandable also for operational and tactical levels, additionally to the strategic level. As a consequence, a better comprehension of a BM is necessary. A BM should clearly describe the value creation process and the interdependencies between different elements (Rosenbloom, 2012). Thus, a first requirement is capturing the entire value creation process. Specifically, interdependencies should be made explicit (RQ1).

Performance measurement using key performance indicators is known to be important (Pauwels *et al.*, 2009). Transferred to BMs, we consider explicit measurement of the value creation flow as important for increasing comprehension (RQ2) (Osterwalder and Pigneur, 2010). In their work, Osterwalder and Pigneur (2010) name this "value capturing" and focus on the cost and revenue structure. However, they do not focus on time-dependency of the value capturing. BMs are not static, but change over time, e.g. influenced by external shocks (Demil and Lecocq, 2010). Therefore, including the capturing changes over time should contribute to an increase of BM comprehension (RQ3) as it provides a more holistic view (Lindland *et al.*, 1994; Overhage *et al.*, 2012). As mentioned, strong comprehension and a related decrease of abstraction can support users of BMs as they have a common base of communication. So Lindland *et al.* stated that "not even the most brilliant solution to a problem would be of any use if no one could understand it" (Lindland *et al.*, 1994, p. 47). Therefore, the requirements which are shown in the following table should increase comprehension of BMs.

ID	Requirement	Description
RQ 1	Make value creation process and interdependencies of elements explicit	It should be easier to understand the relations between the different business model elements and the value creation flow, because the user has more and deeper information.
RQ 2	Allow extending the core value capturing concept of BMC	It should be possible to extend the core BMC value capturing dimensions with additional KPIs. So the user can evaluate the BM and decide rapidly based on this values.
RQ 3	Support time-dependent information of value capturing	Changes of the values should be explicit, so the user can value them and see the direction, the values are heading to.

Table 2. Overview of the Requirements

These requirements will be translated in two design principles. As stated above, we will use the BMC as base because of its popularity in science and practice. As mentioned, the relations between elements of the model should be more explicit. We suggest explicitly relating and visualizing connected BM elements along the value creation process (DP1). This should enable a more comprehensive view without creating information overload. Extending the ability to capture values using a more flexible KPI set will be addressed by the second design principle (DP2). Thus, not only financial values and high level KPIs will be captured, but also more operational KPIs. These KPIs can be defined by the user themselves according their needs. Additionally, time-dependency of the KPIs will be visualized through diagrams following a dashboard approach.

ID	Requirement	Design Principle
DP1	RQ1	Visualize dependencies between business model elements along the value creation process to make value creation process and interdependencies of elements explicit
DP2	RQ2 & 3	Provide an extended value capturing concept using KPIs and corresponding visualizations following a dashboard approach

Table 3. Overview of the Design Principles and the relation to the Requirements

3.3 Instantiation

We instantiated the two design principles in a first prototype. A screenshot is depicted in Figure 1. DP1 is realized in a way that the relations between the elements are shown following a hyperlink approach. After clicking on one element, the directly related elements will be highlighted. In our example, the tool production is directly linked with the key suppliers and all key resources as predecessors and with high-end products and high quality as successors. Additionally, we introduced an extended and more flexible “Value Capturing” dimension extending the established BMC dimensions of “Cost Structure” and the “Revenue Stream”. The represented KPIs in these categories use established dashboard design principles and provide line graphs to visualize time-dependent information. This is also in line with the International Business Communication Standard (Hichert and Faisst 2017).

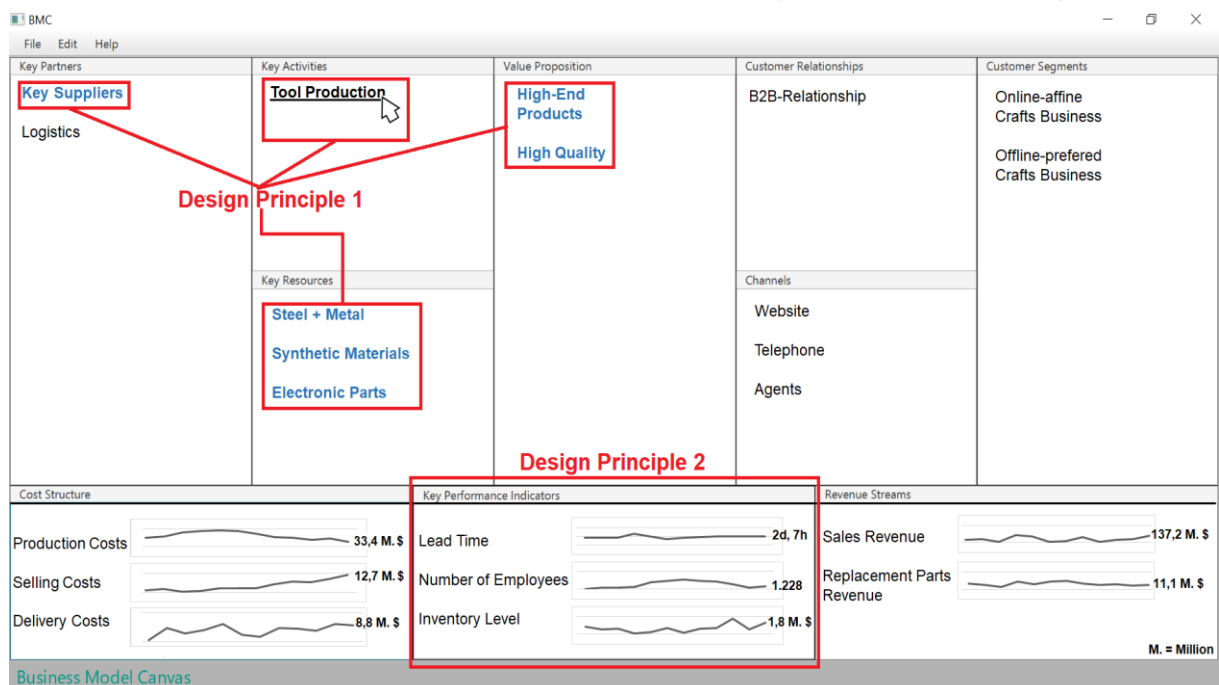


Figure 1. Prototype of the advanced BM tool with design principle 1 and 2.

In general, research in dashboard design or comprehension of process models provides a lot of knowledge about increasing the understanding of models (Figl, 2017). Focusing on the values, the tool can show line diagrams of the value. Like in a dashboard, one can see rapidly the course of the lines. Additionally, it is possible to include some predictions, where users can see a possible future course and can do adaptations where appropriate. The prototype and both design principles are shown in figure 1. As next step, we will proceed the experiment to show, if there is an increase of comprehension through the mentioned requirements and design principles.

4 Experimental Evaluation

To evaluate the tool and the underlying design principles, we propose to run a controlled lab experiment. Our primary presumption is that BM comprehension is a construct consisting of content and content representation for the user (Mayer, 2009). We want to evaluate the expected effects on BM comprehension influenced by different tool configurations.

First, we use the business model canvas (BMC) concept and its implementation in our prototypical tool as a baseline. Osterwalder and Pigneur (2010) introduced the canvas concept in order to capture the value creation process of a company in a simplified and compressed way. This leads to the first hypothesis:

H1: The basic BMC configuration positively influences users' BM comprehension.

Second, we focus individually on the representation of the content (H2A) and the content itself (H2B). Figl *et al.* (2013) highlighted the role of good visual representations of models. The captured information like data, partners or values should be represented in an easy understandable way (Recker *et al.*, 2014). This should be independent from users' characteristic and the contained information. Adding relations to the core BMC concept, we expect an increase of comprehension compared to the baseline BMC. Therefore, we formulate hypothesis (H2A) related to design principle one.

H2A: The effect of BMC extension through relations on users' BM comprehension is stronger than the effect of the basic BMC.

In hypothesis H2B, we turn to the content of business models. Users actively arrange and insert information in visual models (Recker *et al.*, 2014). With their previous knowledge, characteristics and existing mental models this process will then result in the construction of new knowledge (Mayer, 2009). This "one-episode learning process" (Recker *et al.*, 2014, p. 201) will increase the comprehension.

H2B: The effect of the BMC extension through an extended value capturing on users' BM comprehension is stronger than the effect of the basic BMC.

Additionally, we will have a look on the effect, if one combines both design principles:

H3: The effect of the combined BMC extension through relations and further value capturing on users' BM comprehension is stronger than the effect of the basic BMC.

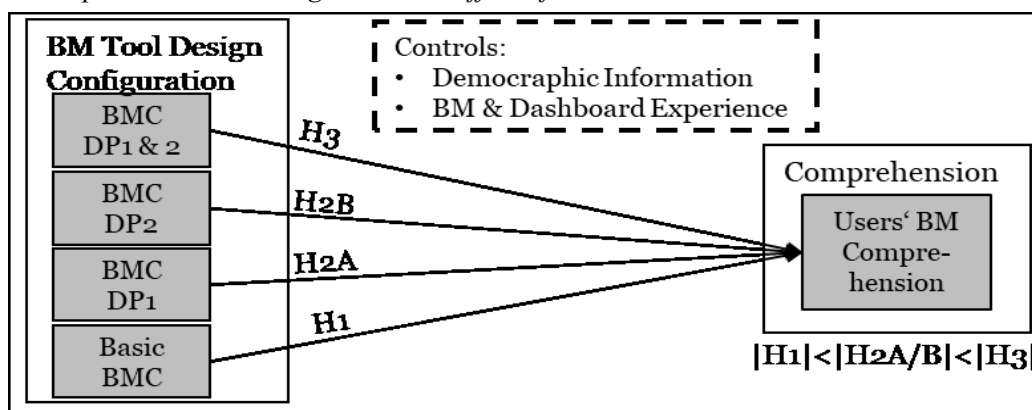


Figure 2. Research Model

All in all, we expect the effect of H3 is higher than H2A/B as well as H2A/B are higher than H1. We want to test these hypotheses through a lab experiment with students in the field of information systems and industrial engineering at our university because we assume they all have the same basic knowledge about BMs. Thus, we can exclude confounders through prior knowledge.

To evaluate the different principles, it is possible to turn functions on / off in our experimental prototype. In configuration “BMC DP1” we offer the group only the relations function. In configuration “BMC DP1&2” we implement both functions. Groups with the “reduced” functionality will get the same information through documents in order to guarantee that each group has the same level of information. Each group runs the same experiment except for the different functionalities offered by the tool. Each of them has to answer then a similar set of questions about the given BM. The students will be divided into different treatment groups in order to test the four hypotheses. Group four will get the full functionality of the extended BM with all the KPIs and relations between the elements. Group two and three will get the extended BM with relations between the elements and further information, but without KPIs or the other way round. Group one will get the basic BM and further information in a textual document. Based on the experiment scenario, we will define a set of comprehension questions about the business model that the students will have to answer afterwards. To measure an increase of comprehension, we compare these answers. A higher number of correct answers will be seen proportional to a higher comprehension.

5 Conclusion

This paper presents our research in progress of the exploration of design principles for an advanced business model tool leading to an increased comprehension of BMs. In this research project we extended the BMC by Alexander Osterwalder (2004) towards an extended comprehension. As the BMC is widely adopted in theory and practice, we use it as the base for our extension. Specifically, we show more detailed the relations between elements and allow for more detailed evaluation of the model using performance measurement. This satisfies *inter alia* the demand of the BM as communication base between different related persons. This is because such tools do not use all opportunities provided by the current available techniques (Veit, 2014). With the proposed design principles, people have the opportunity to build a better common base of a company’s value creation process.

Our work comes with some limitations: The BMC can be filled in by different persons. They can have different views and on the other side, the views are not fully objective. Another limitation is the perception and mental skills of people. For some people with fast perception or people, which work often with the BMC, the additional information can be obsolete for them. Further limitations can include a decrease of abstraction in the strategic view. As the BMC is mainly a strategic management tool, the more operational design principles might dilute this strategic role.

Future work will include the evaluation of our prototype and the realization of the final tool. We therefore want to do a lab experiment, where we evaluate, whether the comprehension is actually increased through our design principles. We will compare the comprehension of three groups with different levels of extension of the advanced BM tool. From a conceptual point of view, future work should also target making the content presented in the BMC more objective. It is thinkable to extract data from a company’s ERP system, as we plan in our BM Mining project (Augenstein and Fleig, 2017). As a consequence, this data can be used to extract a current BM one only has to adapt. The advantage would be, that the degree of objectiveness is increased. Next to this it is thinkable to include predictions of values in the “Value Capturing” categories. This prediction of values can help the users of the model to make decisions more value based.

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