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Norman Schaffer

Clemens Drieschner

Helmut Krcmar

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An Analysis of Business Model Component Interrelations

Completed Research Paper

Norman Schaffer

fortiss & Technical University of Munich
Munich, Germany
norman.schaffer@tum.de

Clemens Drieschner

Technical University of Munich
Garching, Germany
clemens.drieschner@tum.de

Helmut Krcmar

Technical University of Munich
Garching, Germany
helmut.krcmar@tum.de

Abstract

Innovative business models are crucial for a firm's competitive success. When adapting a business model, it is key to understand existing interrelations between its components, as a change in a single component can lead to various changes in other components. Furthermore, the influence of external triggers on components is crucial to understand the inherent dynamics caused by these interrelations. With this study, we gather, describe, and classify interrelations between business model components based on the existing literature. In research, these results can be used to model the inherent dynamics of business models. In practice, this knowledge helps to develop and maintain a stable business model by considering the found interrelations of its components. Furthermore, it supports the evaluation and implementation of changes in BMs. Moreover, we contribute to research on business model innovation, dynamic business models, and cognitive biases in the use of business models.

Keywords: *business model innovation, dynamic, interrelations, interdependencies, decision support*

Introduction

The business model concept is prevalent in scientific literature and companies continuously strive to develop new, innovative business models (BMs). When designing or innovating a BM, one typically aims to solve questions on how to create or enter new markets, what the right product and service offerings are, which ways of value capture are appropriate or how the proposed new model differs from competitors (Zott and Amit 2010) but does not focus on how the model will behave in the market (Demil and Lecocq 2010). Current research lacks insights into mid-and-long term occurrences of BM evolution (Bohnsack et al. 2014). Yet, as evidenced by theory and practice, a firm's BM is not a static construct, but it rather changes and has to be adapted continuously over time (Chesbrough and Rosenbloom 2002; Gerasymenko et al. 2015; Moellers et al. 2019; Wirtz et al. 2016).

When launching a new BM, various adaptations occur. McGrath even states that BMs "often cannot be fully anticipated in advance. Rather they must be learned over time" (McGrath 2010, p. 248), leading to a process of trial-and-error (Birkinshaw and Goddard 2009; Desyllas and Sako 2013). As components are interrelated, even small changes within one component lead to changes or the necessity of adaptation within another component (Bieger and Reinhold 2011). We refer to this phenomenon as inherent dynamics, which mainly occurs between the components a BM is constituted of (Cosenz and Noto 2018).

Despite existing extant literature on specific interrelations, no fully comprehensive overview exists. As of now, these interrelations are not sufficiently understood (Burkhart et al. 2011; Chen et al. 2019; Schaffer et al. 2019). Thus, the objective of this paper is to answer the following guiding research question: *What interrelations exist between business model components, and how are they characterized?*

Answering this question, we identify interrelations between business model components. For each interrelation, we specify the respective impact. The generated knowledge can be used to design new BMs as well as to support the implementation of changes in BMs (Gerasymenko et al. 2015), which improves performance in complex environments (Bock et al. 2012). At the same time, it helps to ensure the necessary tight coupling between the components (Al-Debei and Avison 2010; Demil and Lecocq 2010). This allows for understanding the complexity and inherent dynamic of a BM.

This paper contributes to research on BM innovation (BMI) and dynamic BMs, strengthening the BM as a theoretical construct. In detail, the results contribute toward the research stream of cognitive biases in the use of BMs (Martins et al. 2015), as decision-makers tend to get stuck in a specific path to BMI (Bohnsack et al. 2014). Managers often have cognitive biases in the direction a BM should evolve towards, and do not grasp the entity of complex interrelations leading to ill-informed decisions. If no transparency of the interrelations exists, the cognitive biases may lead to suboptimal decisions and in the long run may endanger the usefulness of the whole BM. Knowing these interrelations minders these biases. We contribute to research on BMI by fostering innovation by a transparent mapping of internal influences of the operating company, as well as external influences such as market conditions, technology progression, or customer demands onto the BM (Andries et al. 2013; Wirtz et al. 2016).

From a practical view, this research offers insights for entrepreneurs and decision-makers to develop more sustainable BMs while considering internal dependencies. Also, this knowledge allows to perceive opportunities due to the transformation of BMs as well as to prevent risks, which result from a specific constellation of components and external factors and fosters the entrepreneurial learning process. A BM should be flexible enough to allow changes, but at the same time offer stability for the development of a company's activities (Cavalcante et al. 2011), which can be evaluated based on the results. Lastly, a comprehensive representation of existing interrelations of a BM increases transparency and helps potential investors to evaluate the profitability.

The remainder of the paper is structured as follows: First, we introduce existing prior work. Next, we outline the applied methodology of our research, building on a literature review. Afterward, the results of the analysis are presented and their implications are discussed in detail. In the last section, we conclude the paper.

Extant Literature on Business Model Component Interrelations

There currently is no fully accepted definition of BMs in the literature (Cosenz and Noto 2018). Massa et al. (2017) have identified three basic interpretations of BMs: as attributes of real firms, as cognitive or linguistic schemas, and as formal conceptual representations of how an organization operates. Formal conceptual representations, as the third interpretation of BMs, are useful to understand and frame the complexity of BMs (Cosenz and Noto 2018; Sterman 2000). Building on this third interpretation of BMs, we adhere to the understanding of BMs by Teece (2010) emphasizing on value creation, value delivery, and value capture. We use the extended definition of dynamic BMs: "A dynamic business model is a complex system of interrelated subcomponents of the value creation, delivery, and capture mechanisms, which is interacting with heterogeneous internal and external influences leading to the evolution of its components and the system itself" (Schaffer et al. 2019).

Interpreting BMs as dynamic and complex systems, Demil and Lecocq (2010) propose "dynamic consistency" as a firm's capability of anticipating and reacting to sequences of voluntary and emerging change, sustaining a BM's performance while adapting it. For preserving performance, the literature emphasizes the necessity to adopt a holistic approach, which incorporates an understanding of existing interrelations between BM components (Baden-Fuller and Mangematin 2013; Casadesus-Masanell and Ricart 2010). Additionally, Casadesus-Masanell and Ricart (2010) stress that existing interrelations in BMs can produce virtuous cycles, i.e. reinforcing feedback loops that would fortify parts of the model

over time. These virtuous cycles can be critical factors in successful BM operation and various aspects of managing BMs can strengthen their implications (Casadesus-Masanell and Ricart 2010), supporting a holistic approach.

Extant literature researched the influence of particular effects on specific components. Gerasymenko et al. (2015) provide research about the effect of venture capital funding on the performance of BMs. In their study, they identified a positive effect of involving an outside CEO into a young venture, i.e. a change in the resources of the BM. Lehoux et al. (2014) perform a longitudinal case study to understand the influence between BM design and technology design, based on insights from three health-technology spin-offs. Davies and Doherty (2019) draw on sustainable business model research to perform a case study with a BM responding to changes in the market as well as the societal environment, providing insights towards changing of value capture objectives and diversifying value creation activities. Visnjic and van Looy (2013) identified a positive impact of the availability of services onto the financial model of manufacturing companies. Krumeich et al. (2013) researched structural relations between BM components, providing an overview of existing interrelations. However, as different components are grouped in this research, it is difficult to understand the interrelations in detail to make use of them in practice.

To map and understand the interrelations between BM components in detail, it is first necessary to select a suitable framework. As mentioned, this study builds on the interpretation of BMs as a formal conceptual representation of how an organization functions, as it is, for example, the Business Model Canvas. In this study, we use the business model component framework by Krumeich et al. (2012). This framework emphasizes on value creation, delivery, and capture and, at the same time, provides great detail, describing comprehensively the constituting components and extending the three value dimensions by a cooperation model and a financial model. In total, the framework consists of 20 components, as such allowing to describe a BM in more detail compared to e.g. the Business Model Canvas, and is depicted in Figure 1.

Value Creation Model		Value Offering Model		Value Capturing Model	
Organizational structure A business model's roles and responsibilities		Value Proposition Benefits a business model provides to its' customers		Customer and Market Segment Target customers and market segment of a business model	
Resource model Resources necessary for operating a business model		Product and Service Offering Products and services offered to realize the value proposition		Communication and Distribution Channel Channels for distribution and communication with customers and stakeholders	
Competence model Available competences to create and capture value		Competitive Advantage Extent a business model is different to competing ones and how this advantage is maintained		Customer Relationship Relationships a business model operator has with its' customers	
Activities and processes Activities and process to provide the value proposition		Competitive Model Competitive environment of a business model			
Cooperation Model			Financial Model		
Structure and Position Relationships to enable a business model and position within the network			Funding Model Sources to receive capital to operate a business model		Distribution Model Sharing of investments, costs and revenues among participants
Coordination Communication channels and coordination mechanisms to operate the cooperation model			Cost Model Costs occurring to operate a business model		Revenue Model Form of the profit-yielding revenue structure
Maturity Maturity of cooperation relationships			Pricing Model Pricing of the product and service offering		Profit model Margin structure outlying the financial value for the operator of a business model

Figure 1. Business Model Component Framework by Krumeich et al. (2012)

Research Approach

We conducted a systematic literature review following the guidelines of Webster and Watson (2002). We build a broad foundation of scientific literature using the databases Scopus and EBSCOhost. For conference papers, we used the AIS digital library. As sources, the Financial Times 50, the IS Basket of 8 (if not included in the Financial Times 50), as well as the top IS conferences (HICCS, ICIS, ECIS, AMCIS, PACIS) were reviewed to guarantee the use of high-quality literature and at the same time taking into account the cross-disciplinary nature of the BM concept. The journal Long Range Planning was included in the sources as well, as it provides various important papers in the context of BMs.

Within these sources, we looked for case studies dealing with the concept of (digital) BMs as well as papers providing or elaborating on interrelations. To do so, we used the following two search streams performing a title-abstract-keyword search in the databases: 1) ["business model" AND (depend* OR interrelat* OR evol* OR dynamic*)]; 2) ["business model" AND case]. After eliminating double hits between the search streams, this provided 139 hits in journals and additionally 147 conference papers. Out of those, 33 have been deemed relevant, as they dealt with the BM as the central concept. We focused on concrete cases to ensure an empirical foundation of the respective insights. Additionally, papers elaborating on interrelations were included. Performing a forward-backward search, the final sample used for coding consisted of 36 papers.

We applied procedures from grounded theory, according to Corbin and Strauss (1990), for coding. We used the component-based BM framework by Krumeich et al. (2012) (see Figure 1) to map the interrelations within a matrix. In the matrix, we summarized the components competitive advantage and competitive model into a single component. To understand the uncertainty and complexity that characterize today's markets, external factors influencing the BM should be taken into account as well (Boons and Lüdeke-Freund 2013; Demil and Lecocq 2010). Thus, we added "external" as an additional component in the applied framework to enhance a detailed understanding of the influence of external triggers on specific components, resulting in a 20x20 matrix.

The authors coded the first ten papers independently and afterward compared and discussed the results to reach conclusive coding. The remaining 26 papers have been coded independently by the authors. Differences have been resolved through discussion of the respective coding results and by obtaining additional information about the cases, if available, in a final round to reduce inaccuracy.

We coded three different kinds of interrelations: "+" is a positive or direct relationship, meaning a component A has a positive influence on component B. Positive describes if the measure of component A grows, in the specific case also the measure of component B grows. For example, if more funds can be generated due to new capital sources (increase in component A: funding model), this may lead to a positive effect on available resources, as more money for external know-how, training or new employees is available (increase in component B: resource model). "-" in term reflects an indirect or negative relationship, meaning if the measure of component A grows, the measure of component B decreases. "N/A" is used for interrelations, which have been found within the specific research, but it is not fully clear what the nature of this interrelation is. This notification is used throughout Figures 2-5.

Results of the Analysis: Interrelations between Business Model Components

In Figure 2 all interrelations between components found within our sample are displayed. A row in the matrix shows the influence a specific component has on other components, e.g. the first-row organizational structure displays what components are affected by changes in the organizational structure. A column, in turn, allows understanding which components affect a specific component of interest. For example, the column funding model displays the entity of components affecting the funding model found within our sample.

The analysis revealed several interrelations between BM components, which occurred more often than the remaining interrelations within our literature sample. The components of value proposition as well as product and service offering show the highest number of interrelations. Additionally, the matrix shows a high influence of other components onto the resource model. Probably more surprising, within

our sample we found several unilateral influences of the value capturing model onto the financial model, meaning these interrelations are not mutual, but rather we discovered a high influence of the value capturing model onto the financial model, but not vice versa. Within the sample, we furthermore only found two cases in which the financial model influenced the cooperation model, while the cooperation model, in turn, influences the financial model in a variety of cases.

In the following, the focal points of our analysis are the most interesting insights we found during the review. These are spots in the matrix which show a high occurrence of interrelations. First, we focus on the quadrants of the matrix in Figure 2, which display models compromising several components. Afterward, we exemplarily discuss the interrelations of specific BM components. We choose to focus on these interrelations, as they show a high number of influences based on the matrix, and are relevant for digital BMs.

Interrelations between the Value Creation Model and Value Capturing Model

The value creation model describes aspects regarding the value creation within organizations, while the value capturing model, in turn, determines which customer segments are being addressed by which ways and how these relationships are organized (Krumeich et al. 2012). Understanding interrelations between those two models is relevant to gather the right competencies and resources as well as to put the right activities in place to create and maintain a suitable approach to communication with the addressed customer segments.

Interestingly, only few interrelations have been found between the models of value creation and value capture. Within our sample, the value capture model is only influenced within the components customer and market segment as well as customer relationship, which both show a positive dependence of the activities and processes as well as of the resource model. This implies the activities and processes, undertaken to enhance the BM positively, influence the relationship with the customers, and allow addressing new customer segments. This should be taken into consideration especially for digital BMs, which build on digital means of customer engagement. In turn, if activities and processes are performed which might be perceived as “negative”, for example diminishing processes such as customer support, a negative influence on the customer and market segment as well as the customer relationship is observed.

Interrelations between the Value Creation Model and Value Offering Model

The value offering model specifies the value proposition a BM aims to express and the products and services offered to do so. The value proposition is considered to be the key component of a BM (Krumeich et al. 2012). Understanding interrelations between the value creation model and value offering model helps to ensure the right use of resources and activities to create the value proposition and helps to understand how the organizational structure supports that creation or might be affected by it.

The value offering model is the one most impacted by other components. Especially between the value creation model and the value offering model, a variety of interrelations occur between its respective components, with most of these being mutual. In general, the value proposition is positively influenced by the components of the value creation model. In turn, within our sample, positive relations of the value proposition to the resource model and activities and processes are found, but a negative influence onto the organizational structure. In the case presented by Davies and Doherty (2019) about a fair-trade social enterprise selling coffee, Cafédirect, a change in the value proposition led to the change in leadership positions, the creation of new management positions as well as a revised, more complex and more costly organizational structure.

	Value Creation Model				Value Offering Model				Value Capturing Model				Cooperation Model				Financial Model				External	
	Organizational Structure	Resource Model	Competence Model	Activities and Processes	Value Proposition	Product and Service Offering	Competitive Mode (& Advantage)	Customer and Market Segment	Communication & Distribution Channel	Customer Relationship	Structure and Position	Coordination	Maturity	Funding Model	Distribution Model	Cost Model	Pricing Model	Revenue Model	Profit Model			
Organizational Structure																						
Resource Model																						
Competence Model																						
Activities and Processes																						
Value Proposition																						
Product and Service Offering																						
Competitive Mode (Advantage)																						
Customer and Market Segment																						
Communication & Distribution Channel																						
Customer Relationship																						
Structure and Position																						
Coordination																						
Maturity																						
Funding Model																						
Distribution Model																						
Cost Model																						
Pricing Model																						
Revenue Model																						
Profit Model																						
External																						

Figure 2. Business model component interrelations

Influences on the Financial Model

The financial model determines the financial viability of a BM from an economic point of view (Krumeich et al. 2012). Understanding which components influence the financial-based components helps to reduce risks and creates financial transparency.

The components of the financial model show a high dependency on other components within our sample. The most influences onto the financial model can be found from the value capturing model and the cooperation model. In particular, the financial model is highly influenced by the components customer and market segment and customer relationship. While the influence of the customer and market segment onto the components of the financial model within our sample is rather heterogeneous, the customer relationship mostly positively influences those components. In the case by Deodhar et al. (2012), presenting a hybrid BM of open-source software, Openbravo ERP, existing customer relationships led to the creation of new revenue sources (Deodhar et al., 2012). Importantly to note, the nature and intensity of these interrelations differ according to the respective revenue model (e.g. one-time sales vs. pay-per-use), a relevant aspect for digital BMs building on recurring revenue sources.

The financial model depends on the product and service offering as well as the value proposition itself. Nowadays, BMs increasingly offer services instead of products (referred to as “servitization”, see for example Weking et al. 2018), which implies different developments onto the financial model, in concrete onto the profitability, which should be taken into consideration. Visnjic and van Looy (2013) find an overall positive impact of the availability of services onto the financial model, which however is not linear and depends heavily on the number and labor-intensity of services offered.

In the following, we describe the interrelations of specific components with other components.

Interrelations of the Component Funding Model

The funding model describes the sources of capital to operate a BM (Krumeich et al. 2012). In practice, it is necessary to understand interrelations of the funding model to improve strategies to receive funding (mainly in the case of venture capital) or to ensure which components not to change if the current funding model should not be adjusted. Within our sample, we found the following five components that are directly influenced by the funding model: resource model, competence model, activities and process, product and service offering, and maturity. Regarding external funding, not only a financial impact of external funding is observed. Rather, external funding can deliver additional benefits to the existing competencies and resources or the existing network. Figure 3 displays the interrelations of the component funding model found in the literature.

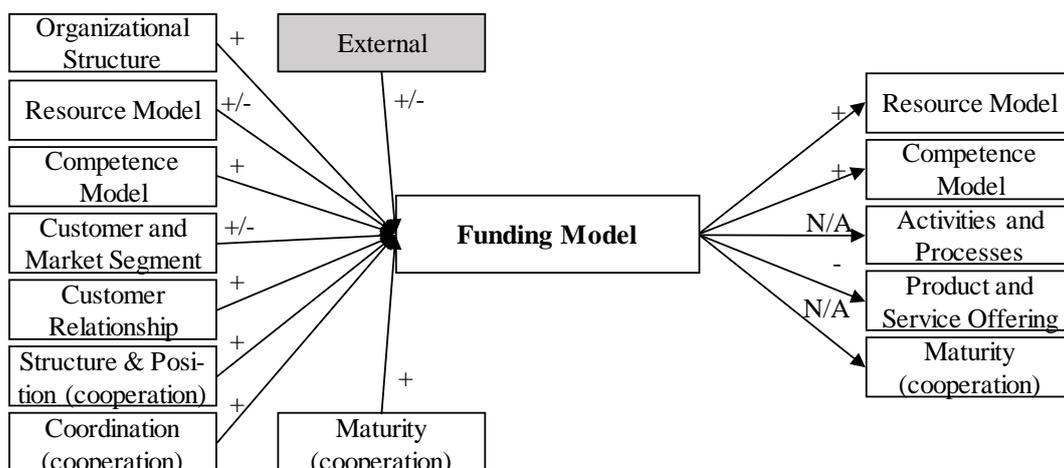


Figure 3. Interrelations of the component Funding Model

Interrelations of the Component Organizational Structure

The organizational structure can be understood as the underlying structure to enable a BM. It defines the BM’s roles and responsibilities for implementing the activities and processes as well as the underlying resource model and competence model (Krumeich et al. 2012). Managers change structures to initiate innovation and to address opportunities (Bock et al. 2012). At the same time, it is important to consider if and how the organizational structure is affected by changes when updating a BM architecture. Within our sample, the four components resource model, activities and processes, value proposition, and customer and market segment directly influence the structure (see Figure 4). For example, addressing a new customer segment might imply necessary changes in the organizational structure. It then should be evaluated if the expected benefits of a new customer segment outmatch the costs (in terms of resources as well as stability in the organization) of adapting the organizational structure that enables the BM.

In turn, the organizational structure directly influences the competence model, the activities and processes, the structure and position in the network, the maturity of the network as well as the funding model within our sample. For example, this implies a change in the organizational structure might be beneficial to create or receive funding. This could be due to a flatter hierarchy allowing a lower cost structure, or potential shareholders might perceive a revised organizational structure positively.



Figure 4. Interrelations of the component Organizational Structure

Influences on the Components Value Proposition and Product and Service Offering

In the center of a BM is the value offering model, which is expressed by its key components value proposition and product and service offering. The value proposition describes the benefits a BM provides to its’ customers. A BM needs to express a clear and beneficial value proposition, which is executed to a large extent by the product and service offering (Krumeich et al. 2012). Knowledge about interrelations of these two components allows focusing on the relevant elements when developing a new value proposition or when testing how changes influence the product and service offering.

Surprisingly, in our sample, we only found four components having a direct influence on both, the value proposition and the product and service offering: the resource model, the activities and processes, the structure and position within the network as well as the customer and market segment (see Figure 5). Interestingly, we found several studies showing a positive relationship of the network directly onto the value proposition, while one might expect the network to have a positive influence onto the BM in general, but not directly onto the perceived value proposition. Additionally, we found external factors influencing these two components. Yet, the value proposition, as well as the product and service offering, are directly interrelated, and both components are affected individually by a variety of other components.

In financial terms, the value proposition is directly influenced by the revenue model and pricing model, as those two components are perceived by the customers of a BM. This expresses that the concrete form of the revenue model and pricing structure directly determines the expected benefit from a customer’s perspective and influences his willingness to pay (Johnson et al. 2008), especially for digital services. For example in the case of so-called “Pay-as-your-drive” auto insurance presented by Desyllas and Sako

(2013), a digitally enabled BM, a revenue model with a pay-per-use mechanism is positively received by its' customers and provides a novel value proposition, while the underlying product and service offering stays the same, i.e. providing car insurance. At the same time, the funding model only interrelates with the product and service offering but has no direct impact on the value proposition itself.

Regarding the customers and the relation with them, interrelations of customer and market segment onto both, the value proposition as well as the product and service offering have been found. However, within our sample, the customer relationship only influences the product and service offering, but not directly the value proposition itself. In the case of a toy retailer presented by Voss et al. (2008), a good relationship with customers and the possibility for customers to test innovations directly influenced the offered products and services.

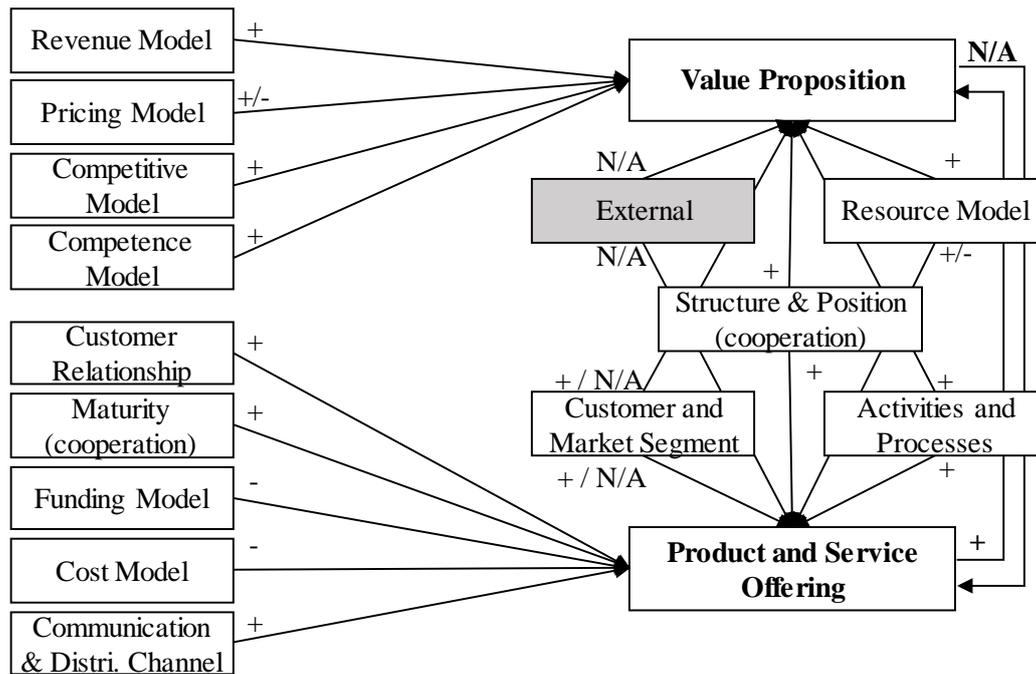


Figure 5. Influences onto the components Value Proposition and Product and Service Offering

Discussion and Implications

The results of this study present different learnings in the context of BMs. First, we identify and characterize existing interrelations between BM components based on prior literature. Knowledge of these interrelations enhances research on BM innovation and dynamic BMs, as knowledge about the interrelations is necessary when updating a BM architecture. Second, we show how interrelations of a specific BM can be mapped, increasing transparency about a BM, which allows more informed decision making and ensures considering all relevant influences while creating strategic flexibility (see Bock et al. 2012) within the BM.

Third, we show how to apply the learnings of the interrelations to study specific components in detail (e.g. “what might influence our funding model”). Specific components, as well as a whole BM, can be evaluated towards risks and opportunities, robustness, cost of changes, and adaptability. A balance between the components should be kept when innovating a BM (Al-Debei and Avison 2010). Explicitly expressing the existing interrelations allows to understand which components of a BM are affected during the innovation process, thus managing to create or keep this balance. At the same time, questions of risk and robustness of a BM can be evaluated, especially considering unconscious changes induced by various influences. By mapping the interrelations of a specific component, it becomes clear if and how this component is affected by other components. If high uncertainty within a specific component exists, e.g. the existing resources, its' influence onto further components can be evaluated and possible consequences are made transparent. On the other hand, if a company, for example, thinks about

changing its' organizational structure, the decision-makers can evaluate if the BM will be affected, and if so, in which components. In that sense, the robustness of a BM (see Haaker et al. 2017) can be evaluated and provides means of a risk-avoidance strategy. Understanding the impact of changes in one component onto other components furthermore enables to understand the cost of changes. It becomes imminent if a rather minor change implies substantial changes within the remaining components of the respective BM, and it allows to evaluate qualitatively beforehand what kind of resources will be necessary. When developing a BM, one can also use the interrelations to ensure the adaptability of the model, as various adaptations are necessary when launching a new BM. As such, knowledge about interrelations provides decision support and is especially helpful to design digitally-enabled BMs.

Our research is subject to certain limitations. Performing a cross-disciplinary review, we aimed to look at the phenomena under study from different perspectives. Yet, relevant prior studies might remain hidden due to the selection of sources and databases as well as the applied search streams. Additionally, coding is always partly subjective. The applied framework consisting of 20 components provides a high level of detail. Yet, it can be challenging to code empirical BMs into this framework. Even though an independent coding process occurred to hinder inconclusive coding, this limitation cannot be fully resolved. Considering Figure 2, one might wonder about empty spots within the matrix, showing the absence of interrelations between components, or in some cases even of whole models. Empirical research is necessary to validate if these empty spots exist due to the selection of sources, the process of coding, or if no interrelations are existing between these components. At the same time, most organizations operate several, sometimes complementing or competing BMs (often referred to as "ambidextrous challenge" in the case of competing BMs, see for example Hoßbach 2015), which should be considered when evaluating interrelations of a BM, but it is not reflected in the applied framework. The research of Hoßbach (2015) provides a detailed study of competing BMs. Lastly, the emotional attachment of decision-makers, as well as structural inertia of organizations inherent in decision making and BMI, is not reflected as well, even though these results help to mitigate this inertia.

These results enhance research on BM innovation as well as on dynamic BMs. They strengthen the BM as a theoretical construct and contribute to calls for research (Massa et al. 2017) in the following ways. First, the literature-based relationships among different business model components generate an initial model towards a theory of BMI and dynamics. It reveals structures of internal interdependencies and possible changes within a BM during its innovation. The models expose possible internal dynamics within a BM and, hence contribute towards an initial theoretical model. Such a theoretical model increases our understanding of risk management, adaptability, and robustness of BMs as well as their dynamics and changes. Clear contributions can be found in the emerging context of sustainable BMs. The field of sustainable BMs explores how organizations adapt their BM to address the creation of economic, social, and environmental benefits (Bocken et al. 2014; Davies and Doherty 2019). Knowledge about these interrelations helps to create a balance between the different forms of value creation and, thus, enhances research on sustainable BMs. We further see this review as a first step and foundation for future research to empirically explore these interrelationships.

Applying the interrelations within organizational context furthermore enhances research for organizations under change. If an organization is in a process of transformation, the influence of different changes of the organization happening over time, for example rethinking the organizational structure or replacing an existing manual process with automated workflows, can be directly mapped onto the BM, improving decision making. Additionally, transparency about the interrelations helps to optimize specific components, such as the funding model, the cooperation model, or the resource model. At the same time it hinders cognitive biases and inertia of decision-makers (see for example Lee and Li 2016). As such, organizations can analyze in BMI projects which implications the adjustment propose onto the whole model, and which further changes might be necessary. This improves decision making and supports opportunity discovery, diminishing cognitive biases, and fostering a strategy learning process (Cosenz and Noto 2018). Also, the comprehensive representation of interrelations of a BM helps to evaluate the profitability for investors potentially funding the business (Chan and Park 2015).

Conclusion and Future Research

This paper has provided a cross-disciplinary review to identify interrelations between BM components. The discovered interrelations have been mapped onto an existing framework and evaluated if the specific interrelation has a positive or negative influence on the respective component. For exemplary components, the various dependencies were described in detail. We found a high number of interrelations affecting the value proposition and product and service offering of a BM. Surprisingly, we only found few dependencies of the financial model onto the value offering model, while vice versa the value offering model is heavily affecting the different financial components of a BM.

Future research should focus on empirical studies to extend these interrelations. For example, we found few dependencies of the financial model onto the value offering model, while vice versa the value offering model is strongly influencing the different financial components of a BM. This model can be complemented to reach an exhaustive description of the phenomena, and finally, a comprehensive model of all components. Additionally, these qualitative interrelations can be partly put in numbers, taking into consideration industry-specifics and further contextualizing factors. This research builds an initial model of theory on how BM components influence each other. Future empirical research can build on this model to evaluate the relative intensity of interrelations and contribute towards a theory of BMI and dynamics. This allows studying mid-and long term occurrences of BM evolution. The overview and description of interrelations enable the creation and improvement of tools in the field of BMI and dynamic BMs as well as in the research stream of sustainable BMs. Based on the interrelations, future research can develop decision support metrics in the context of BMs to help decision-makers comprehend and advance from these metrics when developing a new BM. To do so, industry or case-specific empirical research is suitable to build up a set of generic, but contextualized interrelations (for example for subscription-BMs).

References

- Al-Debei, M. M., and Avison, D. 2010. "Developing a unified framework of the business model concept," *European Journal of Information Systems* (19:3), pp. 359-376.
- Amit, R., and Zott, C. 2001. "Value creation in e-business," *Strategic Management Journal* (22:6-7), pp. 493-520.
- Andries, P., Debackere, K., and van Looy, B. 2013. "Simultaneous Experimentation as a Learning Strategy: Business Model Development under Uncertainty," *Strategic Entrepreneurship Journal* (7:4), pp. 288-310.
- Antonopoulou, K., Nandhakumar, J., and Panourgias, N. 2014. "Value Propositions for Digital Technology Innovations of Uncertain Market Potential," in *Twenty-Second European Conference on Information Systems (ECIS 2014)*, Tel Aviv, Israel.
- Baden-Fuller, C., and Mangematin, V. 2013. "Business models: A challenging agenda," *Strategic Organization* (11:4), pp. 418-427.
- Bieger, T., and Reinhold, S. 2011. "Das wertbasierte Geschäftsmodell – Ein aktualisierter Strukturierungsansatz," in *Innovative Geschäftsmodelle*, T. Bieger (ed.), Berlin, Heidelberg: Springer-Verlag Berlin Heidelberg, pp. 13-70.
- Birkinshaw, J., and Goddard, J. 2009. "What is your management model?" *MIT Sloan Management Review* (50:2), 81-90+94.
- Björkdahl, J. 2009. "Technology cross-fertilization and the business model: The case of integrating ICTs in mechanical engineering products," *Research Policy* (38:9), pp. 1468-1477.
- Bock, A. J., Opsahl, T., George, G., and Gann, D. M. 2012. "The Effects of Culture and Structure on Strategic Flexibility during Business Model Innovation," *Journal of Management Studies* (49:2), pp. 279-305.
- Bocken, N.M.P., Short, S. W., Rana, P., and Evans, S. 2014. "A literature and practice review to develop sustainable business model archetypes," *Journal of Cleaner Production* (65), pp. 42-56.
- Bohnsack, R., Pinkse, J., and Kolk, A. 2014. "Business models for sustainable technologies: Exploring business model evolution in the case of electric vehicles," *Research Policy* (43:2), pp. 284-300.

- Bolton, R., and Hannon, M. 2016. "Governing sustainability transitions through business model innovation: Towards a systems understanding," *Research Policy* (45:9), pp. 1731-1742.
- Bonaccorsi, A., Giannangeli, S., and Rossi, C. 2006. "Entry strategies under competing standards: Hybrid business models in the open source software industry," *Management Science* (52:7), pp. 1085-1098.
- Boons, F., and Lüdeke-Freund, F. 2013. "Business models for sustainable innovation: state-of-the-art and steps towards a research agenda," *Journal of Cleaner Production* (45), pp. 9-19.
- Burkhart, T., Krumeich, J., Werth, D., and Loos, P. 2011. "Analyzing the Business Model Concept: A Comprehensive Classification of Literature," in *Thirty Second International Conference on Information Systems (ICIS 2011)*, Shanghai, China.
- Casadesus-Masanell, R., and Ricart, J. E. 2010. "From Strategy to Business Models and onto Tactics," *Long Range Planning* (43:2-3), pp. 195-215.
- Cavalcante, S., Kesting, P., and Ulhøi, J. 2011. "Business model dynamics and innovation: (re)establishing the missing linkages," *Management Decision* (49:8), pp. 1327-1342.
- Chan, C. R., and Park, H. D. 2015. "How images and color in business plans influence venture investment screening decisions," *Journal of Business Venturing* (30:5), pp. 732-748.
- Chen, J., Guo, Z., and Tang, Y. 2019. "Research on B2C E-Commerce Business Model Based on System Dynamics," *American Journal of Industrial and Business Management* (09:04), pp. 854-874.
- Chesbrough, H. W. 2007. "Why companies should have open business models," *MIT Sloan Management Review* (48:2), 22-28.
- Chesbrough, H. W., and Rosenbloom, R. S. 2002. "The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies," *Industrial and Corporate Change* (11:3), pp. 529-555.
- Chong, A. Y. L., Lim, E. T. K., Hua, X., Zheng, S., and Tan, C.-W. 2019. "Business on Chain: A Comparative Case Study of Five Blockchain-Inspired Business Models," *Journal of the Association for Information Systems*, pp. 1308-1337.
- Corbin, J. M., and Strauss, A. 1990. "Grounded theory research: Procedures, canons, and evaluative criteria," *Qualitative Sociology* (13:1), pp. 3-21.
- Cosenz, F., and Noto, G. 2018. "A dynamic business modelling approach to design and experiment new business venture strategies," *Long Range Planning* (51:1), pp. 127-140.
- D'Angelo, A., and Benassi, M. 2015. "Bio3 Research: An Entrepreneurial Process in the Market for Patents," *Entrepreneurship Theory and Practice* (39:5), pp. 1247-1264.
- Davies, I. A., and Doherty, B. 2019. "Balancing a Hybrid Business Model: The Search for Equilibrium at Cafédirect," *Journal of Business Ethics* (157:4), pp. 1043-1066.
- Demil, B., and Lecocq, X. 2010. "Business Model Evolution: In Search of Dynamic Consistency," *Long Range Planning* (43:2-3), pp. 227-246.
- Deodhar, S. J., Saxena, K.B.C., Gupta, R. K., and Ruohonen, M. 2012. "Strategies for software-based hybrid business models," *The Journal of Strategic Information Systems* (21:4), pp. 274-294.
- Desyllas, P., and Sako, M. 2013. "Profiting from business model innovation: Evidence from Pay-As-You-Drive auto insurance," *Research Policy* (42:1), pp. 101-116.
- Deubener, J., Velamuri, V. K., and Schneckenberg, D. 2016 "A Typology of Freemium Business Models for Mobile Applications," in *Twenty-Fourth European Conference on Information Systems (ECIS 2016)*, Istanbul, Turkey.
- Feller, J., Finnegan, P., and Nilsson, O. 2011. "Open innovation and public administration: Transformational typologies and business model impacts," *European Journal of Information Systems* (20:3), pp. 358-374.
- Freudenreich, B., Lüdeke-Freund, F., and Schaltegger, S. 2019. "A Stakeholder Theory Perspective on Business Models: Value Creation for Sustainability," *Journal of Business Ethics* (17:1), p. 1.
- Gerasymenko, V., Clercq, D. de, and Sapienza, H. J. 2015. "Changing the Business Model: Effects of Venture Capital Firms and Outside CEOs on Portfolio Company Performance," *Strategic Entrepreneurship Journal* (9:1), pp. 79-98.
- Haaker, T., Bouwman, H., Janssen, W., and de Reuver, M. 2017. "Business model stress testing: A practical approach to test the robustness of a business model," *Futures* (89), pp. 14-25.

- Hoßbach, N. 2015. "Dual Business Models: Going beyond Spatial Separation," in Twenty-First American Conference on Information Systems (AMCIS 2015), Fajardo, Puerto Rico.
- Johnson, M. W., Christensen, C. M., and Kagermann, H. 2008. "Reinventing Your Business Model," *Harvard business review* (86), pp. 50-59.
- Khuntia, J., Mithas, S., and Agarwal, R. 2017. "How Service Offerings and Operational Maturity Influence the Viability of Health Information Exchanges," *Production and Operations Management* (26:11), pp. 1989-2005.
- Kranz, J. J., Hanelt, A., and Kolbe, L. M. 2016. "Understanding the influence of absorptive capacity and ambidexterity on the process of business model change – the case of on-premise and cloud-computing software," *Information Systems Journal* (26:5), pp. 477-517.
- Krumeich, J., Burkhart, T., Werth, D., and Loos, P. 2012. "Towards a Component-based Description of Business Models: A State-of-the-Art Analysis," in Eighteenth Americas Conference on Information Systems (AMCIS 2012), Seattle, Washington, USA.
- Krumeich, J., Werth, D., and Loos, P. 2013. "Interdependencies between Business Model Components - A Literature Analysis," in Nineteenth Americas Conference on Information Systems (AMCIS 2013), Chicago, Illinois, USA.
- Lee, Y.-K., and Li, W.-L. 2016. "UNDERSTANDING CONSUMERS O2O BUSINESS MODEL ADOPTION," in Twentieth Pacific Asia Conference on Information Systems (PACIS 2016), Chiayi, Taiwan.
- Lehoux, P., Daudelin, G., Williams-Jones, B., Denis, J.-L., and Longo, C. 2014. "How do business model and health technology design influence each other? Insights from a longitudinal case study of three academic spin-offs," *Research Policy* (43:6), pp. 1025-1038.
- Martins, L. L., Rindova, V. P., and Greenbaum, B. E. 2015. "Unlocking the Hidden Value of Concepts: A Cognitive Approach to Business Model Innovation," *Strategic Entrepreneurship Journal* (9:1), pp. 99-117.
- Mason, K. J., and Leek, S. 2008. "Learning to Build a Supply Network: An Exploration of Dynamic Business Models," *Journal of Management Studies* (45:4), pp. 774-799.
- Massa, L., Tucci, C., and Afuah, A. 2017. "A critical assessment of business model research," *Academy of Management Annals* (11:1), pp. 73-104.
- McGrath, R. G. 2010. "Business Models: A Discovery Driven Approach," *Long Range Planning* (43:2-3), pp. 247-261.
- Moellers, T., Burg, L. von der, Bansemir, B., Pretzl, M., and Gassmann, O. 2019. "System dynamics for corporate business model innovation," *Electronic Markets* (29:1), p. 74.
- Naous, D., Schwarz, J., and Legner, C. 2015. "Analytics As A Service: Cloud Computing and the Transformation of Business Nalalytics Business Models and Ecosystems," in Twenty-Fifth European Conference on Information Systems (ECIS 2015), Guimaraes, Portugal.
- Niculescu, M. F., and Wu, D. J. 2014. "Economics of free under perpetual licensing: Implications for the software industry," *Information Systems Research* (25:1), pp. 173-199.
- Ojala, A. 2016. "Business models and opportunity creation: How IT entrepreneurs create and develop business models under uncertainty," *Information Systems Journal* (26:5), pp. 451-476.
- Rai, A., and Tang, X. 2014. "Information technology-enabled business models: A conceptual framework and a coevolution perspective for future research," *Information Systems Research* (25:1), pp. 1-14.
- Schaffer, N., Pfaff, M., and Krmar, H. 2019. "Dynamic Business Models: A Comprehensive Classification of Literature," in Thirteenth Mediterranean Conference on Information Systems (MCIS 2019), Naples, Italy.
- Singh, R., Mathiassen, L., Stachura, M. E., and Astapova, E. V. 2011. "Dynamic capabilities in home health: IT-enabled transformation of post-acute care," *Journal of the Association of Information Systems* (12:2), pp. 163-188.
- Sitoh, M. K., Pan, S. L., and Cui, L. 2014. "The roles of opportunity processes in a social business model: insights from China's e-commerce villages," in Thirty-Fifth International Conference on Information Systems (ICIS 2014), Auckland, New Zealand.
- Sterman, J. D. 2000. *Business dynamics: Systems thinking and modeling for a complex world*, Boston: Irwin/McGraw-Hill.

- Teece, D. 2010. "Business Models, Business Strategy and Innovation," *Long Range Planning* (43:2-3), pp. 172-194.
- Visnjic, I., and van Looy, B. 2013. "Servitization: Disentangling the impact of service business model innovation on manufacturing firm performance," *Journal of Operations Management* (31:4), pp. 169-180.
- Voss, C., Roth, A. V., and Chase, R. B. 2008. "Experience, Service Operations Strategy, and Services as Destinations: Foundations and Exploratory Investigation," *Production and Operations Management* (17:3), pp. 247-266.
- Webster, J., and Watson, R. T. 2002. "Analyzing the Past to Prepare for the Future: Writing a literature Review," *MIS Quarterly* (26:2), pp. xiii-xxiii.
- Weking, J., Brosig, C., Böhm, M., Hein, A., and Krcmar, H. 2018. "Business Model Innovation Strategies for Product Service Systems – An Explorative Study in the Manufacturing Industry," in *Twenty-Sixth European Conference on Information Systems (ECIS 2018)*, Portsmouth, UK.
- Wirtz, B. W., Pistoia, A., Ullrich, S., and Göttel, V. 2016. "Business Models: Origin, Development and Future Research Perspectives," *Long Range Planning* (49:1), pp. 36-54.
- Zolnowski, A., Christiansen, T., and Gudat, J. 2016. "Business Model Transformation Patterns of Data-Driven Innovations," in *Twenty-Fourth European Conference on Information Systems (ECIS 2016)*, Istanbul, Turkey.
- Zott, C., and Amit, R. 2010. "Business Model Design: An Activity System Perspective," *Long Range Planning* (43:2-3), pp. 216-226.