

Business model innovativeness: designing a formative measure for business model innovation

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Abstract Business model innovation is attracting increasing attention in corporate practice and academia. Despite strong interest in the phenomenon, no common understanding of the concept's meaning has yet been established, hindering dialogue and progress in this research field. This study seeks to build a definition of business model innovation, and to provide a measurement index for the extent of innovativeness of a firm's changed business model. Based on the business model, business model innovation and product innovation literatures, conceptualise business model innovation as a 'new-to-the firm' change that affects at least one out of three business model dimensions: value offering, value creation architecture and revenue model logic. Based on a study among 200 German firms, this study further offers an empirically validated measurement model for business model innovativeness comprising three dimensions and nine indicators. We also emphasise the opportunity-centric potentials of business model innovation as well as the potentials of integrating findings from related research streams into business model innovation research.

Keywords Business model innovation · Value offering innovation · Value architecture innovation · Revenue model innovation · Formative measurement design

JEL Classification M00 · M10 · M19

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1 Introduction

In recent years, business models have become an increasingly popular concept in management literature as well as in corporate practice (Spieth et al. 2014; Zott et al. 2011). The choice and design of business models are increasingly considered to be crucial decisions throughout the exploration and exploitation of business opportunities (Desyllas and Sako 2013; Zott and Amit 2010). Nevertheless, business models are still characterized as “strange entities” (Doganova and Eyquem-Renault 2009, p. 1559) and there is as yet no agreement on how to define them (George and Bock 2011; Ghaziani and Ventresca 2005; Schneider and Spieth 2013; Zott et al. 2011). Given their vague character, it is unsurprising that business model innovation is considered to be “a slippery construct to study” (Casadesus-Masanell and Zhu 2013, p. 480). Business model innovation is defined as “the discovery of a fundamentally different business model in an existing business” (Markides 2006, p. 20), or as the situation in which “a firm adopts a novel approach to commercializing its underlying assets” (Gambardella and McGahan 2010, p. 263). At the core of these definitions, the business model itself, rather than a particular product or service, becomes subject to innovation (George and Bock 2011).

Despite business model innovation’s potentials, to date, companies have widely focused on the innovation of products or services and have frequently been shown to “have little if any ability to innovate the business model” (Chesbrough 2010, p. 354). Furthermore, business model innovation is identified as a highly challenging endeavour: it causes inertia and conflicts with existing structures, values and beliefs (Chesbrough 2010; Christensen and Raynor 2003; Christensen 1997; Doz and Kosonen 2010; Yunus et al. 2010), it requires extensive commitment to experimentation and learning (Baden-Fuller and Morgan 2010; Chesbrough 2010), it presents very demanding leadership tasks (Chesbrough 2010; Doz and Kosonen 2010; Smith et al. 2010), and it builds on the involvement of high levels of creativity, market expertise and internal tacit knowledge (Baden-Fuller and Morgan 2010; Teece 2010; Wirtz et al. 2010).

The ability to innovate an established business model potentially provides firms with opportunities to convert environmental developments into new competitive advantages—advantages that might be unique to the firm and might thereby potentially ensure their long-term success and survival (Casadesus-Masanell and Ricart 2010; Sosna et al. 2010; Wirtz, Schilke and Ullrich 2010; Baden-Fuller and Haefliger 2013). Unsurprisingly, managers are showing strong interest in business model innovation (IBM 2012; Pohle and Chapman 2006).

It is only in recent years that business model innovation has begun to attract academic attention (Casadesus-Masanell and Zhu 2013; Schneider and Spieth 2013, Spieth et al. 2014). Few answers have as yet been provided to the wide range of questions surrounding the concept. Confusion about the term’s meaning and the ubiquity of theoretical constructs potentially incorporated within business model thinking have hindered urgently needed discussion on the theoretical foundations of business model and business model innovation (George and Bock 2011; Teece

2010). Furthermore, its vague and ‘slippery’ character of business model thinking (Casadesus-Masanell and Zhu 2013) impedes dialogue as well as the comparison of results across individual companies and studies. Extant literature does not offer a common understanding of the concept of business model innovation. While this research stream relies heavily on conceptual and exploratory research, an empirically validated measurement scale is missing.

This paper seeks to reduce the vagueness surrounding the concepts of business model and business model innovation; it has two aims:

First, we seek to contribute to a better understanding of how business model innovation can be defined. Reviewing literature on business model concepts, we identify functions of business models in the context of organizational forms of innovation. Combining these findings with the experience of product innovation management scholars in the conceptualisation of product innovativeness, we develop a similar concept at the business model level: business model innovativeness. This paper contributes to the growing literature stream on business model innovation and therefore extends the existing literature on business models, business model innovation and product innovation management.

Second, we seek to provide an answer to the challenge of *how business model innovativeness can be measured*. Based on the derived business model innovation understanding, we develop a formative measurement index and test it using three different samples, following the scale development procedure by MacKenzie et al. (2011) as well as Diamantopoulos and Winklhofer (2001). The outcome of this complex scale development procedure offers the opportunity of a proven concept validated in corporate practice and therefore potential applicability in corporate practice. To date, other business model innovation concepts and terms in extant research are purely theoretical or exploratory. Here, we offer a validated measurement model that can be applied by managers to evaluate their three different types of business model innovation—value offering innovation, value architecture innovation and revenue model innovation.

The remainder of this article is organized as follows. The following section focuses on the conceptual background and the introduction of our business model innovativeness concept. We then explain our complex scale development procedure, present our results, and discuss our results of the scale development procedure, concluding with implications of our study.

2 Business models, business model innovation and innovativeness

2.1 Business models

2.1.1 Functions of business models

Business scholars and practitioners have been using the term ‘business model’ widely without yet having achieved agreement on the meaning of the term (George and Bock 2011; Ghaziani and Ventresca 2005; Zott et al. 2011). Among the various conceptualizations, three major functions of business models—to describe a firm’s

way of doing business, to facilitate opportunity development, and to commercialize new ideas and technologies—have emerged. While the first function—describing the logic and structure of the business—emphasizes a static perspective on business models, the opportunity facilitating function as well as the commercialising function consider business models from a more transformational perspective. Each of these perspectives serves distinct yet complementary functions: the first function reveals a fairly static approach that enables descriptions and classifications, while the dynamic view of the second and third functions emphasize change and innovation (Demil and Lecocq 2010). While all three functions are connected and overlap in various aspects, each provides a distinct benefit.

Within the scope of the first function, business models are understood as *descriptions* of a firm's business logic, and as design and architecture of value creation, delivery and capture (Chesbrough and Rosenbloom 2002; Teece 2010). This perspective emphasizes the “consistent and integrated picture of a company and the way it generates revenues and profit” (Yunus et al. 2010, p. 312) offered by the business model concept. Business models are acknowledged to articulate and describe how a firm's organizational and financial business architecture function (Magretta 2002; Teece 2010; Timmers 1998). Within this perspective, business models are also understood as transactive structures (Mahadevan 2000), or as an activity system “that transcends the focal firm and spans its boundaries” (Zott and Amit 2010, p. 216). Furthermore, business models reflect management's beliefs about customer and market needs and the choices it has made in terms of policies, assets and governance (Casadesus-Masanell and Ricart 2010; Teece 2010). The narrative mechanism provided by each of these business model conceptualizations shows the potential to abridge and reduce complexity as well as to decompose the overall business model into manageable units (Casadesus-Masanell and Ricart 2010; George and Bock 2011). Furthermore, these narrations potentially allow for the classification and development of role models that serve as generic and exemplary descriptions to be copied and used like schemes or recipes (Baden-Fuller and Morgan 2010; Sabatier et al. 2010).

The second function of business models is to *facilitate opportunity creation or identification and development*. Business models are considered to be opportunity-centric, since they represent “the design of organizational structures to enact a commercial opportunity” (George and Bock 2011, p. 99). They represent the “primary vehicle for capturing the firm's approach to the external environment” (Schindehutte et al. 2008, p. 12). The business plan that comes with any opportunity under evaluation “either explicitly or implicitly employs a particular business model that describes the design or architecture of the value creation, delivery, and capture mechanisms it employs” (Teece 2010, p. 172). Despite its enormous potentials, only “in a relatively underdeveloped framework, the business model is a facilitative intermediary in the opportunity-creation process” (George and Bock 2011, p. 88), raising the need for further research on the connection between business models and opportunity creation (George and Bock 2011).

Third, *commercialization of ideas and technologies* represents a core function assigned to business models. It is argued that the economic outcome of a new idea or technology depends not only on its own quality, but to a large extent also on the

chosen business model (Chesbrough 2010). Business models thereby represent the linking element between innovation and value creation (Chesbrough and Rosenbloom 2002) and translate technical into commercial success (Teece 2010). One key task and challenge throughout business model design is to identify how value is to be captured from a particular innovation (Amit and Zott 2001; Teece 2010). Despite its viability, managers frequently assign priority to the development of product or service features rather than focusing on the value logic (Teece 2010).

2.1.2 Dimensions and elements of business models

The variety in business model understandings is further reflected by the manifold numbers of dimensions that have been assigned to business models. A review of extant conceptualizations conducted by Morris et al. (2005) identified the number of business model dimensions to range between four and eight. More recent attempts to describe business models tend to build on fewer dimensions, typically ranging between three and five elements or dimensions (e.g. Demil and Lecocq 2010; Johnson et al. 2008; Moingeon and Lehmann-Ortega 2010; Wirtz et al. 2010). Amit and Zott (2001) emphasized the need to differentiate between business models that are concerned with value creation and revenue models that relate to the appropriation of value. While this differentiation is followed within a range of business model definitions (e.g. Björkdahl 2009; Camisón and Villar-López 2010; Hedman and Kalling 2003), the content captured by the majority of business model understandings rather homogeneously comprises three core integrative dimensions (Chesbrough and Rosenbloom 2002; Demil and Lecocq 2010; Osterwalder and Pigneur 2010; Teece 2010; Yunus et al. 2010): (1) a firm's value offering, (2) a firm's value creation architecture, and (3) a firm's revenue model.

Making use of this three-dimensional business model structure, we provide an overview of the elements assigned to business model in literature in Table 1. Despite the use of manifold ways of labelling the elements assigned to business models, this overview allows for deduction of a more general description of each of the three dimensions. First, the value offering dimensions capture the value proposition of a firm, its target customers, and its resulting strategic and competitive positioning in the market. Second, the value creation dimension describes how a firm realizes its value offering by looking at its core competences and resources, its transactive and organizational structure, its distribution logic, its internal activities and value chain, and its external value creation network. Third, the revenue model explains how a firm generates profits by looking at its economic character in terms of its earnings and cost logic.

2.2 Business model innovation

Business model innovation represents a complementary form of innovation to product or process innovations (Amit and Zott 2012; George and Bock 2011). It relates to “punctuated phenomena that follow disruptions or enactment of new opportunities” (George and Bock 2011, p. 88). To date, the literature has strongly emphasized exogenous shocks or severe crisis situations as drivers of business

Table 1 Business model elements

Publication (exp.)	No. of dimensions	No. of elements	Value offering	Value architecture	Revenue model
Björkdahl (2009)	2	6	Customer segments Customer offering	Activities Resource configuration Distribution Value capture mechanisms Resources	
Hedman and Kalling (2003)	2	6	Customers Offering Competitors	Supply factor and production inputs Activities and organisation Transaction structure	
Amit and Zott (2001); Zott and Amit (2007)	2	3	Transaction content	Transaction structure Transaction governance	
Camisón and Villar-López (2010)	2	3	Degree of diversification	Organisational structure Value chain activities	
Mason and Spring (2011)	2	3	Market offering	Technologies Network architecture	
Aspara et al. (2011)	3	11	Strategies (material) Markets (material) Reputational rankings (cognitive) Product ontologies (cognitive)	Resources (material) Structure (material) Operations (material) Business networks (material) Boundary beliefs (cognitive) Industry recipe (cognitive)	Finance and accounting system (material)
Osterwalder and Pigneur (2010)	3	9	Customer segments Value proposition	Channels Customer relationships Key resources Key activities Key partnerships	Revenue streams Cost structure

Table 1 continued

Publication (exp.)	No. of dimensions	No. of elements	Value offering	Value architecture	Revenue model
Osterwalder, Pigneur and Tucci (2005)	3	9	Target customers Value proposition	Core competence Distribution channel Value configuration Partner network Relationship Structure (material) Operations (material) Network of relationships (material) Boundary beliefs (cognitive) Industry recipe (cognitive) Value chain Value network	Cost structure Revenue model
Tikkanen et al. (2005)	3	9	Strategy (material) Product ontologies (cognitive) Reputational rankings (cognitive)		Finance and accounting (material)
Chesbrough and Rosenbloom (2002)	3	7	Value proposition Market segment Competitive strategy		Cost structure Profit potential
Chesbrough (2007)	3	6	Value proposition Market segment Competitive strategy	Value chain structure Positioning in the value network	Revenue generation mechanisms
Demil and Lecoq (2010)	3	6	Value propositions	Resources and competences Internal and external organisation	Volume/structure of revenues Volume and structure of costs Margin Revenue mechanisms
Kindström (2010)	3	6	Value proposition Target market Competitive Strategy	Value chain Value network	
Morris et al. (2005)	3	6	Offering Market Competitive strategy	Internal capability Personal factors	Economics

Table 1 continued

Publication (exp.)	No. of dimensions	No. of elements	Value offering	Value architecture	Revenue model
Heikkilä and Heikkilä (2010)	3	5	Customers Product/service Value offering	Technology Network structure Resources Value generation Distribution Value delivery	Finance Revenues Revenue generation
Wirtz et al. (2010)	3	5	Value proposition Positioning Customer value proposition	Key resources Key processes Value delivery	Profit formula Revenue logic
Giesen et al. (2010)	3	4	Customer definition Value to customer Strategic choices	Value creation Value network Mechanisms to deliver value Mechanisms to capture value	Value capture Architecture of revenues and costs
Johnson et al. (2008)	3	4	Value proposition	Resource structure Transactive structure	Value structure
Magretta (2002)	3	4	Value structure	Value chain design Value architecture	Revenue generation plan Profit equation
Shafer, Smith and Linder (2005)	3	4	Customer value proposition	Value network configuration Value constellation (internal value chain, ex-ternal value chain)	Sustainable returns Profit equation (sales revenues, cost structure, capital employed)
Teece (2010)	3	4	Customer value proposition		
George and Bock (2011)	3	3	Value proposition (customers, product/service)		
Mahadevan (2000)	3	3	Value proposition		
Moingeon and Lehmann-Ortega (2010)	3	3	Value proposition		
Voelpel et al. (2005)	3	3	Customer value proposition		
Yunus et al. (2010)	3	3	Value proposition (customers, product/service)		

model innovation activities. Environmental forces such as a generally increasing development speed, globalization, technological developments, deregulations, and rising interest in sustainability issues have caused interest in business model innovation (Casadesus-Masanell and Ricart 2011; Cliffe 2011; Wirtz et al. 2010). Technological developments in particular have driven the need to consider an increasing number of potential business model configurations (Casadesus-Masanell and Zhu 2013). Furthermore, they have provided new means of communication for firms and customers (Sánchez and Ricart 2010; Smith et al. 2010; Teece 2010). In addition, the increasing importance of understanding customers' willingness-to-pay and their consideration as an important source of improvement and innovation have further influenced interest in business model innovation (Gambardella and McGahan 2010; Wirtz et al. 2010). Firms that are capable of taking advantage of these developments by innovating their established business models "so they can compete differently" (Casadesus-Masanell and Ricart 2010, p. 195) are more likely to achieve higher growth rates. Business model innovation thereby addresses questions such as how firms can avoid becoming "victims of their own success" (Doz and Kosonen 2008, p. 6), how they can effectively capture the value provided by their innovations (Teece 2010), or how they can realize the full potential of their resources and capabilities (Amit and Zott 2010). When exposed to environmental dynamism, being capable of innovating an established business model is therefore considered to be a crucial capacity for any firm (Hamel and Välikangas 2003; Pohle and Chapman 2006). Furthermore, such firms are thought to need to innovate their business models more continuously and more extensively than they had to do in the past (Doz and Kosonen 2008; Sosna et al. 2010).

Few attempts have been made to define business model innovation. Among these, business model innovation is referred to as the "search of new logics... and new ways to create and capture value" (Casadesus-Masanell and Zhu 2013, p. 464), as the situation "when a firm adopts a novel approach to commercializing its underlying assets" (Gambardella and McGahan 2010, p. 263), or as the "discovery of a fundamentally different business-model in an existing business" (Markides 2006, p. 20). Scholars have further argued that it "involves changing the paradigm by which [a firm] goes to market" (Teece 2010, p. 187). These attempts to define the phenomenon transfer the core idea of business model innovation, but at the same time, they remain as vague as many of the definitions of a business model. Particularly, the question how much a firm's current business model needs to change in order to be classified as a business model innovation has not been answered.

2.3 Innovativeness: perspectives and types

Capturing the precise meaning as well as the extent of innovation represents challenges that are not unique to business model innovation. This discussion emerged among scholars interested in product innovations about a decade ago (e.g. Danneels and Kleinschmidt 2001; Garcia and Calantone 2002). Among them, *innovativeness* has emerged as the most frequently used construct to capture the extent of an innovation's newness (Garcia and Calantone 2002).

Innovativeness needs to be researched as a multidimensional phenomenon (Kock 2007) from different perspectives (Urhahn and Spieth 2013). Following Roehrich (2004), research on innovativeness can be clustered into three perspectives: (1) the consumption of newness, (2) the creation of newness, and (3) the possession of newness.

Innovativeness in terms of the *consumption of newness* refers to “a generalized unobservable trait that reflects a person’s inherently innovative personality, predisposition, and cognitive style and therefore can be applied to multiple situations” (Im et al. 2007, p. 64). Apart from some isolated cases (e.g. Vandecasteele and Geuens 2009), literature on innovativeness in this respect has to date primarily focused on the phenomenon of consumer innovativeness (e.g. Hirschman 1980; Goldsmith and Hofacker 1991; Roehrich 2004; Bartels and Reinders 2010; Fowler and Bridges 2010). Consumer innovativeness is then usually defined as a consumer’s tendency to buy new products more frequently and more quickly than other people (Midgley and Dowling 1978).

From a *creation of newness* perspective, the concept of innovativeness represents an organization’s capacity (e.g. Burns and Stalker 1961; Damanpour 1991; Hult et al. 2004) to engage in innovation. In this respect, innovativeness is an aspect of a firm’s culture (Hurley and Hult 1998; Calantone et al. 2003). From time to time, it is also used synonymously with *innovation orientation* (Tajeddini et al. 2006), which describes a business that “is not only open to, but seeks out new ideas in both its technical and administrative domains. It encourages risk taking and enhances the likelihood of developing radically new products” (Olson et al. 2005, p. 51). Scholars frequently describe innovativeness from this perspective as organizational innovativeness (e.g. Gatian et al. 1995; Subramanian and Nilakanta 1996; Hult et al. 2004) or company innovativeness (e.g. Lefebvre and Lefebvre 1992; Tuominen et al. 2004).

Innovativeness as the *possession of newness* focuses on innovation as the outcome of a firm’s innovation activities. It is usually associated with *product innovativeness*, which reflects the extent to which a new product differs from existing alternatives (e.g. Cooper and Kleinschmidt 1999; Danneels and Kleinschmidt 2001; Cillo et al. 2010). Product innovation researchers blamed the ambiguity in the ways that innovation and newness are understood for hindering progress in their field. At the most abstract level, a new product’s innovativeness refers to the difference between the new and the old (Garcia and Calantone 2002; Szymanski 2007). Managers as well as practitioners have applied labels such as evolutionary versus revolutionary, incremental versus radical, or discontinuous versus continuous innovation to better characterize a new product’s innovativeness (Danneels and Kleinschmidt 2001; Garcia and Calantone 2002). Criticisms concerning this situation particularly address the lack of distinction between a product’s newness and unfamiliarity with it (Danneels and Kleinschmidt 2001). The question to whom a product is new—whether it is new to the world, to the industry, to the customer or whether it is simply new to the firm—needs to be distinguished (Calantone et al. 2006; Garcia and Calantone 2002).

Furthermore, an increasing number of dimensions of innovativeness have emerged (Garcia and Calantone 2002; Gatignon et al. 2002; Kock et al. 2011).

Garcia and Calantone (2002) initiated this discussion by distinguishing between technical and marketing factors. The extent of technological newness included in a new product coins its technological innovativeness (Green et al. 1995; Kock et al. 2011). Market innovativeness thereby refers to the extent of increase in customer value through the new product (Chandy and Tellis 2000; Jordan and Segelod 2006). Danneels and Kleinschmidt (2001) further included organizational innovativeness, referring to the appropriateness of a firm's resources for innovation. More recently, environmental innovativeness complemented the dimensions of innovativeness; this relates to an innovation's impact on the environment (Gemünden et al. 2007; Salomo et al. 2007). Despite innovativeness predominantly being associated with product innovations, further innovativeness measures have emerged. In addition to looking at individual products, a program level perspective is increasingly applied (Siguaw et al. 2006; Stock and Zacharias 2013). Furthermore, service innovations are separately analysed from product innovations owing to their particular characteristics (Berry et al. 2006; Dotzel et al. 2013).

In this respect, the concept of innovativeness stands in the tradition of Knight's (1967) "innovation radicalness", which is not limited to tangible goods only but can also relate to services, processes or people, etc. Service innovativeness for instance can thus be defined, accordingly, as the extent to which the dimensions of a service offering differ from present service alternatives. Even though literature generally agrees about such a definition of product innovativeness (Firth and Narayanan 1996; Szymanski et al. 2007), some researchers broaden it by adding a dimension of meaningfulness or appropriateness (Sethi et al. 2001; Wang and Ahmed 2007). However, here, the generally acknowledged understanding will first be adopted by defining product innovativeness as the level of relative newness embodied in an innovating firm's output, no matter whether such output consists of a product or service.

2.4 Innovativeness of business models

Building on the experience of product innovation management scholars, to be able to capture the extent of newness of a changed business model, we need to identify (1) to whom the innovation would be new, and (2) which are the relevant dimensions that need to be taken into account. To provide an answer to the first aspect, one key characteristic of business model innovation needs to be considered: its reliance on reconfiguring a firm's existing resources or competences (Amit and Zott 2010). This emphasis on the individual firm thus determines that the innovation needs to be new to the particular firm to be considered as a business model innovation. Even though further innovativeness levels might demand additional dimensions of newness (such as being new to the industry or market), in this study, we consider the basic understanding of business model innovation as a change that is new to a particular firm.

To identify the relevant dimensions of business model innovativeness, we build on the dimensions and elements identified in prior literature. As discussed, business model innovation relates to the transformative view on business models incorporated in their functions to serve for opportunity facilitation and commercialization

of new ideas and technologies. In this perspective, the revenue logic—which is considered to be a separate unit among a number of business model conceptualizations that relate to the static, descriptive role of business models (e.g. Amit and Zott 2001; Camisón and Villar-López 2010; Zott and Amit 2007)—represents a key dimension. Recent corporate history has provided us with prominent examples—such as the implementation of GE Aviation’s power-by-the-hour concept for aircraft engines—that illustrate how influential this business model dimension can be in the innovation context. Thus, we consider three distinct dimensions of business models for innovation: (1) a firm’s value offering, emphasizing the offering to its customers, (2) a firm’s value creation architecture, focusing on how the firm realizes its value offering by looking at value creation within the company and beyond the company’s boundaries, and (3) a firm’s revenue model, considering the earnings and cost logic applied by the firm.

Business model innovation has at its most concrete been described as a fundamental or paradigmatic change (Markides 2006; Teece 2010). While there is no doubt that business model innovation goes beyond pure product or service innovation, this vague characterization does not provide us with a clear guideline of how much change needs to occur within these dimensions to count as a business model innovation. Therefore, the assumption is that to achieve such a fundamental or paradigmatic change, not only a particular business model element but at least one of the three business model dimensions (value offering, value architecture, revenue model) needs to be innovated. Thus, one can distinguish three distinct basic business model innovation types—(1) value offering innovation, (2) value architecture innovation, and (3) revenue model innovation. Each can occur independently from any changes in the remaining dimensions, even though changes in one dimension are likely to cause the need for alignment in further dimensions of a firm’s business model. Value offering innovation thereby refers to designing a new value offering that meets an existing but yet unfulfilled customer demand, or that stimulates an additional but not yet consciously perceived demand. Second, value architecture innovation refers to the exploration of new applications and combinations of a firm’s base of resources and competences or within its external partner network. Third, revenue model innovation refers to the innovation of a firm’s core earnings logic. Firms develop new ways of generating earnings and managing their costs while simultaneously meeting customer needs, and providing the firm with the highest possible profit it can derive from its resources and competences.

3 Methodology

The development and validation of adequate measurement tools is a challenging endeavour (Hinkin and Tracey 1999; MacKenzie et al. 2011). In our particular case, the abstract character and the vague understanding of business model innovation jointly add to the difficulty of making it a measurable construct. We have defined business model innovation as a change in at least one business model dimension—a firm’s value offering, its value creation architecture, or its revenue model logic. Even though we assume that changes in these dimensions can be interrelated, this is

not a necessary requirement. Thus, we suggest that business model innovativeness—measuring the newness of the changed business model—is a formative construct. With formative constructs, changes in single indicators cause a change in the latent variable, while a change in the latent variable does not necessarily cause a change among all indicators (Diamantopoulos and Winklhofer 2001; Jarvis et al. 2003). Furthermore, indicators and dimensions of this construct neither need to be necessarily correlated, nor do they need to have the same antecedents or consequences (Fornell and Larcker 1981; Rossiter 2002).

Despite its scarce previous usage, increasing attention is paid to formative indicators in management research today (Diamantopoulos et al. 2008). In contrast to traditional scale development processes aiming at the development of reflectively measurable constructs, index creation procedures cannot rely on the elimination of items throughout the application of classical test theory, since any elimination of an indicator might lead to substantial adulteration of the construct's content (Bollen and Lennox 1991; Diamantopoulos and Winklhofer 2001; Jarvis et al. 2003). During the index development process, strong emphasis therefore needs to be paid to the specification of the breadth of content and the indicators (Diamantopoulos and Winklhofer 2001; Nunnally and Bernstein 1994). While the single indicators do not necessarily need to be correlated, they must fully capture every aspect of the phenomenon (Diamantopoulos and Winklhofer 2001).

The index development process applied in this study follows the steps suggested by MacKenzie et al. (2011) for scale developments in general, and the procedure outlined by Diamantopoulos and Winklhofer (2001) for formative index developments in particular. It comprises four steps: (1) content specification, (2) indicator specification and assessment of content validity, (3) assessment of indicator collinearity, and (4) assessment of external validity.

First, content specification is conducted to clarify the construct's conceptual domain. This step is based on a literature review, 16 expert interviews and several workshops with practitioners and academic scholars. Four experts were from academia, at the professor level, 12 were from corporate practice (of which three were from the automotive sector, three from chemical/pharmaceutical/biotech, three from machine and plant manufacturing and three from the transportation and logistics industry).

Second, we conducted indicator specification and assessed of content validity. In this step, we had to ensure that the generated indicators fully capture all aspects of the construct (Bollen and Lennox 1991). Indicators were developed based on the same data sources as previously used for content specification. Additional judgments of 25 innovation management experts are considered to ensure content validity. These innovation management experts were employed in companies operating in the automotive (5), chemical/pharmaceutical/biotech (4), machine and plant manufacturing (5), information and communication (3), energy services (2), as well as the transportation and logistics industry (6). This sample does not overlap with the sample of step 1.

In a third step, we assessed indicator collinearity, to identify potential multicollinearity issues.

In a fourth and final step, we evaluated external validity by using reflective indicators to test the formative measurement model (Bruhn et al. 2008; Diamantopoulos and Winklhofer 2001). We used a data sample comprising 200 firms for this evaluation of external validity. This data was collected among strategy and innovation management experts from German firms operating in various industries. Of the companies, 36.5 % had 1500 or few employees, 25 % had 1501–3000 employees, 24 % had 3001–10,000 employees, and 14.5 % had >10,000 employees. Of the companies, 96 % operate in a business-to-business environment, while 55.5 % claimed to have both business-to-business and business-to-customer operations.

4 Results

4.1 Step 1: content specification

Precisely defining the conceptual domain represents one of the most important steps throughout any measurement development (Nunnally and Bernstein 1994). A failure to capture all relevant aspects of a construct would result in the exclusion of these aspects and therefore should be avoided (Diamantopoulos and Winklhofer 2001). To provide an adequate construct domain, we first reviewed the existing literature for definitions of business models and business model innovation. We were particularly interested in gaining an understanding about which elements are assigned to business models, how they can be grouped, and how much change is considered to be required in order to coin the term business model innovation. We discussed these definitions and concepts during an initial workshop with strategy and innovation management experts from corporate practice. Based on their comments and a further workshop with innovation management experts from academia, first working definitions of business models and business model innovation were established. We collected feedback to these working definitions from the same group of strategy and innovation management experts that attended the initial workshop, and made minor adjustments. In a next step, we conducted 16 in-depth interviews with practitioners in various functions in four firms. During these interviews, we asked respondents to provide their personal understandings of the terms business model and business model innovation before being providing the opportunity to give feedback to our working definitions. We incorporated these findings into the working definitions, and the resulting changes were again discussed in a workshop with the innovation management and strategy practitioners.

One particular emphasis during this process was on capturing the business model elements that coin each of the three business model dimensions in a way that they allow for a comprehensive and precise description of a firm's business model. Figure 1 illustrates the result of this process. Three elements were identified to describe a firm's value offering: (1.1) target customers, (1.2) product and service offering, and (1.3) positioning. These elements serve to explain which benefits a firm provides to whom and how it thereby differentiates itself from its competitors. To outline the value creation architecture, we identified four elements: (2.1) core

(1) VALUE OFFERING What am I offering to my customers?			(2) VALUE ARCHITECTURE How do I realize my offering?				(3) REVENUE MODEL How do I earn money?	
(1.1)	(1.2)	(1.3)	(2.1)	(2.2)	(2.3)	(2.4)	(3.1)	(3.2)
Target customers	Positioning	Product and service offering	Core competencies & resources	Internal value creation	External value creation	Distribution	Logic of earnings	Logic of costs
Whom do I want to reach with my offering?	How can I differentiate from my competitor's offering?	Which products and services and related customer benefits do I offer?	Which core competencies and resources do I have? What is my offering based on?	Which value creation activities are delivered internally?	Which value creation activities are delivered externally?	How would I like to reach my target customers?	Which types of earnings do I generate and what are the main income drivers?	How does my cost structure look like and which are the main cost drivers?

Fig. 1 Business model dimensions and elements

competencies and resources, (2.2) internal value creation, (2.3) external value creation, and (2.4) distribution. These provide a description of which resources and competencies a firm's value offering is built on, which activities within and beyond the firm are used for value creation, and how the firm's offering reaches its target customers. Two further elements coin a firm's revenue model logic: (3.1) logic of earnings and (3.2) logic of costs. These serve to explain how a firm earns money by outlining the types and sources of revenues, as well as the cost structure and main cost drivers.

4.2 Step 2: indicator specification and assessment of content validity

Based on the derived definition of business model innovation, indicators for measuring business model innovativeness were created using various sources, including interview transcripts, workshop discussions, and deduction from the developed definitions (Churchill 1979; Nunnally and Bernstein 1994). The aim was to comprehensively and inclusively cover all three subdimensions of the business model construct (Bollen and Lennox 1991; Diamantopoulos and Winklhofer 2001). Table 2 represents an overview of the derived indicators.

Content validity is regarded to be the most crucial type of validity in formative index developments (Rossiter 2002). In alignment with the suggested procedure of MacKenzie et al. (2011), we followed the assessment of content validity developed by Hinkin and Tracey (1999). We asked participants to rate, for each item, how they evaluate its relationship with each construct dimension on a five-point Likert-type scale (ranging from 1 = *not at all* to 5 = *completely*). Participants comprised innovation management experts with a sample size of n = 25, which lies within the suggested range of 12–30 participants for such pre-tests (Hunt et al. 1982). We conducted a repeated one-way ANOVA for each single item. Thereby, all items showed strong relationships with one business model dimension. The results are illustrated in Table 3.

Table 2 Business model innovativeness indicators

Item	Innovated business model dimension and element	Indicators in questionnaire
1_1	Value offering: target customers	Target customers have changed
1_2	Value offering: product and service offering	The product and service offering has changed
1_3	Value offering: firm's competitive positioning	The firm's positioning in the market has changed
2_1	Value architecture: core competences and resources	The firm's core competences and resources have changed
2_2	Value architecture: internal value creation	Internal value creation activities have changed
2_3	Value architecture: partners in value creation	Role and involvement of partners into the value creation process has changed
2_4	Value architecture: distribution	Distribution has changed
3_1	Revenue model: revenue mechanisms	Revenue mechanisms have changed
3_2	Revenue model: cost mechanisms	Cost mechanisms have changed
VOI	Value offering innovation	The value proposition towards the customers has changed
VAI	Value architecture innovation	The value creation architecture has changed
RMI	Revenue model innovation	The logic how revenues are generated has changed

Table 3 Results of appropriateness ratings to test for content validity

Original domain and item	Mean value			F	Highest domain
	VOI domain	VAI domain	RMI domain		
<i>Value offering innovation (VOI domain)</i>					
Target customers have changed	4.28	1.40	1.84	42.69**	VOI
The product and service offering has changed	4.32	1.92	2.04	30.53**	VOI
The firm's positioning in the market has changed	3.92	1.68	1.84	24.26**	VOI
<i>Value architecture innovation (VAI domain)</i>					
The firm's core competences and resources have changed	1.84	3.60	2.28	11.02**	VAI
Internal value creation activities have changed	1.84	4.36	1.80	31.30**	VAI
Roles and involvement of partners in the value creation process have changed	1.68	4.12	2.04	29.22**	VAI
Distribution has changed	1.92	3.60	2.48	8.03**	VAI
<i>Revenue model innovation (RMI domain)</i>					
Revenue mechanisms have changed	1.56	0.94	4.32	43.79**	RMI
Cost mechanisms have changed	1.44	2.68	3.96	20.43**	RMI

** $p < 0.01$

4.3 Step 3: assessment of indicator collinearity

The formative measurement approach of the construct makes traditional tests for indicator reliability and convergence obsolete, since we have no assumptions about the strength of the relationships of individual indicators or the construct (Hulland 1999). Instead, as formative measurement models are based on multiple regressions, we needed to test for multicollinearity (Diamantopoulos and Winklhofer 2001). Table 4 illustrates the strength of the correlations among the indicators as well as the variance inflation factors (VIF) for each indicator. All correlations are significant at the 1 % level. The VIF scores range between 1.437 and 3.829. This strongly indicates that there is no multicollinearity issue in the data, since the values are far below the common threshold value of 10 (Kleinbaum et al. 1996).

4.4 Step 4: assessment of external validity

Since internal consistency is not appropriate for formative indicators, tests for external validity are commonly incorporated in formative index development approaches (Bagozzi 1994; Diamantopoulos and Winklhofer 2001; Jarvis et al. 2003). Besides implementing the formatively measured construct into a structural relationship with further variables that have previously been theoretically hypothesized, a second approach is to assess the external validity of the formative measurement model by using reflective indicators for the construct (Bruhn et al. 2008; Diamantopoulos and Winklhofer 2001). Making use of survey data of 200 strategy and innovation management experts, in this study, we applied the second approach. The survey questionnaire incorporated both the formative measurement index as well as reflective indicators for each of the three business model innovation types. Managers were asked to indicate their agreement with each of the indicators and items on a seven-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*). This data enables us to test the index's external validity using a Multiple Indicators and Multiple Causes (MIMIC) model where the single latent variable business model innovation is simultaneously measured formatively and reflectively. The results of the PLS analysis are illustrated in Fig. 2.

At the measurement model level, we can see that all weights of the nine formative indicators are significant. The loadings of all three reflective items are .837 or higher, showing high significance, and displaying high average variance extracted as well as composite reliability scores. Therefore, the reflective construct is suitable to assess the formative construct's external validity. The analysis of the variance inflation factors of all first-order constructs indicates no multicollinearity issue, with VIF scores ranging between 1.746 and 1.995. Concerning the structural model level, all three dimensions show strong and highly significant path coefficients. The R^2 of .807 shows a very high level of explanatory power of the formative measurement model for the reflectively measured variables (Diamantopoulos 2006).

Table 4 Correlation

Indicator	M	SD	VIF	1_1	1_2	1_3	2_1	2_2	2_3	2_4	3_1	3_2	VOI	VAI	RMI
1_1	4.10	1.792	1.993	1											
1_2	4.79	1.739	2.486	.653	1										
1_3	4.56	1.770	2.552	.664	.743	1									
2_1	4.40	1.730	2.765	.431	.575	.458	1								
2_2	4.61	1.680	3.828	.475	.604	.528	.783	1							
2_3	4.73	1.680	3.084	.498	.605	.508	.716	.804	1						
2_4	4.31	1.833	1.437	.650	.566	.685	.485	.516	.517	1					
3_1	4.47	1.972	2.584	.471	.516	.479	.527	.510	.504	.598	1				
3_2	4.58	1.871	2.584	.424	.517	.482	.563	.509	.531	.537	.783	1			
VOI	4.36	1.897	–	.547	.678	.577	.597	.590	.630	.473	.538	.537	1		
VAI	4.68	1.802	–	.508	.611	.544	.701	.811	.854	.546	.543	.548	.643	1	
RMI	4.51	1.905	–	.424	.441	.474	.504	.508	.522	.573	.763	.821	.591	.560	1

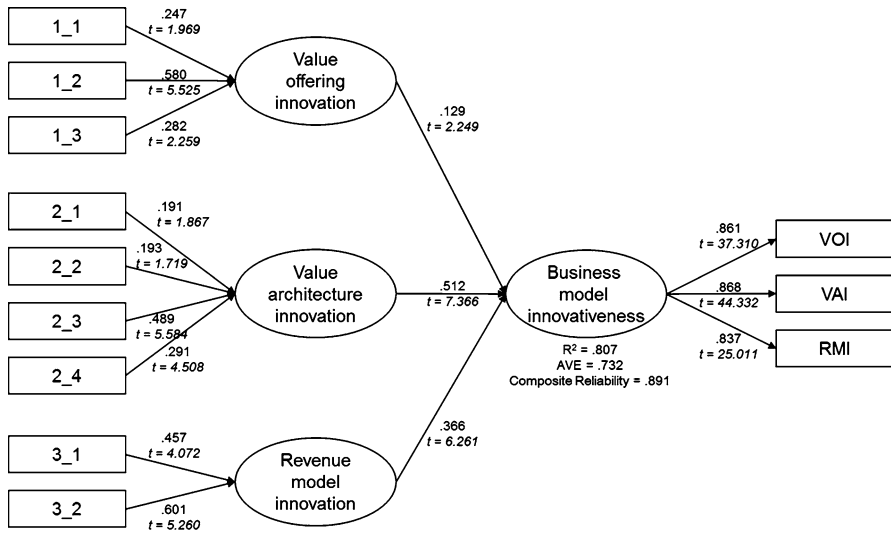


Fig. 2 PLS estimates for measurement model and structural model

5 Discussion and conclusion

Academic research on strategy, entrepreneurship and innovation issues continues to dedicate considerable attention to business model innovation. This study set out to develop better understandings and definitions of business models, business model innovation, and their measurement. The results of our scale development process revealed several notable findings, which also provide fruitful insights for researchers and practitioners: (1) the need to distinguish between the particular functions of business models, (2) the potentials of integrating findings from other research streams into business model innovation research, and (3) the development of a measurement index of business model innovativeness.

First, our results demonstrate that three distinct functions business models in literature can be identified: (a) description of a firm’s key business logic, (b) opportunity facilitation, and (c) commercialisation of new ideas and technologies. Our categorisation of business model conceptualisations in terms of the particular roles assigned to business models shows that the reason for having manifold business model understandings lies not only in the concept’s complexity, but also in the great variety of applications assigned to business models. Since these roles vary widely from static and descriptive to dynamic and facilitative concepts, business models thereby need to fulfil very distinct requirements. This implies the need to clarify the context and purpose assigned to business models when studying the phenomenon. Our research thus responds to the call for research to consider and identify different roles of business models (George and Bock 2011; Ghaziani and Ventresca 2005; Zott et al. 2011) while considering various attempts to define business models (e.g. Chesbrough and Rosenbloom 2002; George and Bock 2011; Spieth et al. 2014; Teece 2010). Furthermore, we contribute to the business model

innovation literature (Afuah 2003; Afuah and Tucci 2001; Amit and Zott 2001; Zott and Amit 2007, 2008, 2010; Zott et al. 2011) by providing a comprehensive definition of business model innovation, since many studies currently use the concept without providing a definition (Zott et al. 2011).

Second, within business model innovation, the business model itself becomes the unit of analysis for innovation. Prior research has emphasized a number of particularities (mainly emphasizing challenges) of this innovation type. One contribution of this study is to show that despite many differences, some of the challenges faced in business model innovation research are similar to those occurring in the study of other innovation forms. Drawing on the experience of product innovation management scholars in capturing the extent of newness of product innovations, business model innovativeness is conceptualised as a new-to-the-firm change in at least one out of three business model dimensions: (a) a firm's value offering, (b) a firm's value creation architecture, and (c) a firm's revenue model logic. We contribute to the conceptual understanding of the construct, as business model innovation is understood as a 'slippery' construct (Casadesus-Masanell and Zhu 2013). Here, we identified the need to differentiate the dimensions of newness (how much of the current business model needs to be new) and the type of newness (to whom does it need to be new). In doing so, our study builds to the need to differentiate business model innovation from product innovations (e.g. Zott et al. 2011; George and Bock 2011; Teece 2010). Additionally, we extend earlier findings by Bucherer et al. (2012), who sought to integrate and combine findings from product innovation into business model innovation literature. Integrating such findings—not only from innovation management, but also from further fields, including entrepreneurship and strategy research—might therefore provide useful advice to the advancement of business model innovation literature (Spieth et al. 2014; Schneider and Spieth 2013).

The outcome of this complex scale development procedure offers the opportunity of a proven concept validated in corporate practice and therefore the potential applicability in corporate practice. Other BMI concepts and terms in extant research are to date purely of theoretical or exploratory character. Here, we offer a validated measurement model to be applied by managers to evaluate their three different business model innovation types: value offering innovation, value architecture innovation and revenue model innovation.

Third, this paper provides an empirically based measurement index for business model innovativeness that was tested using three different samples following the scale development procedure by MacKenzie et al. (2011) as well as Diamantopoulos and Winklhofer (2001). As business model innovation has only begun to attract academic attention in recent years (Casadesus-Masanell and Zhu 2013; Schneider and Spieth 2013; Spieth et al. 2014), we are now able to mitigate the vague and 'slippery' character (Casadesus-Masanell and Zhu 2013) of the business model innovation/innovativeness concept. Our research extends business model innovation literature while providing a measurement tool for future research in which business model innovation is seen as a new-to-the-firm innovation. In extant research, only one single approach to measure business model innovation exists that emphasises different business model design themes and a new-to-the-market perspective (Zott

and Amit 2007). Our study extends extant research (e.g. Björkdahl 2009; Camisón and Villar-López 2010; Hedman and Kalling 2003), since it validates three distinctive types (Chesbrough and Rosenbloom 2002; Demil and Lecocq 2010; Osterwalder and Pigneur 2010; Teece 2010; Yunus et al. 2010) of business model innovation: (1) a firm's value offering innovation, (2) a firm's value architecture innovation, and (3) a firm's revenue model. Each of these can occur independently from any changes in the remaining dimensions, even though changes in one dimension are likely to cause the need for alignment in further dimensions of a firm's business model.

1. Value offering innovation thereby refers to designing a new value offering that meets an existing but yet unfulfilled customer demand, or that stimulates an additional but not yet consciously perceived demand. Our scale development reveals that value offering innovation is covered by three business model elements: (1.1) target customers, (1.2) product and service offering, and (1.3) positioning. These elements serve to explain which benefits a firm provides to whom and how it thereby differentiates itself from its competitors.
2. Value architecture innovation refers to the exploration of new applications and combinations of a firm's base of resources and competences or within its external partner network. Our study extends extant research, since it validates four business model elements for value architecture innovation: (2.1) core competencies and resources, (2.2) internal value creation, (2.3) external value creation, and (2.4) distribution. These provide a description of which resources and competencies a firm's value offering is built on, which activities within and beyond the firm are used for value creation, and how the firm's offering reaches its target customers.
3. Revenue model innovation refers to the innovation of a firm's core earnings logic. Firms develop new ways to generate earnings and manage their costs while simultaneously meeting customer needs, and providing the firm with the highest possible profit it can take out of its resources and competences. Empirically, we show and prove that two further business model elements coin a firm's revenue model logic innovation: (3.1) logic of earnings and (3.2) logic of costs.

This methodological contribution thereby enables large-scale quantitative research on business model innovation literature (Afuah 2003; Afuah and Tucci 2001; Amit and Zott 2001; Zott and Amit 2007, 2008, 2010; Zott et al. 2011), which is still in its infancy, with very few quantitative studies (Casadesus-Masanell and Zhu 2013; Schneider and Spieth 2013).

For managerial practice, this paper presents conceptualisations of business models and business model innovation, which fulfil several purposes. First, it outlines the various applications the business model concept potentially has in corporate practice. In addition to a business model's descriptive role, which allows for the explanation of a firm's business logic, we particularly emphasise its relevance in the commercialisation and facilitation of opportunities.

Second, this paper provides a two-level business model description that comprises three dimensions and nine underlying elements. Depending on the required abstraction level, the logic as well as the change of a business model can be explained at either level. This allows one to use the concept in discussions with different target groups and scopes and, further, for comparability and measurement of business model innovativeness across companies and industries.

Third, besides providing a common language, the three suggested business model dimensions also illustrate the potential starting points for innovation at the business model level, which allows for measurements of extents of change. Here, managers are now able to differentiate three distinctive business model innovation types. Effects of single or combined business model types, such as value architecture and revenue model innovation, and its/their effects on corporate success, can be estimated by managers. Since we have now validated business model elements, it is now possible to derive certain patterns in a corresponding industry that enables a consideration for the own company.

Our study enhances the understanding of business model innovation by analysing its dimensions, its elements and an empirical validated measurement index of the extent of change at the business model level. These findings are based on the business model, business model innovation, and product innovation literature as well as on an extensive index development procedure. However, our study has some limitations, which—in turn—provide opportunities for further research. First, in our scale development study, we focus on the most elementary business model innovation type, in which newness refers to a situation that is new-to-the-firm. No assumptions are made about further levels of newness (such as new-to-the-industry or new-to-the-market). Since this aspect might be of interest in future studies on the effects of business model innovation, future research should address additional levels of newness, such as new-to-the-industry or new-to-the-market—solely or in combination. Second, in our study, we assumed change in the dimensions of a business model to be interrelated. However, we did not provide any detailed information on the interrelatedness of change in the business model dimensions. A more in-depth analysis of these relationships and interdependencies of the distinct business model elements and dimensions presents another field for future research on business model innovation. Third, our study focuses on business model innovation in incumbent firms. Since we rely on the new-to-the-firm perspective, we compare the business model change from the existing to the previous status quo of the focal firm's business model. However, in case there is no status quo to be compared with, the subject of investigation changes from incumbent firm to start-up companies. Thus, we provide no explicit implications for start-up firms. Here, future research might follow up on conceptualisation on business development by Amit and Zott (2001) as well as Zott and Amit (2010) to investigate which of our findings can and which cannot be transferred to start-up firms.

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