Journal of Business Economics (2019) 89:1097–1147
https://doi.org/10.1007/s11573-019-00954-1

ORIGINAL PAPER

Learning from failures in business model innovation: solving decision-making logic conflicts through intrapreneurial effectuation

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Published online: 29 October 2019

Abstract
Established organizations need to adapt their current business models (BMs) to match dynamic changes in their environment. Alternatives to the established BM usually incorporate a different logic of how value is created, offered, and captured. When selecting and implementing the best BM alternative, organizations have to make decisions on several highly uncertain questions: What will the future look like, on what basis should we take action, how do we act under risks and limited resources, and how should we behave in light of unexpected events and towards outsiders. Firms can apply the logic of causation or that of effectuation when making these decisions. In this context, we apply a longitudinal single case study of a manufacturing company encountering a digital transformation journey. In this case study, we investigate the shift from a product-based to a smart service model and the underlying process of decision-making in the context of business model innovation (BMI). From our case study, we identify latent conflicts resulting from two different BM logics: the logic of value offering, creation, and capture of the dominant (established) BM versus that of the new one. We show that logic conflicts become especially visible when actors cannot reduce uncertainty about the new BM effectively. These conflicts finally inhibit the change of the dominant BM to the new one. Sensemaking in the company about the latent logic conflicts within the BMI process reveals the need to change its decision-making logic from managerial causation to intrapreneurial effectuation. The findings from our study contribute to entrepreneurship and institutional theory while highlighting the concept of institutional intrapreneurship for BMI. Our results suggest separating the alternative BM from the existing one. This separation can reduce cognitive uncertainty associated with BMI processes through logic pluralism, i.e., building a new decision-making logic in parallel to the old one. We contribute to the BMI literature by adding logic conflicts of BMI and the decision-making logic of an organization to the list of important contingency factors that influence the execution and outcome of a BMI process.

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Keywords Business model innovation · Digital transformation/Digitization · Institutional theory · Effectuation · Causation · Sensemaking · Institutional entrepreneurship · Institutional logic · Family business · Value migration · Pivoting · Longitudinal single case study · Mixed-method · Logic pluralism

JEL Classification M13 · M15 · O32 · O33

1 Introduction

Many firms need to adapt their business model (BM) to profit from digital innovation and its resulting interconnectedness. A BM represents the logic of how a firm operates and creates value for its stakeholders (Casadesus-Masanell and Ricart 2010). This value logic of BMs includes the value proposition, commercial value architectures (like core competencies, resources, internal and external value creation mechanisms, distribution systems), and the ways of capturing value through a profit formula (Laasch 2018; Müller et al. 2018; Spieth et al. 2018; Spieth and Schneider 2016). The dominant product-based BM and its underlying value logic of manufacturers is encountering increased competitive pressure. Established product offerings converge more and more to a commodity status. Pure product or service innovation is no longer sufficient to stay competitive (Arnold et al. 2016; Foss and Saebi 2017; Müller et al. 2018). Hence, we currently observe an elimination of product-related cultural routines linked to a transition to demand-based and customer-centric logics enabled by emerging digital technology and new data-driven BMs (Hankammer et al. 2019; Reimann et al. 2010; Schallmo et al. 2017; Visnjic et al. 2016). This move in the value logic from an incumbent to a new BM is called 'value migration' by Hacklin et al. (2018). Increasing value migration triggers established firms to engage in a systematic business model innovation (BMI) process to adapt their existing BM and create new sources of competitive advantages (Arnold et al. 2016; Hacklin et al. 2018; Müller et al. 2018).

According to Hacklin et al. (2018), the practice of innovating and reconfiguring the primary BM is characterized by pivoting. Pivoting the primary BM is an approach of experimenting and searching for an improved primary BM in a path-dependent way. Pivoting results in a new business logic. Such a pivot is essentially a shift in business strategy to test a new BM that requires direct or indirect feedback during the innovation process (Hacklin et al. 2018). In this context, Casadesus-Masanell and Ricart (2010) regard a firm's strategy as a higher-order choice that includes a contingency plan of action, determining the design of the BM. Thus, the new BM design is based on strategic decision-making about the firm's goals and a plan of action (Schneckenberg et al. 2017). In this process, firms need to adapt their organizational design and their mindset, i.e., the shared mental models, values, beliefs, and associated assumptions (Arnold et al. 2016; Hock et al. 2016). Such values and beliefs are artifacts from the learning history of an organization creating its *institutional logic* (Gawer and Phillips 2013). Establishing a new BM means not just to master the migration process from an established to a new value logic, but also

to shift its institutional logic of how the firm creates, offers, and captures value in exchange with its customers, suppliers, and partners (Casadesus-Masanell and Zhu 2013; Spieth et al. 2018; Thornton et al. 2012).

These arguments suggest that failures in BMI originate from the challenges associated with the process of changing the established institutional logic when designing new BMs (Heidenreich and Kraemer 2016; Heidenreich and Spieth 2013). Many factors, such as operational routines, strategic complexity, organizational inertia, or established power and authority from a dominant internal or external coalition restrain the strategic decisions required to innovate its BM (Casadesus-Masanell and Ricart 2010; Heinze and Weber 2015; Vaskelainen and Münzel 2018). In this regard, Foss and Saebi (2017) assume that anticipated changes are conflicting with existing shared mental models. The prevailing path dependence on the dominant BM logics creates self-reinforcing effects that restrict managerial decision-making during the process of BMI (Franke and zu Knyphausen-Aufsess 2014; Laudien and Daxböck 2016; Schneckenberg et al. 2017). Being trapped in the status quo hinders firms from carrying out endogenous change (Laudien and Daxböck 2016). Digitization as a transition based on digital innovation can be considered an endogenous change, rather than a change that is triggered exogenously. In this context, digitization presents an ambiguous and uncertain opportunity, less so an obvious threat for manufacturing firms to act upon (Martins et al. 2015). However, despite a rather large body of research on shifting decision-making practices when endogenously innovating a BM, many firms still struggle with organizational conflicts in this process (Foss and Saebi 2017). This situation calls for a better understanding of the conditions when and how such a logic shift in decision-making happens (Berends et al. 2014; Reymen et al. 2015, 2017).

The institutional theory perspective is useful in explaining perseverance with a dominant logic to secure stability and achieve legitimacy in the business environment (Thornton et al. 2012). The institutional entrepreneurship literature describes this dilemma as the "paradox of embedded agency" and suggests tactics for overcoming this paradox through achieving pluralism in logics and thereby enabling endogenous change of dominant BM logics (Battilana et al. 2009; Heinze and Weber 2015; Tracey et al. 2011). In the context of innovation, Heinze and Weber (2015) link their institutional intrapreneurship concept to the effectuation and causation logic of decision-making (Sarasvathy 2001). They propose using the causation-effectuation framework as a promising theoretical lens to study and explain the innovation of institutionalized logics (here: the shift from causal to effectual decision-making). We follow this perspective in our paper and contribute to calls for research on the influence of effectuation and causation as opposing decision-making logics when explaining transformation in established organizations (Chiles et al. 2008; Heinze and Weber 2015; Micelotta et al. 2017).

Overall, we address the following research question: *How can companies overcome embedded institutional value and decision-making logics, including their subsequent conflicts, to innovate their dominant business model?*

We answer our research question by building a longitudinal case study of an incumbent, family-owned German manufacturer in the pump industry. From our research, we aim to understand better the underlying decision-making logic of how

firms apply effectuation and/or causation along the BMI process. We examine how a firm initiates BMI to start the process of pivoting their dominant BM and analyze the challenges and conflicts along the process. We are interested in understanding why logic conflicts emerge and how the organization responds to these conflicts to create a positive BMI outcome. We contribute to the BMI literature by illuminating the process stages, practices, and outcomes of BMI. Our longitudinal case study reveals latent logic conflicts resulting from a misfit between the innovation of an alternative BM and the dominant decision-making logic to manage and reduce uncertainty along the BMI process. In this context, we link the BMI concept to the institutional theory literature and explain how incumbent firms accomplish BMI in an endogenous way by applying institutional pluralism (organizational hybridization) of value logics (Heinze and Weber 2015; Schildt and Perkmann 2017; Spieth et al. 2018). Our study proposes a comprehensive checklist of process steps, outcomes, and conflicts that might hinder successful BMI.

We organize our arguments in the established logic of management research papers: First, we outline the theoretical background of our research and review the literature on BMI, institutional theory, and the decision-making logics of causation and effectuation. We describe the research setting and report the results of our case study analysis, followed by a theoretical discussion and implications. We end with limitations and future research opportunities.

2 Theoretical background

2.1 The challenge of business model innovation

The digitization of manufacturing provides an opportunity for increased interaction and value creation between a diverse set of actors, such as providers, contributors, and clients. The integration of information and communication technologies (ICTs) into products enables firms to capture data about customer needs more effectively for innovation. These data enable firms to create new demand-based and customer-centric value propositions that are the basis for new BM designs (Arnold et al. 2016; Hankammer et al. 2019). Realizing these benefits requires the use of new routines and digital practices in a new business logic to establish a new BM (Arnold et al. 2016; Casadesus-Masanell and Ricart 2010; Müller et al. 2018). The literature describes BMI as a fundamental or paradigmatic shift in at least one of three higher-order BM dimensions, namely value offering, value architecture, and revenue model (Arnold et al. 2016; Casadesus-Masanell and Ricart 2010; Müller et al. 2018; Spieth and Schneider 2016; Teece 2010). First, value offering innovation transforms the value proposition in terms of a firm's products and services, target customers, and strategic positioning in the market. Innovating the value offering aims to meet a presently unsatisfied customer demand. Second, value architecture innovation addresses new value creation mechanisms and explores new applications and combinations of a company's resource base, its external partner network, and new distribution mechanisms for transacting and connecting. Finally, revenue model innovation refers to the innovation of how a company generates profits by focusing on its mechanisms

relating to earnings and costs. Innovating the revenue model creates novel ways of capturing value through the creation of a new profit formula (Spieth and Schneider 2016). Other conceptual explanations in the literature define BMI in a similar way as changing the underlying value logic in its three higher-level dimensions (Chesbrough 2007; Clauss 2017; Jansen et al. 2006; Johnson et al. 2008; Laasch 2018; Müller et al. 2018; Saebi et al. 2017; Schneckenberg et al. 2017; Spieth et al. 2018; Wei et al. 2014).

It comes as no surprise that firms attempting to perform successful BMI face multiple challenges and conflicts (Chesbrough 2010; Foss and Saebi 2017; Massa et al. 2017; Spieth et al. 2016; Teece 2010). Creating new business logics requires organizational learning, flexibility, experimentation, and adjustment. Innovating the BM often depends on the reconfiguration of organizational structures and culture (Arnold et al. 2016; Buliga et al. 2016; Foss and Saebi 2017; Hock et al. 2016; Khanagha et al. 2014). Consequently, BMI implies a strategic decision to adjust the current mode of individual and organizational structures and processes of doing business (Laudien and Daxböck 2016). A recent stream of literature regards BMs as cognitive instruments for managers to make sense of the value logic of how a firm creates, offers and captures value (Laasch 2018; Martins et al. 2015; Müller et al. 2018; Spieth et al. 2018). According to Müller et al. (2018) and Spieth et al. (2018), we apply this perspective in our study and regard the BM as a logic frame of how companies in the manufacturing domain can utilize digitization to provide new (and appropriate) mechanisms for value offering, creation, and capture. In this regard, current BM logic drives managers' decision-making (Schneckenberg et al. 2017). Thus, the BMI process is full of conflicts and resistance, including cognitive shortcomings and myopia towards the dominant logic of doing business (Chesbrough 2010; Franke and zu Knyphausen-Aufsess 2014; Schneckenberg et al. 2017; Vaskelainen and Münzel 2018). Management's attention and decision-making tends to support BMs that are consistent with the dominant logic, constraining firms' BMI process (Franke and zu Knyphausen-Aufsess 2014; Thornton et al. 2012; Vaskelainen and Münzel 2018).

Only a few empirical research studies (Laasch 2018; Ocasio and Radoynovska 2016; Spieth et al. 2018; Vaskelainen and Münzel 2018) have investigated the influence of institutional logics on BMs. However, this literature does not explain how institutional logics influence the innovation process in terms of logic conflicts (Micelotta et al. 2017) and how firms can appropriately manage BMI to change the dominant BM (Spieth et al. 2014).

2.2 Institutional theory perspective on business model innovation

Institutional theory provides a theoretical perspective which helps to explain the challenges of BMI (Gawer and Phillips 2013; Laasch 2018; Spieth et al. 2018; Tracey et al. 2011). It can serve as an interpretation framework on both the individual and the organizational level to understand how the beliefs, attitudes, decisions, and actions of various actors involved in a BMI process influence its outcomes (Spieth et al. 2018; Thornton et al. 2012). Firms face ambiguity and uncertainty in

innovating their BM (Reymen et al. 2017; Schneckenberg et al. 2017). From an institutional logic perspective, firms concentrate on socially built sets of physical practices, norms, values, and beliefs to shape cognition and decision-making for internal efficiency and external legitimacy when facing ambiguity or cognitive shortcomings (Lounsbury 2002; Thornton 2002). The institutional theory enables a more profound perspective from which the theoretical puzzle of BMI and its conflicts can be studied (Laasch 2018). Institutional logic sets the goals that, in turn, determine resource requirements for institutionalized practices and underlying actions as means-end couplets (Friedland 2002; Spieth et al. 2018; Thornton 2002). In most firms, the dominant value logic is entirely determined by the commercial market logic which focuses on firms' goals to increase financial returns for shareholder value maximization (Mair et al. 2012; Thornton et al. 2012; Vaskelainen and Münzel 2018).

However, research shows that BM designs are not just influenced by their dominant institutional logic of commercial market value. Different institutional logics might shape a BM design (Laasch 2018; Spieth et al. 2018; Vaskelainen and Münzel 2018). Today, the phenomenon of digitization provides new field-level value logics for doing business in the manufacturing industry, such as implementing data-driven or as-a-service BMs (Arnold et al. 2016; Müller et al. 2018). Gawer and Phillips (2013) investigated the underlying forces of an organization that adapts existing and seeks new leadership to coordinate a novel digital infrastructure as its institutional value architecture. They use the example of Intel's transformation to show how an organization can successfully change its logic from creating value in a manufacturing supply chain to adapting a digital product platform logic. Like Intel, many organizations now strive to build new practices and have a shared expectation among their members that the new value logics will be implemented to improve competitive advantage. However, these logics often contradict their dominant BM logic (Heinze and Weber 2015; Laasch 2018; Spieth et al. 2018). When pivoting away from the existing BM, firms hence have to manage institutional plurality in terms of several alternative and potentially conflicting institutional value logics in parallel (Jay 2013; Laasch 2018; Mair et al. 2012; Pache and Santos 2010; Spieth et al. 2018).

The resulting "hybrid" organization can cause conflicts due to different goals setting and funding structures to achieve these goals. These differences increase ambiguity and the level of uncertainty in decision-making (Schneckenberg et al. 2017). In practice, managers often find it difficult to accurately evaluate performance which is required to assess the value of a new BM alternative by their internal and external stakeholders (Townsend and Hart 2008). Additionally, uncertainty is increased by conflicts arising from competition between two opposing BM logics for limited resources, e.g., fighting for financial investment and managerial attention (Ocasio 2011; Spieth et al. 2018). In this context, BMI shows characteristics of an intra-organizational political process that includes different institutional demands in terms of mental frames that determine managerial actions (Casadesus-Masanell and Ricart 2010; Pache and Santos 2010).

The existing institutional theory literature has explored the practice of logic change in a diverse set of industries (Gawer and Phillips 2013; Heinze and Weber 2015; Laasch 2018; Spieth et al. 2018; Töytäri et al. 2018). However, previous research has neglected the associated interplay between the process of pivoting

towards an alternative BM logic and the underlying decision-making logic of realizing BMI. Following several recent authors (Heinze and Weber 2015; Laasch 2018; Micelotta et al. 2017; Töytäri et al. 2018), we assume that influential institutional elements of the latter conflict with the BMI process. A comprehensive understanding of such innovation processes could enhance our understanding of how firms can incorporate new BM logics into their routinized practices and underlying decision-making logic (Howard-Grenville et al. 2011; Schneckenberg et al. 2017). Schildt and Perkmann (2017) suggest that research should explore which steps and approaches are required to integrate and realize innovations that involve organizational hybridization of different logics. Heinze and Weber (2015) stress the importance of investigating institutional work behind change since this sheds light on the process of accomplishing institutional pluralism (organizational hybridization) of value logics. In this context, a theoretical puzzle comes up, the *paradox of embedded agency* from the research on institutional entrepreneurship (Greenwood and Suddaby 2006; Micelotta et al. 2017): If organizations or actors are institutionally embedded in a dominant BM logic that is determined by its strategy, how can they distance themselves from institutional pressures and act strategically to innovate their BM, while their beliefs and actions are all determined by the institutional logic they wish to change (Battilana 2006; Berglund 2015; Garud et al. 2007; Holm 1995)? Our study strives to explore this paradox in the context of BMI and identify strategies to address it.

2.3 Institutional intrapreneurship and its decision-making logic of causation and effectuation

In our study context, Laasch (2018) recommends further research on BMI and institutional pluralism as well as of the associated conflicts and tensions. Following his research recommendation, we use the institutional intrapreneurship concept by Heinze and Weber (2015) and its underlying work (Greenwood and Suddaby 2006; Tracey et al. 2011). Management's decision-making capabilities influence the recognition and evaluation of new BMs (Schneckenberg et al. 2017). In most cases, managers remain unaware of the potential of BMI because they are biased towards the dominant BM logic. Thus, a new way of thinking with a new decision-making logic is required to benefit from the new BMs (Chesbrough 2010; Schneckenberg et al. 2017; Vaskelainen and Münzel 2018). Here, the institutional intrapreneurship concept provides a theoretical basis for the study of this phenomenon. It proposes the concept of effectuation and causation-type logics in decision-making (Sarasvathy 2001) to explain the innovation of institutionalized logics (Heinze and Weber 2015).

Sarasvathy (2009) defines causation as the traditional basis for making decisions, based on the principle that *"to the extent we can predict the future, we can control it"* (Sarasvathy 2009, p. 17). In the context of creating new ventures like in BMI, Sarasvathy (2001) describes the causational decision logic as a goal-oriented approach that relies on analysis of the environment that creates reactive and planned behavior. It is a process that *"take[s] a particular effect as given and focus[es] on selecting between means to create that effect"* (Sarasvathy 2001, p. 245). Decision-making based on causation focuses on accomplishing desired goals through a specific set

of given resources as the means to maximize the "Return on Investment" (ROI) and avoid unexpected events by analyzing the market and predicting the future. Causation originates from traditional management theories and practices, which refer to the search for and selection of tactics for efficiently exploiting an existing resource and capability base (Sarasvathy 2009).

In contrast, effectuation emphasizes the creation of something new with given means, such as resources/competencies or specific experience as the basis for action (Sarasvathy 2001). To deal with high uncertainty and to leverage contingencies, managers start executing processes like BMI with the competencies they already possess, limiting their losses, forming partnerships, and focusing on creativity by co-creation (Dew et al. 2009; Sarasvathy 2001, 2009). According to Sarasvathy and Dew (2008), effectuation can transform prevailing institutions and restructure these into new ones. Chiles et al. (2008) propose examining the influential logics of effectuation and causation to explain how different institutions and their logics emerge and transform.

Recently, also the innovation literature (Chesbrough 2010; Futterer et al. 2017; Reymen et al. 2017; Schneckenberg et al. 2017) has linked BMI outcomes to the effectuation and causation framework as an alternative approach to reduce uncertainty in the BMI process. The innovation literature argues that the effectuation approach is more suitable in projects with high uncertainty as compared to more conventional product development approaches, which rather rely on causal reasoning and an adaptation of causative instruments (Berends et al. 2014, 2016; Brettel et al. 2012). However, as BMI is a new process for many firms, we assume that incumbent firms often apply common and established innovation approaches to BMI, which are characterized by a causational process logic of decision-making. A causative process logic affects the evaluation of risk, investment, or change of core competencies (Brettel et al. 2012; Dew et al. 2009; Fisher 2012) and hence the outcome of the BMI process. Table 1 summarizes the dimensions and characteristics of causational and effectual decision-making to structure our research framework to later investigate different decision-making logics in the BMI process observed in our case study.

The five innovation-related components of decision-making outlined in Table 1 follow either the underlying logic of causation or that of effectuation. When following the established logic of causation for the design and implementation of new BMs, which typically characterizes the stage-gate thinking applied in most new product development processes, the outcome of BMI process may be negatively affected due to a high degree of uncertainty (Brettel et al. 2012). To ensure successful changing a dominant BM logic into a new one, organizations have to make several decisions under uncertainty. In this context, the core issues of decision-making under uncertainty include the basis on which action to take, how to behave in light of unexpected events and towards outsiders, as well as what contingencies and risks will influence the future context of the new value logic (Reymen et al. 2017). Dealing with these uncertainties calls for an application of an effectuation decision-making logic, which has been shown to be the better approach for dealing with projects with high levels of innovativeness and uncertainty (Brettel et al. 2012; Dew et al. 2009; Reymen et al. 2015, 2017; Schneckenberg et al. 2017).

Table 1 Decision-making logic dimensions of causation vs. effectuation according to Dew et al. (2009)

Issue	Causation	Effectuation
View of the future	Predictive: the future is a continuation of the past. Accurate prediction is both necessary and useful	Creative: willful agents shape the future (at least partially). Assuming that prediction is neither easy nor useful
Basis for taking action	Goal-oriented: goals, even when constrained by limited means, determine sub-goals and actions, including which individuals to bring on board	Means oriented: goals emerge by imagining courses of action based on given means. Who comes on board determines what can be and needs to be done. Not vice versa
View of risk and resources	Expected return: frames the venture creation problem as pursuing the (risk-adjusted) maximum opportunity and raising the required resources. The focus is on the upside potential	Affordable loss: the problem is pursuing adequately satisfactory opportunities without investing more resources than stakeholders can afford to lose. Limit downside potential
Attitude towards outsiders	Competitive analysis: competitive attitude toward outsiders. Relationships are driven by competitive analyses and the desire to limit dilution of ownership	Partnerships: advocating in stitching together partnerships to new markets. Relationships, particularly equity partnerships, drive the shape and trajectory of the new venture
Attitude towards the unexpected	Avoiding: predictions, planning and focus on targets form hallmarks of causal frames. Contingencies are obstacles to be avoided	Leveraging: eschewing predictions, rethinking of possibilities and transformations of targets. Contingencies are opportunities for novelty creation

3 Method

3.1 Research setting, case study description and context

In line with suggestions by Gupta et al. (2016) and Futterer et al. (2017), we examine the processes and dynamics of BMI longitudinally. In this study setup, we investigate how and why events play out over time in a single, in-depth case study of a global manufacturer. The selected case company (PumpCo) is a mid-sized German market leader operating in an established and asset-intensive manufacturing industry. The company is family-owned but led by outside managers. In 2014, it formulated the strategic goal to implement digital technologies to create smart industry equipment and new value-adding services by establishing a new BM. We selected PumpCo because it offers a real-life case of purposeful BMI with its conflicts and issues between the new BM logic and its associated implementation logic. We gained deep insights into the nature of the BMI process of an incumbent firm by observing the BMI process over a multi-year period.

PumpCo's products are special application pumps, which are essential parts of highly specific systems of fluid transport and production. The company offers critical parts of machinery and infrastructure to its customers. This creates a lock-in effect after installing the pumping technology in the broader system. The existing value-creation logic focuses on the continuous development of existing pumping technology and market penetration by low margin product sales of the original equipment. Thus, the underlying BM logic concentrates on optimized large-scale pump sales (as a capital good), based on a single transaction. With each transaction, PumpCo acquires new customers who become a source of future revenue through spare part sales with high margins. This kind of efficiency-centric BM logic creates value by aggregating demand and making use of scale advantages. While this efficiency-centric value creation model worked well for many decades, it has recently been challenged by increasing Asian competition and commoditization of the original value proposition due to globalization and digitization within its niche industry. Technology leadership and "German engineering excellence" as PumpCo's prevailing value creation mechanism and success factors of the last decades are continuously eroding. The firm first reacted by increasing its R&D efforts and using digitization to push product performance and quality to an even higher standard. This activity, however, resulted in self-cannibalization of the highly profitable spare part business through reduced product wear and tear. Thus, a new business model was needed.

Our research accompanied a BMI pilot project at PumpCo. We observed and documented the internal process of BMI for a focal product line. The leading BMI protagonist was the Head of Product Management, a member of the senior management team and executive board of PumpCo. When he understood that the new digitalized pumping technology is difficult to market under the established BM, he promoted the development and implementation of a new BM with a different value logic. His main partner was the senior project manager of this product line. Both persons were very knowledgeable and experienced in product development and operations,

but had acquired good knowledge about the concept of BMI. They formed a project team and ran a pilot project for BMI. The BMI project encompasses BMI workshops, focus (group) discussions, and an assessment of the generated BM alternatives by top and middle management to define the final pivot from the dominant BM.

PumpCo was not just selected as a case study due to the deep and continuous data access, but also because it forms a typical BM pivoting case. PumpCo does not represent an extreme case, distinctive situation, or deviant characteristics, making it a highly generalizable case (Mason 2017; Yin 2017). PumpCo can be characterized as a common and instrumental case (Silverman et al. 2015; Stake 2000) because it demonstrates how BMI is processed and which practices and types of conflicts can emerge. The case provided us the base for a detailed analysis of the underlying process steps of BMI and its decision-making logic, helping to solidify the application of our theoretical frameworks.

3.2 Data collection

We planned and executed the longitudinal case study according to the guidelines proposed by Yin (2017). Our study employed his three main components of rigorous execution of case study research: definition of a protocol for gathering data, data collection, and data analysis. We built the protocols upon the theoretical framework and divided into the acquisition of two research data sources, which we grounded on a qualitative mixed-method approach (process ethnography and semi-structured interviews). Our qualitative research team was composed of an ethnographer, an interviewer, and two external researchers involved in coding, data analysis, and interpretation.

The first research data source (RDS1) focused on an inductive investigation and analysis of the BMI process, as well as its practices and challenges, to develop a single process narrative from the stream of reporting (Gioia et al. 2013; Gioia and Chittipeddi 1991; Langley 1999). From RDS1, we used a set of real-time data collection methodologies through ethnographic project work at the firm (Pettigrew 1990). The research team was regularly present on-site and took on a passive/observing role during the two-year pilot BMI project (Takeda et al. 1990). PumpCo allowed us to gather data from operational cycles and various series of events during the BMI process (see Table 2). The firm access provided us with the opportunity to explore the context, the BMI process character, and the environment in which PumpCo operated and was trying to pivot the primary BM (Pettigrew 1990).

According to Brady and Collier (2010) and Spradley (2016), we applied causal-process observations and ethnographic interviewing as data collection methods to reveal internal information, knowledge, and expertise for causal inferences. This approach allowed us to explore specific themes suitable for meeting our research objectives, while simultaneously maintaining the flexibility to investigate unforeseen but relevant findings (Yin 2017). Within the case study company, we had access to the appropriate informants of the higher middle and top-management, as well as internal data and documents. In more than 2 years of case study research,

Table 2 Overview of recorded and transcribed data building RDS1 (9.3 h)

Event	Type of data	Informants	Duration (min)
E1	Focus group discussion	Head of product management, senior project manager of focal product line	40
E2	Ethnographic interview	Head of product management	5
E3	Ethnographic interview	Head of product management	50
E4	Pilot BMI workshop A	Senior project manager of focal product line, senior application engineer, 2 development engineers, 2 application engineers	80
E5	Ethnographic interview	Head of product management	12
E6	Stakeholder BMI workshop B	Head of product management, senior project manager of focal product line, head of sales area 1, head of customer service, senior program and IT manager	200
E7	Ethnographic interview	Senior project manager of focal product line	7
E8	Focus group discussion	Head of product management, senior project manager of focal product line	79
E9	Ethnographic interview	Head of product management	26
E10	Ethnographic interview	Head of operations	59

over 1000 h of research time were spent at the headquarters of the company from 2014 to 2016 (Arend et al. 2015; Yin 2017). We acquired appropriate data from documentation, archive records (e.g., internal and external reports as well as internal surveys, etc.), direct observations and participant observations at seminars, workshops, focus group discussions, and ethnographic interviews. This broad spectrum of sources allowed us to generate a holistic and legitimate set of data. The collected ethnographic data were partially recorded or documented for analysis (Spradley 2016). The "Appendix" summarizes our data sources at PumpCo, while Table 2 presents an overview of our transcribed qualitative data from informal focus group discussions, ethnographic interviewing, and workshop records of RDS1 (Spradley 2016).

As our second research data source (RDS2), we studied the content and nature of BMI concerning evolving conflicts around institutionalized logics at PumpCo. RDS2 included the analysis of the process of decision-making and which logics PumpCo applied for BM implementation (Pettigrew 1990). We followed a deductive approach with semi-structured interviews (Langley et al. 2013; Pratt et al. 2006). We further investigated the issues and outcomes associated with the BMI initiative and its processes while linking our findings to the causation-effectuation theory framework by Sarasvathy (2001). For RDS2, we adopted a procedure for data triangulation based on Pratt et al. (2006). In doing so, we carried out our investigations in a more systematic and deductive way, using semi-structured interviews and considering how the decision-making logic influenced the outcome of the BMI process observed through RDS1. The developed and applied interview guidelines (see "Appendix") were divided into two parts. In the first part, interviews focused on obtaining information about outcomes, concerns, conflicts, and potential issues of BMI within PumpCo. We linked these insights to the identified practices, challenges, conflicts, and process outcomes of the first research phase. The second part of the interview guidelines examined the applied decision-making logic within PumpCo to pivot away from the dominant BM. We selected our sample of interview partners based on their positions in the organization and their knowledge of the BM logic. We, therefore, interviewed all members of the extended global management team of PumpCo (see Table 3) in the second half of the research period. The interviewees were actively involved in the long-term strategy development and operational leadership of PumpCo and were thus familiar with new BM alternatives. Furthermore, all selected interview partners had been involved in innovating at least one component within the established BM of PumpCo in the past and could provide information on their experience with regard to challenges, potential conflicts, decision-making, and success factors. Hence, they could be classified as experts in the relevant context of BMI (Miles and Huberman 1994).

Table 3 provides an anonymized overview of the interviews and an allocation of the direct quotations in the findings chapter to the participants' numbers (#). The 15 semi-structured interviews lasted between 45 and 80 min (average/total duration ~ 58/880 min). We conducted, recorded, and transcribed the interviews according to the principles of Gläser and Laudel (2010) and Yin (2017).

Table 3 Overview of interviews at PumpCo building RDS2 (14.6 h)

#	Position	Geographic area	Interview duration (min)
I1	Head of technology management[a]	Europe	69
I2	Senior project manager of focal product line	Europe	53
I3	Head of product management[a]	Europe	80
I4	Head of PumpCo area 3	Asia	67
I5	Second CEO (support processes)[a]	Europe	50
I6	Head of sales area 1 (core market)	Europe, Africa, Middle East	64
I7	First CEO (core processes)[a]	Europe	59
I8	Head of PumpCo area 4	Asia	47
I9	Head of PumpCo area 2	North America	38
I10	Head of sales and marketing[a]	Europe	66
I11	Head of operations area 5	South America	44
I12	Head of sales area 5	South America	60
I13	Head of operations[a]	Europe	74
I14	Head of sales area 6	Asia	57
I15	Head of PumpCo area 5	South America	52
Total duration of interviews			14:40 h

[a]Member of the board of directors

3.3 Data analysis and validity

For the two research data sources, RDS1 and RDS2, we applied first- and second-order analyses in line with the procedure of Gioia and Chittipeddi (1991). In the first-order analysis, we used established ethnographic process analysis (Langley 1999; Langley et al. 2013) to determine themes and patterns in events and informants' interpretations, using descriptive and observational data along the process of BMI. We focused our attention on the interpretations provided by those involved in the BMI and about the initiative, as well as associated procedures, practices, and interactions within the organization and among its stakeholders (Gioia and Chittipeddi 1991).

For the reporting aspect, we follow a single narrative grounded in the accounts of the informants and the experience of an ethnographer (Gioia and Chittipeddi 1991; Langley 1999). We categorized the ethnographer's observations according to different chronological phases that emerged during the BMI project, covering more than 2 years. The descriptive themes and critical elements of the BMI process are positioned around verbatim quotations by the primary informants of the BMI initiative and internal stakeholders. The acquired data displays the knowledge and insights gained by the important actors who managed, participated in, or influenced the BMI process. Other secondary data, archive records, and semi-structured interviews with top and middle management allowed further interpretations and triangulations to be

made about the BMI initiative, its challenges and decision-making logic (Pratt et al. 2006).

During the analysis, we paid attention to the themes and patterns that were relevant to the BMI elements, procedures, practices, process outcomes, and organizational response (Yin 2017). We screened sequences of events to detect important points in potential causal chains (Langley 1999). Doing so allowed us to derive labeled BMI stages and practices, based on the ethnographer's experience and the interaction with the informants and other stakeholders of PumpCo. At the same time, we were able to abstract the main stages, practices, outcomes, conflicts, and challenges based on earlier process studies of BMI (Frankenberger et al. 2013; Hacklin et al. 2018; Wirtz 2013). From the first-order analysis, we develop a single process narrative of BMI (Langley 1999; Langley et al. 2013), which starts with BM initiation and continues to BM realization.

The first-order findings and the informants' interpretations and decision-making schemes provide a comprehensive narrative of development stages, applied practices, process outcomes, and events to unveil insights into the management of BMI and the factors influencing it. The findings from the narrative formed the descriptive basis for a second-order analysis of the data with a more analytical, theoretical focus to understand better the process outcomes of BMI. The second-order analysis of the informants' and ethnographer's data aimed to disclose underlying structures of conflict, which lead to the process outcome of BMI (Gioia and Chittipeddi 1991; Langley 1999; Langley et al. 2013).

In line with the second-order analysis outlined by Gioia and Chittipeddi (1991), we used both the ethnographer and the external researchers to examine our recorded and transcribed data of RDS 1 and 2 from a theoretical point of view. The aim was to create a more profound understanding about the dimensions of BMI. Our second-order data analysis follows common types of approaches to qualitative content research (Boyatzis 1998; Miles and Huberman 1994), which is oriented on the multi-step approach by Gioia and Chittipeddi (1991) and Gioia et al. (2013). We assessed the generated material in line with the qualitative content analysis approach by Boyatzis (1998) while applying analog and digital coding with Atlas.ti by three researchers.

First, we applied an inductive method of coding by using open and in vivo coding to investigate each of the informants' accounts and determined explanations for various events and activities that occurred during the BMI process (Boyatzis 1998). Second, we assessed the internal consistency of the informants' statements and interpretations over time, along the BMI process, based on the previously produced inductive method results. In a third step, we used theoretical sampling and methods of constant or repetitive comparison (Gioia and Chittipeddi 1991; Glaser and Strauss 1970; Strauss 1987) to further analyze our transcribed qualitative data from the various informants and data sources. We sampled our analysis data according to its relevance to the BMI process outcomes, incidents, and conflicts. Third, we continuously compared our sampled data from different sources and different periods to uncover underlying latent structures and significant patterns for a theme-based explanation of the incidents and outcomes of the BMI process (Gioia and Chittipeddi 1991; Glaser and Strauss 1970).

Fourth, we developed an initial list of first-order codes based on the BMI literature (Frankenberger et al. 2013; Hacklin et al. 2018; Laudien and Daxböck 2016; Müller et al. 2018; Spieth and Schneider 2016). We used these codes to abstract the theoretically explanatory dimensions from the emergent pattern and themes of BMI in the data. Following Spradley (2016), we constantly compared our codes to other data until dimensional patterns became evident that related to emerging BMI dimensions (Spieth and Schneider 2016) in the form of value offering, value architecture and revenue model innovation (Spradley 2016).

In a fifth analysis step, we applied a deductive process of pre-determined categorization which is based on preliminary theoretical consideration of the prevalent decision-making logic (Sarasvathy 2001) along the BMI process. According to Sarasvathy (2001), each of the five decision-making dimensions are either causational or effectual. We therefore composed explicit definitions, examples, and coding rules for each logic, using the five decision-making logic principles of causation and effectuation as presented in Table 1 before. Based on this structure, we aimed to identify conflict themes that occur due to the prevalent decision-making logic used in innovating and implementing the new BM logic. Thus, we applied a theory-driven deductive analysis process to the three BMI and five effectuation-causation dimensions. We thereby ensured the mandatory openness for unexpected results that can occur as part of decision-making research. We derived suitable codes in an iterative process, which we revised, reduced to aggregated themes (second-order codes and aggregated dimensions) and checked for reliability (Boyatzis 1998; Miles and Huberman 1994). In a final analysis step, we ran comparisons between the information derived from the coding of BMI dimensions and effectuation theory to extend the theory on conceptual frameworks (Boyatzis 1998; Miles and Huberman 1994). Hence, we integrated the coding patterns associated with the conflicts of the BMI dimensions and decision-making dimensions into a theoretical framework (see Fig. 1).

To ensure the validity and reliability of our data analysis, we further supplemented the first- and second-order analyses with information from secondary data sources, such as e-mails, minutes from project meetings, internal project reports, and presentations ("Appendix"). We discussed our findings and interpretations in focus groups with informants from PumpCo after each research period. This approach enabled us to add further details to the critical events mentioned by different informants which is a crucial step for validating our findings (Amaratunga and Baldry 2001). Additionally, we compared our coding outcomes and discussed differences after each round of coding. We, therefore, validated our coding by discussion, modification, and refinement with multiple contributors within the research group. We reached further agreement on the final coding scheme by referring to the innovation management literature (Duriau et al. 2007). After we achieved an inter-coder reliability of 89% agreement upon all codes through our series of code discussions among the authors, we build a data structure according to Gioia et al. (2013), illustrated in Fig. 1, which organizes our findings for interpretation.

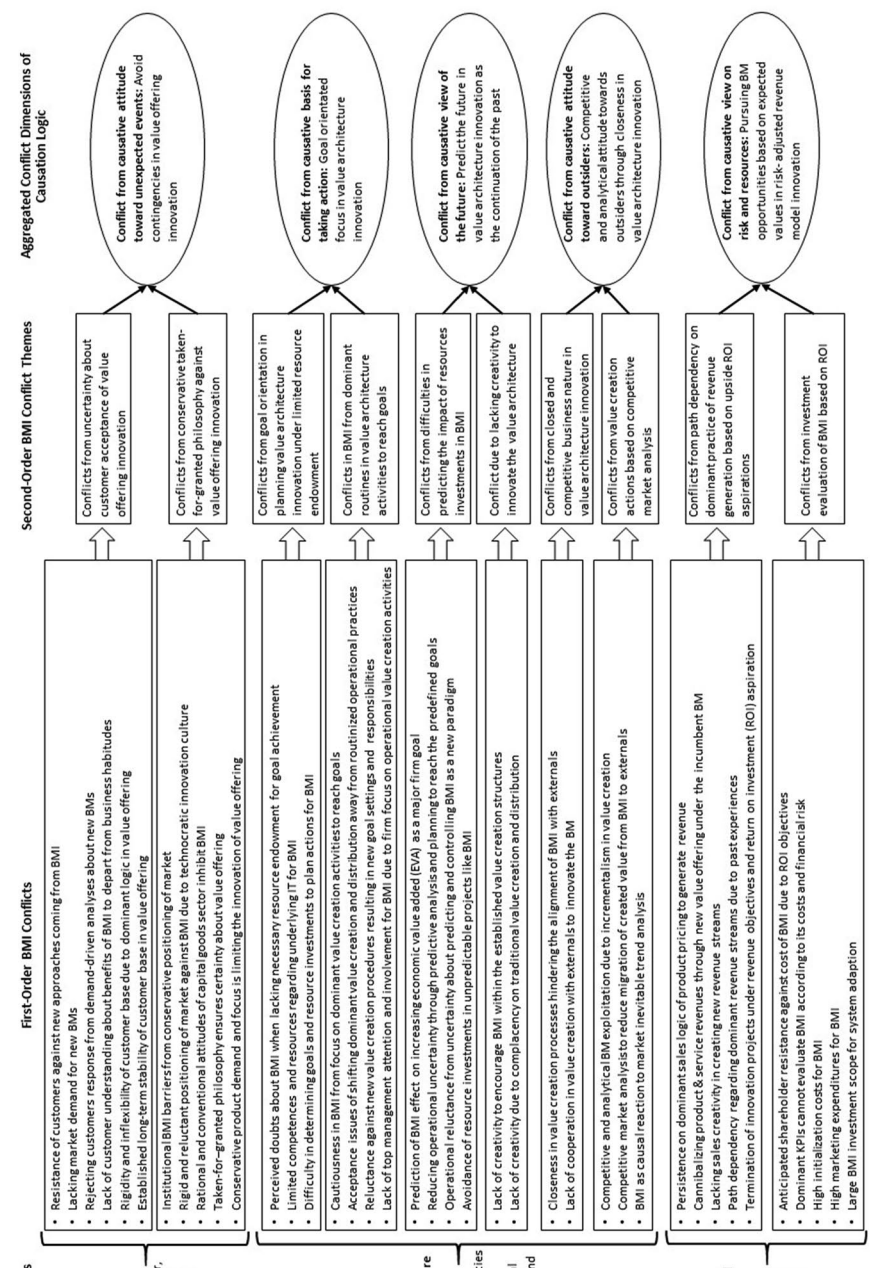

Fig. 1 Data structure about conflicts of causation logic in BMI

4 Findings and analysis

4.1 First-order findings: BMI process narrative and conflicts

We developed a single narrative (Langley 1999; Langley et al. 2013) along the various stages of a BMI process (Frankenberger et al. 2013): initiation, design ideation, design integration, and realization. At PumpCo, these stages covered more than two years (2014 to 2016).

Stage 1: BMI initiation

The BMI initiative started with a context analysis of the recent BM according to its value logic, focusing on the niche industry structures and the resulting pressure on the BM. This analysis of the status quo identified the strengths and weaknesses of the dominant BM and its underlying value logic. In a first step, PumpCo identified that its core value proposition, a specialized pumping technology, was increasingly commoditized due to an increasing offer of substitutes. Digitization had led to the homogenization of technological standards within the pumping industry. The BMI project team's analysis revealed that it was not able any longer to appropriate value from its technology development efforts. A detailed review of the value capture mechanisms showed a disparity between the high use-value of the company's novel technology and the low exchange-value in terms of realized price and product revenues. In its dominant BM, PumpCo centered its value capture mechanism on its institutionalized industrial relationships. These are characterized by repeat sales, competitive product substitutes, and high buyer power, resulting in lower margins for PumpCo's product sales. Customers increasingly captured the additional value of product innovation. At the beginning of the BMI process, the BMI initiative identified a latent margin dilemma due to the competition-based pricing logic. The Head of Product Management explained the dilemma as follows:

> "We're the victims of our technological developments. We want to do something good for the customer, and he is happy, but he just accepts the innovation and the created value without wanting to pay more. However, this new technology is more expensive to produce than standard pumps in the field. Additionally, our spare parts business, which is a big chunk for us, will suffer as a result of the efficiency gains and reduced wear and tear. Overall, there is the question of whether the investment for innovation pays off when we accept a low-profit margin from the beginning to be able to sell the product. That is twice as bad for us." (E2, Head of Product Management).

While facing new market conditions like digitization and a reconfiguration of the industry environment, PumpCo's value logic regarding its value offering, value creation, and value capture started to age. However, there was no evident threat by extensive migration of value to new BMs. PumpCo's business environment was stable and its dominant BM was still performing well. In this context, the migration of value was more latent and not obvious in affecting the performance of PumpCo's

dominant BM in a negative way. The literature (Hacklin et al. 2018) describes this phenomenon as low value migration.

The BMI project team understood that PumpCo needed to innovate its BM endogenously because they lack exogenous triggers supporting BM change. They analyzed potential novel opportunities to innovate value creation and value capture so that it could again profit from its technology development efforts. The company recognized that the ongoing digitization of industrial manufacturing, such as sensor-based machine monitoring, could become a promising pathway to solve their dilemma. PumpCo discovered new BM opportunities like as-a-service BMs to sell the outcome (liters of pumped compounds) instead of the equipment. In this situation, wear-based aftersales services of spare parts would no longer contribute to revenue generation. Rather, increased product quality and lifespan through smart product architectures and predictive maintenance services would be the future focus of digital value creation and revenue generation. Based on the results of the analysis, the BM initiative determined that a shift of its value creation logic from analog product-centricity to digital service orientation would increase the use-value for the customer in terms of novelty and appropriateness. Digital service orientation, in turn, would create a higher willingness to pay. However, the Head of Product Management recognized the existing and rather conservative structures of PumpCo. The conservatism within PumpCo saw BMI as too risky and too uncertain to pivot the dominant value offering into the new direction without further investigation. PumpCo, therefore, started a dedicated innovation process for BMI to convince critical stakeholders.

The BMI initiative developed a group-level approach to increase awareness and acceptance of the opportunities and potential future threats the company would face. PumpCo, as an organization, first needed to build BMI capabilities to create acceptance. This involved rethinking of recent beliefs, norms, practices, strategies, and structures that created legitimacy for PumpCo's dominant BM. To achieve this, PumpCo tried to develop a new and alternative BM logic in-house, which the Head of Product Management described as follows:

> "The only sustainable solution for our identified R&D dilemma is a change in the intellectual culture to overcome internal acceptance barriers. We can considerably increase the probability that an innovative product is established through the development of a custom-made business model by ourselves." (E-mail statement, Head of Product Management).

Consequently, PumpCo developed a systematic BMI process by building on existing and proven process models which integrated state-of-the-art tools as well as frameworks from the BMI literature (Frankenberger et al. 2013; Schallmo et al. 2017; Wirtz 2013). This included BM patterns (Gassmann et al. 2014), Blue Ocean thinking (Kim and Mauborgne 2014), BM canvas templates (Osterwalder et al. 2010, 2014), stage-models and roadmaps for BMI (Schallmo et al. 2017; Wirtz 2013).

As the central outcome of the first stage of BMI, we observed that the BM project team created enough knowledge and evidence—and ways to communicate this evidence—to question the validity of the status quo BM logic on the individual and

project level. However, this disconfirming information was still not readily accepted at higher levels of the organization due to the dominance of the established BM that was not exogenously under threat from value migration to other alternative BMs. In response to these acceptance issues, the PumpCo project team developed and systemized the BMI process using a focus group and workshop approach. The developed BMI process should enable organizational co-creation and learning about alternative BM designs. In the following stages, PumpCo tracked and documented how it innovated its BM and involved critical stakeholders. In doing so, the objective was to create acceptance and diffusion of a BM alternative beyond the project level to an organizational level.

Stage 2: BM design ideation

The BM design started with an ideation activity by applying BMI-related tools in a workshop and focus group setting. Participants were company-internal, with advanced customer, sales, and engineering knowledge on the product and service offerings of the new pumping related technologies. The objective of the first workshop was to visualize and analyze the established BM, its underlying value proposition, and PumpCo's positioning within its niche industry. This included a market scan of potential change triggers by a focused and structured involvement of stakeholders who were aware of technological changes by digitization and their influence on PumpCo's competitive position. The second practice of the ideation phase referred to the understanding and visualization of a new value offering that could link the needs of central customers to new product and service offerings within the industry, following the jobs-to-be-done approach (Hankammer et al. 2019). The analysis revealed that priority in the value proposition lay on performance and usage of PumpCo's products. PumpCo's customers should pay for the utilization and the performance of the pump as an asset, rather than for the transfer of its ownership. The newly proposed value offering involved the integration of digital ICT, enabling PumpCo to act as a remote operator of machines and optimizing the overall system and its pumping processes. The Head of Product Management explained the insights behind this value proposition as follows:

> "Now you need to get closer to what the customer needs. So no longer, what the solution is to get there, but closer and closer to what they want and the jobs-to-be-done: what is the actual needed outcome. For us, it's not the pump but rather the transportation of fluids—that's what's needed. Nobody needs a pump." (E3, Head of Product Management).

Based on the generated insights, a BM design workshop with internal stakeholders followed. The workshop aimed to develop a detailed vision of an alternative BM. Stakeholders from middle and higher management of the sales, IT, and R&D departments participated. These stakeholders would be important promotors for a change in the dominant BM logic. The project team applied a set of BMI tools, including BM and Value Proposition Canvas, SWOT analysis, Blue Ocean Strategy tools, and PESTLE analysis to design a vision of a data-driven operator BM based on smart pumping technologies. PumpCo's project team evaluated the stakeholder workshop

by subsequent focus group discussions and further refined the new BM before ultimately communicating the results on an organizational level. An outcome of the second BMI stage was that the project team evaluated the new value proposition as promising and adequate for solving the issues and dilemma of PumpCo's product development and digitization efforts.

Stage 3: BM design integration

In the next step, the BMI initiative at PumpCo focused on the organizational integration of the new BM by elaborating on the required value chain architecture and potential revenue models. This stage aimed to guide PumpCo's stakeholder decision-making on a higher organizational level by reducing uncertainty about the alternative BM concept. A viable and communicable BM prototype was used to achieve this. The Head of Product Management described this with the following statement:

> "My first step would be, as I have always said, think prototypically. Thus, you need to build a prototype first and determine its objectives and where to build it and with whom to work with it. Of course, it also depends on what kind of prototype it is, but if it is like it is here, then it's relatively predetermined where you might go: so to what kind of customer. Then all you have to do is think about where you are going to reach your objectives. Who is most likely to be open to it? Does it have to be in Germany or Europe?" (E8, Head of Product Management).

In a first step and with the help of external consultants, a competence analysis was carried out to understand the resources and capabilities required to implement the new value offering effectively. The analysis revealed issues in the area of ICT resources and capabilities for smart products and ICT connected applications. The following value creation analysis determined how different operator model activities could create and deliver value for the customer. As a result, the BMI project team developed a new BM concept based on data-driven monitoring approaches, using sensor-based and connected smart product architecture. Finally, the BMI project team innovated the revenue mechanisms and cost structures by analyzing the value streams between all business actors. As a result, the new BM concept contained a new profit formula using performance-based revenues with IT and service-based cost structures.

On this basis, an internal prototyping process tested and compared various aspects of the new BM. The BMI project team used the information gathered along the process and from discussions with central internal stakeholders to select the most suitable value architecture and revenue model option for BM implementation: a data-driven operator model based on a performance-based revenue model.

Stage 4: BM realization: pivoting

In the next phase, the BMI project team created a dedicated implementation plan to realize the alternative BM design through pivoting. The implementation plan included a detailed further assessment of the components of the new BM, which

involved the calculation of a business case. The business case analysis served as a justification document demonstrating the expected commercial benefit to internal stakeholders. A business plan followed, which contained the goals, methods for achieving these goals, and the estimated timeline. The BMI project team directed the implementation of the alternative BM following the goals and governance settings of PumpCo. Business planning had to ensure that the prototype, with its new value offering, architecture, and revenue model, included tactics to maximize the initial profit for PumpCo's estimated investments in BMI. The BMI project team used the established engineering stage-gate process model to plan the pivoting to the new BM. The process provided a defined sequence and decision points after each step, including functional specification documents and scope statements.

At the gates, senior management was involved in decision-making. In the following assessment phase, the BMI team presented the results of the previous analysis, design, and validation activities in a board meeting that included top and senior management from the various company divisions. While the project team expected to get the approval to move on to BM implementation, the board decided against investing in the new BM. The Head of Product Management summarized his conclusion of the decision-making process as follows:

> "We have made it clear that the essential core element for the new business model "pay per use" is the possible digital concentration of know-how through process data. Only there would we find benefits for all stakeholders involved. However, at the same time, this results in the biggest implementation problem. Only a few colleagues can imagine that data collection can help to build up so much new and additional knowledge that the pumping processes as a service significantly improve. Also, many colleagues are uncertain and have doubts that we can start with such a model without being able to offer these advantages to the customer right from the start. They think that we first have to set up the infrastructure and build the capabilities to collect the data and build up the knowledge." (E-mail statement from Head of Product Management).

The pivoting of the new BM failed because the board did not see the needed shift in the value architecture to leverage pumping process knowledge via a new performance-based revenue model. In this context, critical stakeholders for BMI did not acknowledge the identified potential migration of value from product engineering to data-driven services as a future value logic. Uncertainty and doubts about the new value logic arose because the identified (low) migration of value to a new digital BM was not adequately predictable. Thus, the dedicated BMI activities and the planning efforts by the project team increased uncertainty among the board members, rather than providing certainty about the new BM.

Stage 5: BM realization: separation

The outcome of the previous phase was the organization's decision to reject the BMI project team's proposal and not to allocate resources to pivot from the dominant to an alternative BM. From our process observations, it became clear that the main challenge associated with BMI at PumpCo was not a lack of ability, knowledge, or

understanding of dedicated BMI tools and processes. Instead, it was a lack of capability and willingness to change the dominant BM and to explore new BM opportunities within the firm's organizational structure.

Nevertheless, the project team continued its BMI activities, but now selected a non-core area of PumpCo's business independent of the dominant decision-making and attention of the established organization. Without support from top management, the team designed a separate, small-scale pilot implementation instead of a large organization-wide realization of the new operator BM. This smaller-scale realization limited the downside potential, as the Head of Product Management explained:

> "Nevertheless, we have now remained in the position of looking for opportunities in our non-core market to offer a full-service model. Thus, we are preparing conditions for a fast, small-scale trial and share the risk and the financial benefits with the test customer. Thus, we will try to offer a service model in a simple way, while excluding ambitious targets such as digital know-how concentration and organizational integration. Parallel to our testing, I will also involve our sales and other externals parties to ensure commitment. There, I will nudge the idea of digital know-how concentration." (Head of Product Management, E-mail statement).

In the end, the BMI project team piloted some elements of the new value logic in a fast and small-scale experiment separated from the dominant logic of decision-making and doing business at PumpCo. The experimental setting implemented only the core components of an operator BM as a minimal viable business model to demonstrate the value of the new BM by involving internal and external stakeholders to create commitment and share benefits and risks. In doing so, they intended to reduce uncertainty and increase acceptance of the new value logic as a secondary BM by the creation of credible and persuasive trial and error results. Following an entrepreneurial thinking approach, the BMI project team realized the new BM separately in a non-core market. They left the dominant BM stable and unaffected to gain legitimacy and to reduce cognitive uncertainty regarding the beliefs and attitudes of critical stakeholders about the new BM by creating an experimental learning environment for BMI in parallel.

4.2 Second-order findings (I): linking BMI logic conflicts to causative decision-making logic

Figure 2 summarizes the entire BMI journey of PumpCo along the five stages identified from RSD1 in the first phase of our research setting. Our first-order findings revealed key practices, outcomes, and conflicts in each stage of the BMI process. In the second research phase, utilizing RSD2, we want to understand and theoretically reflect what happened and identify the causes for logic conflicts in PumpCo's BMI process. As indicated in our literature review in Sect. 2, a combined perspective of institutional theory and entrepreneurial decision-making theory has guided our analysis of these second-order findings. The case analysis revealed that the BMI project

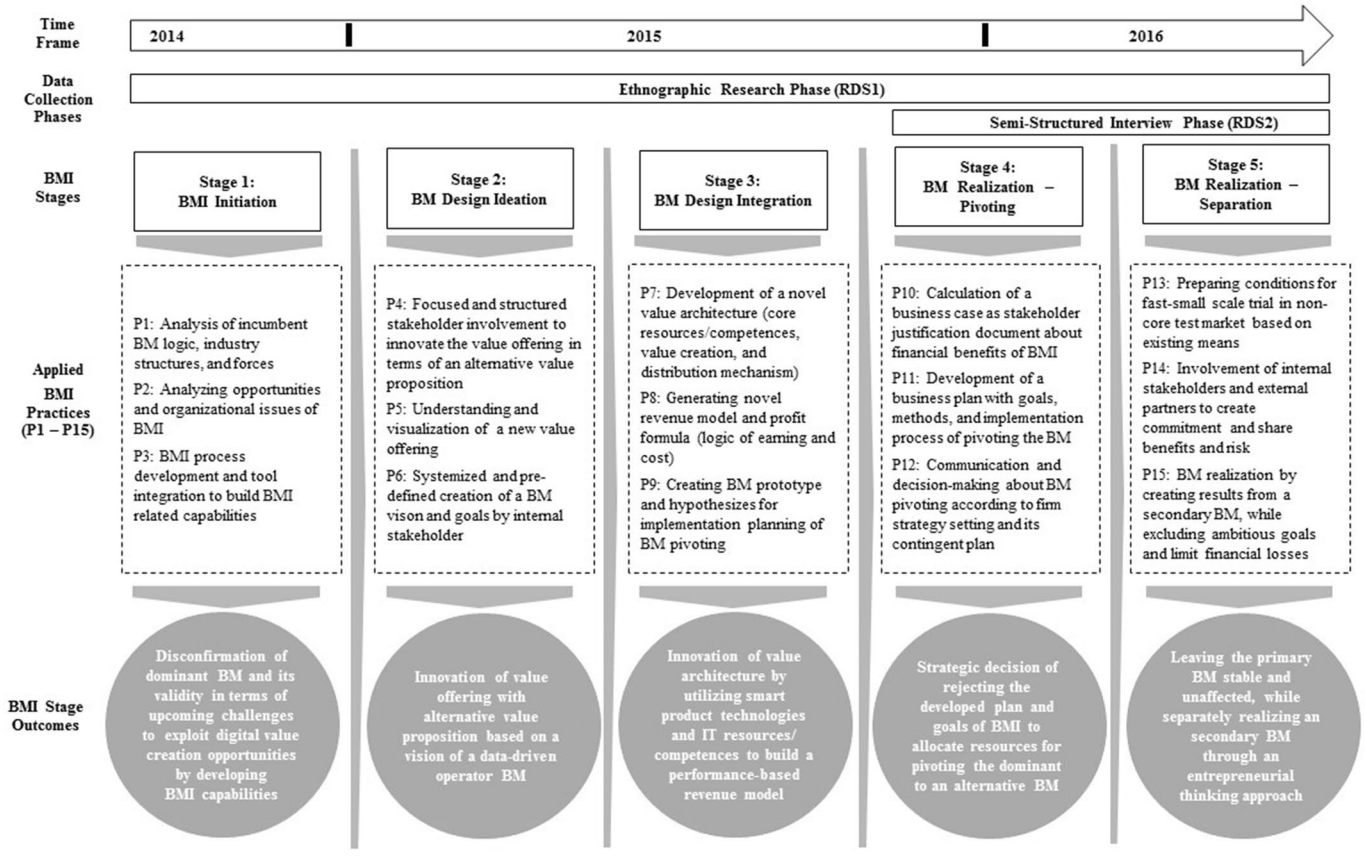

Fig. 2 BMI process of PumpCo with stages, practices, and outcomes

team was not able to create sufficient certainty in decision-making among central stakeholders. The opposite happened: the planning approach for BMI applied by the project team paradoxically increased uncertainty, which in turn prevented an organization-wide integration and realization of the alternative BM through pivoting.

This observation revealed a serious misfit between the decision-making logic that the team applied and that one required when pivoting a primary BM. Drawing on institutional intrapreneurship (Heinze and Weber 2015) and decision-making logics of causation and effectuation (Dew et al. 2009; Harms and Schiele 2012; Reymen et al. 2015; Sarasvathy 2001, 2009), we interpreted the logic followed by PumpCo's BMI team and involved stakeholders as typical *causative*. The project team mainly orientated its activities towards the goal of maximizing profit while using competitive analysis and predicting the future to minimize business contingencies. This practice was institutionalized in the company's established governance and decision-making logic, which strove to reduce the level of uncertainty about innovation outcomes and to maximize the impact of innovation. The intended outcome of the causative BMI process at PumpCo was the creation of a well-planned alternative BM concept. The team's (wrong) assumption was that such a process should lead to internal acceptance and the availability of adequate resources for BMI because it would legitimize its realization by reducing uncertainty through prediction and planning as much as possible.

In the following sections, we elaborate on the problems and conflicts encountered during the BMI process at PumpCo in detail. We coded and matched the identified conflicts concerning value offering, value architecture, and revenue model innovation (Spieth and Schneider 2016) to the decision-making logic of causation and effectuation (Read et al. 2009; Sarasvathy 2001) in Table 1 from the theoretical background chapter. The reader may refer back to Fig. 1 in the method section for an overview of the data structure applied by our research team.

4.2.1 Conflicts resulting from causation logic in value offering innovation

Our data suggests conflicts resulting from PumpCo's causative attitude towards unexpected events. The BM team tried to avoid contingencies in terms of uncertain and unexpected events as much as possible. When defining and implementing the new logic of the value offering, conflicts arose, for example, from uncertainty about customer acceptance of the new value offering:

> "It is new and it takes time to convince the customer of the advantages. Our experience shows that our customer normally has some resistance to novel approaches and offerings coming from business model innovation." (I15; Head of PumpCo Area 5).

Here, PumpCo had difficulties from the lack of customer acceptance (customer resistance) and the lacking market demand for a new BM and its new value proposition. Following its standard routine, PumpCo applied quantitative market research during the BMI process. The team, for example, conducted concept testing to survey its existing customers whether they liked the new BM or not. However, in this research, customers mostly rejected the new BM because they did not understand

the benefits of the new BM value offering, as outlined by the Head of Product Management:

> "The customer won't even understand the benefits of the new business model at first. They might say; let me try it on my own for free and then we can talk about it later. So there you can see how difficult the topic is and that you end up saying we're doing it like we've done it before." (E5, Head of Product Management).

In this sense, PumpCo regarded its customers as rigid and inflexible why it focused on accurately planning the value offering to ensure long-term stability of the customer base:

> "Let's have a look at our existing business model and its development in the last decade. If we do a long-term analysis, we will see that our customer base has not changed in the last 10 or 12 years. The application areas, the market segmentation, and customers have all been the same for years." (E8, Senior Project Manager of a focal product line).

Furthermore, conflicts in value offering innovation emerged from conservatism and taken-for-granted philosophy at PumpCo. The existing causative decision-making frames at PumpCo created resistance against new ways of offering products and services in its niche industry:

> "In a conservative market, such as the pump market, all customer segments and all suppliers are characterized by a very conservative intellectual culture. The institutional barriers are even higher for innovations which need a new business model. Innovating the business model is all a bit more difficult in a conservative environment." (E9, Head of Product Management).

This attitude created the need for reliable prediction and led to the avoidance of unfavorable contingencies, as potentially caused by BMI. Consequently, institutional barriers hampered BMI. Like PumpCo, this entire niche industry has had a strong commitment to traditional values and ideas. Most stakeholders were not willing to change and abandon the dominant value offering logic. The Head of Customer Service explained from an industry perspective that it is problematic to achieve acceptance of an innovative service offering by an operator BM:

> "Yes, innovation culture is an old issue. All mechanical engineering firms have a hard time with that. Of course, this also has to do with the market attitude, because it is so rigid and slow-moving. If you do something great, then the market does not play along. Innovating the business model is not part of the technical expert culture of an engineering company." (E6, Head of Customer Service).

The rational attitude of the capital goods sector and its technocratic innovation culture led to a rigid and stable market positioning. Our data showed that the BMI process applied by the project team could not overcome the conservative dominant

logic of the industry value offering. Industry members were taking the established pumping technology for granted, as emphasized by the following quote:

> "But this is now well-tried. It is already 30 years in the market and perhaps you can argue that the 30 years themselves have proven that you can do nothing wrong." (E4, Senior Application Engineer).

The technology-focused perspective provided customers and pump vendors with certainty about the value offering as a central part of the institutionalized value logic. The novel value propositions of the BMI concept, on the contrary, caused legitimacy problems, challenging the established value logic of this industry (a specialized, product-centric manufacturing orientation for a conservative value chain) with its conservative product demand. The applied causative decision-making just reinforced the uncertainty whether customers would accept the new value logic (data-driven services and customer-focus on new digitization use cases) that contributed to its rejection.

4.2.2 Conflicts resulting from causation logic in value architecture innovation

Analyzing the BMI dimension of value architecture, we identified conflicts from three causative dimensions: the basis for taking action, the view of the future, and the attitude towards outsiders. First, conflicts emerged as a result of the goal-oriented focus within the causative view of planning value architecture innovation under limited resource endowment. Conventionally, PumpCo would gather all required core resources and competences before starting a project like a new BM implementation:

> "Management has doubts about starting BM implementation before all the necessary means are gathered. This is always necessary to reach the predefined goals that determine how the resources are allocated to the project." (I3; Head of Product Management).

Consequently, in the BMI proposal, senior managers across all functions quickly identified a lack of appropriate resources, capabilities, and organizational structures at the time of implementation of the new BM. In their understanding, the managers perceived that the required digital value creation mechanisms and structures to successfully launch and execute the digital service model were not in place. This resource gap was not limited to technical resources, data, and infrastructure, but also included competences, know-how, and human resources. In the end, the BM development and planning practices increased the uncertainty by outlining the novel value architecture in great (technical) detail.

Additionally, this analysis revealed PumpCo's difficulty in determining goals and requirements for resource investments within the new domain of data-driven business models. The CEO explained this as follows:

> "If we assess the course of a strategic action that we do something with the idea, then we work on further details and sub-goals. Then we make a plan, a schedule, determine the cost and the investments as well as the revenue over time to achieve the goals. However, planning the innovation of our business

model with goals and resources is all a bit more difficult to do because we have never done this before and lack experience in defining our goals and allocating the necessary resources to the project" (I7; first CEO).

In turn, the high degree of uncertainty increased the risk associated with allocating and investing sufficient resources for the required new value architectures. At the time of launching the new value architecture, PumpCo's strong goal orientation combined with a lack of appropriate resources caused conflicts in the form of perceived doubts about BMI. Related to this, our research disclosed that the established focus on dominant routines in value creation and distribution activities to reach defined goals caused a strong cautiousness at PumpCo, mirroring the conflicts identified concerning the value offering before:

"A company like PumpCo, which acts a little bit narrow-minded, sticks to and is successful with what it has done for more than 60 years." (I2; Senior Project Manager of a focal product line).

"We could have done better in innovating our business model, but we were too cautious. Because we used a way to develop this where we were too restrained and tied to our routine activities of our incumbent business model in the initial year. To reach our defined goals, we follow our established value creation activities habitually." (I4; Head of PumpCo Area 3).

Thus, BMI faced acceptance issues when PumpCo's BMI-team proposed to shift the dominant value creation and distribution logic away from routinized operational practices. Established routines rested on a fixed mindset of how the company exploited its core capabilities and resources in value creation. PumpCo believed in the quality of its core competencies, such as its established engineering skills and its sales routines. These were successful company practices that caused reluctance to adopt new value creation procedures based on new goals and responsibilities. While most individuals and especially the top management at PumpCo were highly engaged in their operational day-to-day business routines, the idea of learning a new BM logic created a feeling of discomfort. The resulting lack of management attention and involvement for BMI caused potential denial and avoidance behavior against the implementation of the new BM:

"Some will try to deny or avoid the new procedures and activities of the new business model because they are afraid of having to learn the required capabilities while taking new responsibility and risks. Therefore, some will abandon their responsibility because they are a little bit scared of new tasks, activities, and the new risks coming with the new business model. For instance, if we are in a bigger procedural plant, our new goal is to ensure that the pump is running flawlessly without downtime. Then we will take over the risk for failures within the plant of our customer." (I3; Head of Product Management).

A second conflict emerged from a causative view of the future. The dominant view at PumpCo was that the future in value architecture innovation is a continuation of the past. Causative decision-making towards pivoting the established BM

rested on reliably predicting the future impact of resource investments in BMI that caused conflicts. As the Head of Operations explained, PumpCo had established the managerial accounting tool *Economic Value Added* (*EVA*) to calculate the future returns from investments into the new value architecture:

> "The main objective is to increase the company value. In our company, this is determined by the EVA, Economic Value Added. We only start and continue innovation projects like business model innovation, where we believe that they have a positive effect on the predicted EVA. (…) You need to do an analysis to quantify the impact of the new business model on our operational structures. That is important for assessing projects like BMI that the management can set the project goals and allocate resources to such an innovation project according to our firm strategy." (I13, Head of Operations).

Increasing EVA was a major key performance indicator (KPI) that drives decision-making within PumpCo. PumpCo's BMI team, however, was not able to predict the future outcomes of the BMI initiative. The team lacked appropriate measures to predict the monetary effect of the new BM and the required investments in the value architecture, as Head of Sales Area 5 described:

> "For us, it is a new paradigm because we never did this business model concept before. I am not sure how to manage and how to control it. We need to have the right measurement methods because this is something that we never experienced before." (I12; Head of Sales Area 5).

Especially in operational functions like sales, finance, and marketing at PumpCo, KPIs were used to reduce operational uncertainty that allows sufficient prediction for causal planning to reach strategic goals. According to the Head of PumpCo for Area 2, the company would not start changing the dominant BM and invest in BMI projects unless it had reasonable predictions on the market and success measures:

> "But this business model would affect us in our value creation and we are not willing to invest resources in something that is not predictable." (I9; Head of PumpCo Area 2).

The behavioral patterns institutionalized by the dominant BM logic caused anxiety. The anxiety resulted in operational reluctance to implement the alternative value architecture because the outcome for a BMI project investment was not predictable and therefore uncertain.

PumpCo assumed that BMI would negatively influence the productivity of the institutionalized resource base. As a result, PumpCo persisted on its dominant BM with its value creation and distribution architecture that had always followed a predefined plan to reach the originally set goals of its strategy to please shareholders (members of the founding family). Thus, PumpCo stayed in its comfort zone, focusing on existing pumping technology. The company's myopia led to misinterpretation of its competitiveness and impeded organizational creativity to implement a new logic of doing business, as the Head of Operations explained:

> "I think it's going very well. I think that many competitors would be happy to be in our market position. Nevertheless, I think we are in danger of losing momentum. We are a bit too satisfied and too focused on these traditional ways of doing business and its strategy. At some point, it will not work like that anymore. But as I said, there is, or this comes from, the lack of creativity in sales. In my eyes, they first need some experience that there is a business model opportunity." (E10, Head of Operations).

Regarding the value architecture, our analysis revealed an organizational feeling of (unjustified) satisfaction with the achievements of its present BM. PumpCo demonstrated 'organizational egocentricity' causing complacency that resulted in a lack of creativity and thus prevented it from perceiving potential threats of its current BM or opportunities for value architecture innovation.

Third, conflicts emerged from a causative attitude toward outsiders, characterized by a closed and competitive business nature in innovating the value architecture. The lack of openness in its value creation processes prevented alignment of BMI with external actors. In turn, for PumpCo cooperation with external parties to create the new value architecture was not an option. The Head of Product Management commented on the closed mindset and how it prevented the realization of the new BM concept:

> "Our company is not famous for opening itself. Especially not in our value creation processes, which would make the process of innovating our business model challenging because we need external input to align the new business model to the outside world." (I3; Head of Product Management).

A related conflict resulted from PumpCo's propensity to carry out competitive market analysis to determine which value creation activities to follow. PumpCo used typical analytical (causal) reasoning tools such as scenario, competence, or feasibility analysis to enlighten its thinking about value creation and distribution. Business relationships were driven by competitive analysis and closed value creation to protect PumpCo's intellectual property. PumpCo rather developed a preference for analytical exploitation of its dominant BM by incremental value architecture innovations to reduce value migration to external actors and especially competitors. The following quotations from the sales team emphasize this tendency:

> "After all, our focus in our business model lies in further developing our technologies and achieving market penetration to generate success in lucrative applications identified from our competitive market research." (E6, Head of Sales Area 1).

> "All of this involves the analysis of new customers and markets and the planning of value creation activities to penetrate the market. When we create and launch something new and valuable like a new business model, we always use competitive analysis tools and strategic planning to reduce the leakages and migration of value to protect our ownership of intellectual property." (I12; Head of Sales Area 5).

This established competitive attitude of PumpCo reinforced the dominant BM and its intellectual property incrementally, instead of realizing new value creation and distribution mechanisms in an alternative value architecture in collaboration with others. Thus, also innovation efforts like the BMI project were perceived and evaluated as a causal reaction to inevitable trends, but not as an opportunity to create a very different value logic.

4.2.3 Conflicts resulting from causation logic in revenue model innovation

In our data, we further identified conflicts resulting from the causative way of evaluating the revenue opportunities from the new BM. Conflicts arose from a path dependency in dominant practices for revenue generation and increasing ROI. PumpCo had a proven sales logic to generate revenue and drive profits: developing superior pumping products at the right price and selling them with persuasive sales tactics, followed by a profitable spare parts and service business. Offering smart pumps with reduced wear and tear would challenge the dominant revenue logic and would cannibalize the revenues from the highly profitable spare part business. Overly focusing on product pricing in sales constrained creativity when creating and evaluating opportunities for new revenue streams. The Head of Operations highlighted this:

> "It turns out that the sales department is not able to sell the new technology under the old business model because it sells it based on the estimated product price. This is the wrong approach because we would be better off selling the performance, which would be more profitable and would utilize the new technology and its features. But in this sense, the sales department is lacking creativity." (E10, Head of Operations).

PumpCo's pricing strategy focused on forecasts about customers' product purchases and sales of products on stock. Emphasis was consequently placed on the marketing of established products while focusing on the firm's salesforce abilities and their operational experiences that created a path dependency in revenue generation:

> "The sales department does not consider and deal with the underlying technical issues. They do not consider why the new business model should be of interest to our customers. Even they are not interested in it because it is so simple to continue selling pumps as usual. If they are not selling enough, they adapt the price and do some marketing research and campaign. Then it gets a bit more expensive, but it is easy and fast!" (E5, Head of Product Management).

> "The sales department does not accept an innovation like BMI in the first place because it first wants to sell what it always sells and can do best." (I3; Head of Product Management).

The general reluctance of the sales department to accept BMI came from the fear of losing control and from the (perceived) increased uncertainty in revenue creation to reach firm goals. As discussed before, a key reason for the resistance at PumpCo was its strong focus on goal achievement. This focus is anchored in the established strategy and demanded by the short-term, goal-driven plan of PumpCo's shareholders. The proposed new BM directly challenged this established and successful (but being on the verge of commoditization) revenue model of PumpCo, as noted by the Head of Operations and the first CEO:

> "Our shareholders expect a very high internal rate of return on capital employed. This high internal rate of return always hinders us as a cost factor where we have to tie up capital on our balance sheet. With an operator model, you tie up capital because the pumps remain completely on our balance. This makes it less attractive to change to a more promising but also more capital-binding business model such as an operator model." (I13, Head of Operations).

> "The central requirement to start such a project is that it contributes to the overall objectives, like firm revenues or results. We specify that projects, which we execute, have to return X- % on investments or more. If they do not deliver that, we terminate them." (I7; first CEO).

PumpCo evaluated and terminated innovation projects like BMI based on revenue objectives and ROI aspirations. Hence, the shareholder orientation towards goal achievements caused a conflict between the high initial investment costs for the new BM and their assessment from a traditional ROI perspective. Pivoting the revenue model through BMI from a product-sales to a performance-based model was seen as a cause of negative financial consequences that would create (anticipated) shareholder resistance from the company owning family. In a performance-based BM, a vendor like PumpCo remains the owner of the assets and is responsible for their maintenance, performance, and overhaul while the customer pays a performance-based usage fee. The second (vice) CEO stressed the perceived negative financial effects and risk of BMI in the following statement:

> "This new business model would have a significant negative effect on our KPIs. An operator model, where the machines would remain in our balance sheet, would result in a balance sheet extension with additional cost of tied capital and thus, worsen our KPIs. This would be a financial risk that we cannot evaluate or estimate at the moment." (I5; second CEO).

The BM team argued that the new revenue model would increase equity between PumpCo and its customers. However, such a move was not in line with the institutionalized shareholder value-maximizing strategy and its governance, which demands a high internal rate of return on capital employed. Thus, the institutionalized dominant KPIs cannot adequately evaluate BMI according to its cost, financial risk as an innovation opportunity. Stakeholders perceived BMI as a large and risky investment with high initialization cost, marketing expenditures, and system adaption cost:

> "I think the initialization expenses for such a pay-per-use business model are relatively high. There is a lot of work involved. It is only worth it if I can convince my big customers of it and if it creates a large amount of performance-based revenue directly. When doing this, the sales department sees a lot of work and cost for them then." (I13; Head of Operations).

> "We already developed a similar new and service-oriented business model. However, we did not adopt the service model because this would have been a far too big investment for us. Additionally, our underlying system and internal processes for sales and billing, etc. are not able to handle the changes. Because of the anticipated cost, we did not consider the new BM further." (E4, Senior Application Engineer).

In the end, the conflicts resulting from the high BMI investment costs, a new revenue logic, and at the same time high levels of uncertainty and risk caused the rejection of the BM proposal. We can interpret this KPI-based, ROI-focused thinking and comparison with past investments as typical causative decision-making by the board and other decision-makers of PumpCo.

4.3 Second-order findings (II): Explaining the decision-making logic shift to intrapreneurial effectuation in BMI

After the rejection of the BM proposal, the BMI project team realized that its initial approach to BMI failed. Despite using novel tools and templates, the BMI project still followed a planning and goal-orientation approach that is in line with the established governance structure of decision-making. However, in light of this established logic, the new BM appeared very unattractive with just too high cost and too high uncertainty in all three dimensions of the new value logic (value offering, value architecture, revenue model). The majority of the involved stakeholders doubted the technical feasibility and economic viability of the planned BM and the strategy shift to data-driven pumping process optimization. It was unclear for them how they could operate and create value through digital knowledge concentration. For most stakeholders, it seemed paradoxical to create a competitive market position based on (process) knowledge not available yet. Within their decision-making, PumpCo evaluated the new BM as too challenging to implement and as not suiting to its contingent plan (Casadesus-Masanell and Ricart 2010) about the strategic deployment of core competencies and resources to reach the institutionalized company goals. Thus, the decision-makers were uncertain how PumpCo could compete in the market and create a competitive advantage with the new BM. As a result, PumpCo as an organization persisted on their existing BM. The Head of Product Management understood that conservative rigidity in terms of sticking to the traditional strategic direction was one of the core reasons why the board rejected the proposed data-driven BM:

> "It is wrong to hope that business model innovation will happen quickly. We are no start-up. So, we are not a speed boat, but we are more like an oil tanker. Even if we are not as big as a large stock-listed corporation is, we cannot slow

down easily. For us, it is not simple to pivot and change our strategic direction. This is all a bit more difficult in a conservative environment." (E9, Head of Product Management).

He also stressed this as the biggest learning from the BMI project:

"The important aspect is not the learning effect concerning the BMI tools, but rather an effect regarding the cognitive mindset of the stakeholders involved and the challenges for them to learn a new logic of value creation." (E9, Head of Product Management).

The team's approach had caused a set of conflicts between the value logics of the new BM and the established logic followed for its validation and implementation. The BMI process revealed that PumpCo was able to develop a new BM on the project level, but not to implement it on the organizational level. A quote by the Head of Operations illustrates this:

"We are already good at developing new business model ideas. However, we lack the capability to effectively communicate and exploit these ideas to get the new business model adopted and implemented within our organizational structure." (E10, Head of Operations).

When reflecting on their experience, the BMI project team identified that *"the biggest challenge is changing the culture of thinking within the company"* (I2; Senior Project Manager of focal product line).The team realized that their approach of planning for an uncertain future with a low and unclear value migration was not sufficient to cope with that uncertainty about BMI. It had applied all the established methodology of PumpCo's R&D process to validate radical project proposals: stage-gate reviews, business plan templates, and business case calculation. However, this was not sufficient to reduce the emerging cognitive uncertainty and to create organizational commitment from top management—people not engaged in the BMI planning and validation process but just confronted with a new value logic and BM proposal. Therefore, the BMI team concluded, *"a different thinking model and complete change of mindset"* (*I1; Head of Technology Management*) would be required to deal with the inherent uncertainty about BMI. The Head of Product Management understood that predicting the future to reduce the uncertainty makes little sense within a BMI process:

"But in the last few years, we observed over and over again that it does not make a lot of sense, especially in development projects where the uncertainty is very high in early stages, to look too far into the future." (I3; Head of Product Management).

The Head of Operations described this as follows:

"You need to approach this completely differently and faster. Rather than to approach it conceptually through planning, you need to take some unpredictable risks." (I13; Head of Operations).

After making sense of the latent logic conflicts, the BMI project team decided to follow an unconventional innovation path that is different from drafting a causative implementation plan (following the usual stage-gate logic of PumpCo's product and technology innovations). The team concluded that the application of an entrepreneurial logic might not just be the right approach for the early, creative stages of the BMI process (initiation and design), but also could become a suitable approach for the BM realization stage. The Head of Product Management specified the following actions as intrapreneurial:

> "We should not say entrepreneur but rather intrapreneur, in other words trying to reinvent the company from within." (E9, Head of Product Management).

The head of operations also has emphasized the need for separation of the alternative BM from the dominant BM logic to overcome internal resistance. He assumed that a separated setting for experimental trial-and-error learning could help to reduce uncertainty:

> "It would also be possible to separate the service theme from the pump manufacturing theme and establish a separated business unit with its new business model. It has become clear that the sales department here doesn't like the new model very much because they lack creativity. Our operations focus purely on price, delivery time, and quality of the existing products. (…) Nevertheless, I could very well imagine that you could go to another manufacturer and say, look, how about you disinvest your pumps? Or put them aside, we preserve them, you can always install them again if you don't like working with us. Now we are selling you a service. The fact that you try it out and create a best practice. Then you are experiencing how something like this works and what kind of problems there are. This enables you to promote the new BM by addressing the problems and convince others with the created field results." (E10, Head of Operations).

Thus, the BMI project team understood that they had to follow a trial-and-error approach to learn from unexpected events and outcomes, instead of trying to meet gate criteria in its established development approach to avoid contingencies. Thus, the BMI project team selected a different set-up with a separated and experimental approach, rather than following its established planning and validation logic. The decision was made to treat the BM realization as an intrapreneurial experiment in parallel to the existing business operations. This kind of entrepreneurial experimentation indeed was not entirely new for PumpCo. The trial-and-error decision-making described the Head of PumpCo Area 3 as follows:

> "When you are not sure in the beginning, you build your ideas on experimental R&D settings. Then you go out and try out with what you have. After this, you go back to the drawing board and say yes, this is the right way, or this is the wrong way, and you evolve. Therefore, we tried not touching the financial goals with predictions but instead evolved the approach and our goals. I do not think that any soccer team would go on to the pitch and play a planned game. Because when the competition changes its game, you have to evolve. Thus, I

think this is quite understandable in my mind. We have met a lot of unknowns because sometimes when you enter into new business models like this, you have a lot of uncertainty that changes the objectives along the way and hopefully you still reach your destination." (I4; Head of PumpCo Area 3).

Already in the past, some R&D and product development projects at PumpCo with a high level of uncertainty and unknown outcomes had been conducted based on available resources for taking action without predicting financial outcomes or setting long-term goals. This *means-orientation* (Dew et al. 2009) suggests that potential goals emerge while taking action. Thus, the involved team members actively shape means—a typical principle of the *effectual decision logic* (Sarasvathy (2001). Following this logic, the BMI project team started to implement an early BM prototype, continuously refining and fine-tuning it. It communicated benefits and risks with partners while ensuring commitment among critical BMI stakeholders. In line with the effectuation dimensions, the BMI team focused on its existing capabilities, project experiences, and knowledge ("who I am") and its R&D specialists ("what I know") (Dew et al. 2009; Sarasvathy 2001).

Within this experimental setting of means-orientation, the project team utilized their given financial resources and physical assets ("what I have"), such as R&D equipment, in a *non-predictive control* manner. This allowed team members to build on their *creativity*, an essential characteristic of the effectual view of the future. Furthermore, by clearly communicating financial risk and limiting the downside potential, the team followed the effectual approach of experimenting within the boundaries of *affordable loss* (Dew et al. 2009). Notably, unexpected outcomes are not avoided in this scenario, but the attitude of *leveraging contingencies* is encouraged (Brettel et al. 2012; Sarasvathy 2001). A combination of collaboration and trial-and-error learning was used to gain access to external resources and thereby ensure stakeholder pre-commitment for idea generation (Dew et al. 2009).

Co-creation through partnerships between members of the organization and external actors like customers is another characteristic of the applied effectual logic (Sarasvathy 2001). In this context, the BMI team engaged in collaboration with partners like key customers through PumpCo's R&D networks ("whom I know"), seeking out actors for the experimental pilots. As a result, the role of the customer changed from a passive to an active one:

"We have to identify a good customer somewhere and then you just do it. Then they say you have a year's contract here and we sell you a year's pumping capacity. You pay so and so much per month and you have no investment costs. Then we try it out with you. The customer probably won't say no. Then we will actively involve the customer to create mutual value and benefits which is visible for all involved parties and thus creates commitment for the new business model." (E10, Head of Operations).

To summarize, shifting the realization logic from causation to effectuation helped to ensure that the BMI process progressed beyond the design stage to implementation. Separating the innovative BM from the existing business helped to avoid the influence of the primary BM and its dominant causative decision-making logic. The

BMI initiative thereby built pluralism in the firm's decision-making logic through intrapreneurial BMI (Heinze and Weber 2015). PumpCo realized intrapreneurial BMI by separating the new from the dominant BM and following an effectuation logic throughout the entire BMI process. Through logic pluralism, PumpCo could overcome and even avoid conflicts arising from using the institutionalized and conflicting decision-making logic to implement a novel BM. Figure 3 summarizes the results from our case analysis in the form of a conceptual framework, which we theoretical discuss for theoretical and practical implications in the following section.

5 Discussion and implications

5.1 Theoretical discussion

Our longitudinal case analysis identified several different logic conflicts (Fig. 1) emerging in an established organization that strives to engage in endogenous BMI (Fig. 3). The logic conflicts arose from a process of causative development and implementation of an alternative BM with a conflicting new value logic. While conventionally a causative decision-making logic like the stage-gate process is applied to reduce uncertainty, it paradoxically increased uncertainty in our case company. In turn, the emerging logic conflicts between the causative decision-making logic and the new BM logic affected the legitimization of BMI. Only when the actors progressively became aware of these conflicts, they understood that pivoting the established BM requires intrapreneurial action and separating the alternative BM logic from the dominant one. By switching to the alternative decision-making logic of effectuation, the BM project team was able to deal differently with the uncertainty of BMI.

Following a causative planning logic for BMI was not a suitable approach because it interrupted the process from BM ideation and integration to the actual BM realization. Thus, our analysis shows that the institutionalized decision-making logic established in an incumbent to implement innovation is an important organizational antecedent and trigger for counteractive conflicts that can inhibit BMI. In our case, causation led to a goal-driven procedure, characterized by rational analyses and thorough planning to reduce uncertainty. The causative planning approach was an implicit part of PumpCo's strategy and its institutionalized governance system. It sought to make use of pre-existing knowledge, capabilities, and resources. Chandler et al. (2011, p. 376 f.) describe such an approach as "*envisioned from the beginning and all efforts are directed at achieving the pre-envisioned state*." Companies, therefore, make decisions based on their strategy and underlying goal setting to choose a specific BM design. In the case of PumpCo, the underlying value logic of the dominant BM was entirely shaped by its commercial market logic, with shareholder value maximization as the critical goal (Spieth et al. 2018; Thornton et al. 2012; Vaskelainen and Münzel 2018). The commercial market logic drove the BM design towards greater efficiency and incremental enhancement of the value proposition, rather than pivoting the value logic radically to that of a digital operator and servitization (Laasch 2018; Vaskelainen and Münzel 2018).

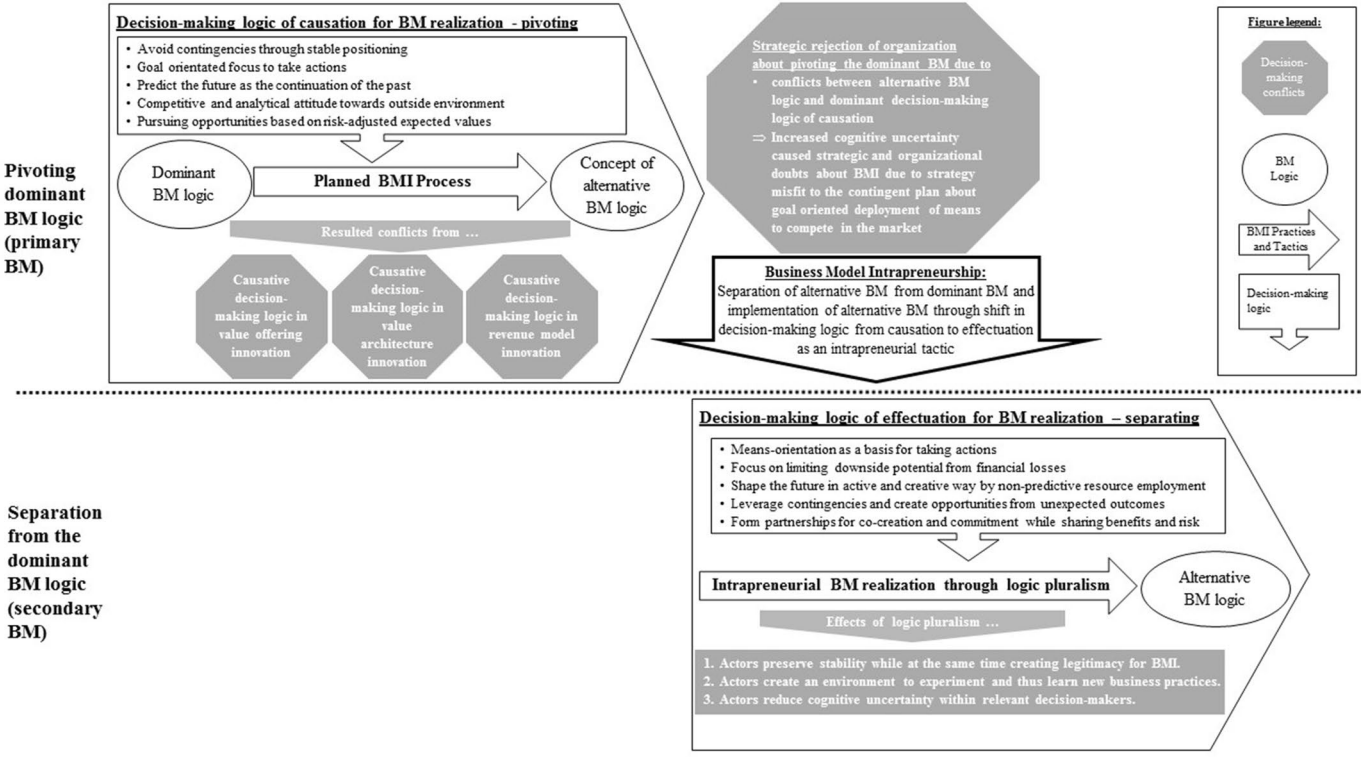

Fig. 3 Conflicts of decision-making logic and intrapreneurial tactics to realize BMI

Consequently, incumbent firms favor protecting the dominant logic equilibrium of the existing BM and focus on increasing efficiency and maintaining financial stability. Therefore, on an organizational level, they become cognitively constrained in their decisions to potentially realize alternative value logics of doing business (Martins et al. 2015). These cognitive constraints impede them from acknowledging that they have a strategic opportunity to pivot away from their dominant value logic to an alternative one (Casadesus-Masanell and Ricart 2010). For us, the most surprising outcome of our case analysis has been the latent mismatch between the causative decision-making logic and the alternative BM logic. The BMI project team was not aware of this logic conflict, resulting in consistent (or even increasing) uncertainty concerning the new value offering, value architecture, and revenue model. As a result, the BMI implementation process failed, although the team used all the new approaches and tools prescribed in the BMI literature (Frankenberger et al. 2013; Gassmann et al. 2014; Kim and Mauborgne 2014; Osterwalder et al. 2010, 2014) in the design stage to create the new BM alternative. The need for fundamental BM change by pivoting the dominant BM was not seen by critical stakeholders because the migration of value was low and a BM threat was lacking (Hacklin et al. 2018). Therefore, it was difficult for the project team to convince crucial stakeholders that the new BM would have a better product-market fit concerning customers' needs. The difficulty resulted from PumpCo's situation that its dominant BM was still well-performing in its product-market fit to address customer needs. This caused cognitive uncertainty about the benefits of BMI that impeded the planning and execution of changing the dominant BM through the decision-making logic of causation during the BM realization phase.

We interpreted from our case analysis that decision-making practices need to be aligned with the logic that manages the high uncertainty along the process of BMI in order to progress towards a successful implementation of the new BM. The BMI initiative at PumpCo adopted finally a trial-and-error decision-making, which resembles the logic of effectuation (Dew et al. 2009; Sarasvathy 2001). While causation is more effective in environments where the future is easily predictable, effectuation is more effective in unpredictable environments with high levels of uncertainty (Brettel et al. 2012; Dew et al. 2009). Effectuation induces creative and transformative tactics and is a more heuristic and dynamic approach. The creation of an idea does not follow a static blueprint or formalized process based on goal settings. Instead, it follows a dynamic, iterative, and creative design process (Sarasvathy 2001, 2009).

While effectuation originally was described as a viable decision-making logic for startup companies, Brettel et al. (2012) empirically showed that effectuation is a suitable approach for corporate entrepreneurship to effectively deal with (high) uncertainty in corporate R&D projects and risky innovation initiatives. Our results suggest that this finding can be transferred to the context of BMI in established organizations, confirming earlier propositions in the literature (Futterer et al. 2017; Laudien and Daxböck 2016; Schneckenberg et al. 2017). Thus, BMI demands an approach to work with available means to take action without having to predict financial outcomes or meet long-term strategic goals. Interestingly, also in PumpCo, such an effectual approach was already common practice for new (radical) product development projects with high uncertainty. It was a surprising observation for us

that it hence took the BMI team so long to realize that also the implementation of its new BM should follow such a path. However, sensemaking of latent logic conflicts and adjusting the BMI strategy is a process that takes time and effort. It is hard for established organizations to develop a tactic suitable for overcoming the conflicts from institutionalized logics (Battilana et al. 2009; Heinze and Weber 2015; Tracey et al. 2011).

This finding has important discussion points for advancing actor-dependent institutional work in intrapreneurship. Confirming Pache and Santos (2010), we infer that BMI is an intraorganizational political process provoking conflicting institutional demands. The characteristics of the BMI process can be linked to the paradox of embedded agency (Greenwood and Suddaby 2006; Micelotta et al. 2017). At the case firm, the uncertainty among embedded actors rose from simultaneously maintaining conflicting logics during the BMI process. Logic conflicts emerged from applying the institutionalized decision-making logic of causation to pivot and change the dominant BM while being confronted with an alternative and contradicting BM, where an effectual logic could manage uncertainty better. Hence, it is important to detect the source of logic conflicts to take appropriate action. Based on our observations, we assume that making latent logic conflicts obvious is a key capability of successful BMI in terms of organizational learning across multiple levels (Crossan et al. 1999). Once the logic conflicts are apparent, actors can choose their tactics to achieve change (Heinze and Weber 2015; Pache and Santos 2010). In our case, the company's tactic was separation resulting in logic pluralism with the following effects (see Fig. 3): First, actors preserve stability while at the same time creating legitimacy for BMI. Second, actors create an environment to experiment and thus learn new business practices. Third, actors reduce cognitive uncertainty within relevant decision-makers.

To summarize, our analysis revealed how BMI process outcomes (Fig. 2) triggered different responses by the BMI project team to react to logic conflicts by decision-making logic pluralism (Fig. 3). Institutional theory describes pluralism as the integration of multiple regimes into organizational practice (Heinze and Weber 2015; Jay 2013). Our analysis indicates that following effectuation as the decision-making logic, in combination with a separation of the BM value logic is a promising strategy to achieve BM intrapreneurship in established organizations. We assume that logic pluralism is an enabling condition for institutional entrepreneurship and resolves the paradox of embedded agency (Battilana et al. 2009). Thus, actors can become institutional intrapreneurs despite the absence of exogenous trigger for BMI (like high value migration to new BMs). In this context, institutional intrapreneurship addresses existing goals with the dominant BM and causative decision-making while creating new goals following an effectuation logic for realizing an alternative BM in a parallel experimental setting of BMI. In this way, such pluralism reduces the cognitive uncertainty associated with BMI. The logic pluralism gives alternative BMs a chance to be seen as legitimate and to be realized while actors can preserve organizational stability regarding the dominant BM and its value logic (Battilana et al. 2009; Heinze and Weber 2015; Micelotta et al. 2017).

5.2 Theoretical and managerial implications

Our research explores practices associated with the initiation, integration, and realization of BMI from an institutional logic perspective. We contribute to the BMI and institutional theory literature by explaining how incumbent firms accomplish BMI in an endogenous way by applying institutional pluralism (organizational hybridization) of value logics (Heinze and Weber 2015; Schildt and Perkmann 2017; Spieth et al. 2018). Furthermore, our study contributes to the BMI literature by illuminating the process stages, practices, and outcomes of BMI using a longitudinal case study. It reveals latent logic conflicts resulting from a misfit between the innovation of an alternative BM and the dominant decision-making logic to manage and reduce uncertainty. The collected in-depth process data indicate that BMI can be continuously narrowed by institutionalized boundaries, on our case defined by the causative logic of decision-making along the innovation process. The firm failed to pivot the primary BM due to these logic contradictions. Consequently, the organization's decision-makers questioned the BMI plan and decided to retain the status quo BM logic. Our study found that causation had a negative and hindering impact on the BMI process, which is in contrast to other studies reporting a positive effect of causation logic on BMI (e.g., Futterer et al. 2017).

The results of our study indicate that an alternative BM needs to be separated from the dominant one when the alternative value logic contradicts the underlying innovation decision-making logic. Otherwise, a significant reduction of innovation-related uncertainty is not possible for BMI. By studying BMI longitudinally, we revealed that a critical success factor along the BMI process is the dedicated capability for implementing BMI without affecting the firm's dominant value logic. Thus, we regard purposeful switching as pluralism in the innovation decision-making logic, e.g., from causation to effectuation, to be a relevant tactic when innovating a BM within incumbent firms (Heinze and Weber 2015). The presence of latent logic conflicts is complementing the existing academic knowledge about institutional entrepreneurship. According to the literature, pluralism tactics in decision-making reduce the tension between institutional determinedness and transformative agency and thus address the paradox of embedded agency (Battilana et al. 2009; Berglund 2015; Heinze and Weber 2015). To continue to be able to operate, we suggest that firms create awareness through socio-cognitive sensemaking of latent logic conflicts against BMI (Nambisan et al. 2017). We suggest to take the perspective of organizational learning and apply, for instance, the 4I-Framework of Crossan et al. (1999) in this context to trigger the change faster in an established company.

Further, our findings extend the work of Hacklin et al. (2018), who investigated the effect of low value migration on the choice decision regarding the two BMI strategies of pivoting the primary BM or introducing a secondary BM. We imply that BMI under low value migration was not predictable concerning the benefits and goals of implementing a new value logic in terms of value offering, architecture, and revenue innovation. In this context, the realization of BMI by pivoting the dominant BM to a new one and applying a causative decision-making logic caused conflicts that inhibited the BMI process. These logic conflicts emerged from an opposing value logic and the non-predictability about the anticipated value migration to a new

BM. Under this condition, the dominant decision-making logic of causation was not appropriate to manage and reduce the emerging uncertainty to set goals while allocating management attention and resources to BMI.

From our case study results, we deduce that the new contradicting value logic of an alternative BM was incompatible with the causative decision-making logic of the dominant BM. Therefore, the pivoting under low value migration failed in the implementation stage at our case company. We propose that firms confronted with low value migration and a conflicting value logic in their alternative BM should separate their BMI efforts from the dominant BM logic. In doing so, firms should change their decision-making logic to effectuation when realizing BMI to manage the unpredictability resulting from the slow and thus uncertain value migration to a future secondary BM. The logic separation leads to logic pluralism within the focal firm as a suitable tactic to deal with logic conflicts and cognitive uncertainty. From our case study results, we assume that pivoting the dominant BM is only successful when a high-value migration with predictable value outflows to new BMs is existent. The pivoting of the dominant BM is challenging and prone to fail under the condition of low value migration because of the emergence of latent logic conflicts. Therefore, the decision to pivot or to separate depends not only on the extent of the value migration argued by Hacklin et al. (2018) but also on the potential extent of logic conflicts, which affect the change in the value logic. Based on our study, we infer that logic conflicts are another contingency factor influencing the BMI strategy choice for a low degree of value migration.

Taking our findings together for practical implications, we recommend becoming aware of the current logics applied in the organization. Managers need to clarify in which decision-making logic they are starting their BMI process and whether this logic is compatible with the new BM or not. The causation-effectuation framework can serve as a great structure here. Members of a BMI team should, therefore, discuss the main issues when innovating their dominant value logic in terms of how to perceive the future (predictive vs. creative), what is the basis for taking action (goal vs. means), how investments are evaluated (ROI vs. affordable loss), how outsiders are considered (competitive vs. partnership), and how to deal with unexpected events (avoiding vs. leveraging) (Dew et al. 2009). Based on the outcomes of this discussion, the team can choose an appropriate BMI strategy. This, in turn, affects how the firm plans the scope of its organizational change process. In case of logic fit with no or negligible logic conflicts, firms are likely to pivot their dominant BM since changes are manageable (Kotter 2012). In case of a logic misfit and significant conflicts, firms should rather separate their alternative BM (i.e., implementing a secondary BM) to generate the opportunity of creating new resources instead of investing in a resource-intensive change management process of the existing BM logic.

6 Limitations and future research

Our research applies an exploratory, longitudinal single case study. Such an approach provides rich, in-depth, contextual data, suitable for deep process analysis. However, it also has limitations regarding the generalizability of our findings. The

single case study cannot provide a full explanation of all factors which influence logic conflicts and enablers of BMI. Future research may use multiple case studies in different industries, cross-industry surveys, or archival or longitudinal panel data to test and validate our findings. Another limitation refers to our case firm. It is a family-owned business. Even though the owners do not run the firm, family businesses are assumed to show differences in organizational processes or corporate policy in comparison to non-family firms (Bammens et al. 2011). How goals are set, or the specific history of the family might correlate with managing logic shifts since experience shape practices and firm culture (Sharma et al. 1997).

Future research could further examine the intersection of value logics and institutional work in terms of practices of institutional intrapreneurship for BMI. In particular, factors such as organizational culture, market position, governance structure (centralization and formalization), or leadership style appear to have an impact on decision-making. These factors could be compared to further test the validity of our findings about logic shifts and pluralism in BMI.

Furthermore, future research could explore details of the process of sensemaking of latent logic conflicts and shifts in decision-making logic. How and when does this sensemaking occur, and can specific practices or interventions trigger it? This could help to answer the question of why some established firms are better in innovating their BM than others. Therefore, future research should focus on clear performance outcomes of BMI by analyzing the effectiveness of different decision-making logics to support BMI successfully.

7 Appendix: Data source and analysis at PumpCo

Source	Type of data	Use in analysis
Causal-process observations in PumpCo's headquarter	About 1100 h of local presence at PumpCo's headquarters	Becoming familiar with the focal firm to better evaluate the contributions from the informants and establishing trust. Using process tracing to collect process-related indication and data for causal inferences concerning BMI initiatives and decision-making logic
BMI Workshops A	1,5 h unstructured and experimental BMI initiation workshop with six participants at PumpCo (recorded)	Workshop A was characterized as an experimental workshop to provide valuable practical findings regarding the development of a customized BMI process and outcomes of the ideation of a new value offering
BMI Workshop B	3,5 h BMI workshop with application of BMI ideation tools with 5 participants plus moderator (recorded)	Workshop B involved potential BM stakeholders to ideate and to develop a new BM concept, using BMI process templates and tools from the literature to accelerate the adoption of new BMs

Source	Type of data	Use in analysis
Workshop validation session	Two focus group discussions (follow up) after each workshop about findings, results and insights and recommendations as well as validated interpretations (partly audio-recorded)	Critical review and validation of results and interpretation concerning the workshop and process findings
Focus group sessions	Four focus group sessions in 2014, 5 focus group sessions in 2015, 3 focus group sessions in 2016 (partly documented and recorded)	Deepening the understanding and validation of the observations, findings, milestones, assumptions, and interpretation concerning BMI by presentations targeting middle and senior managers. Critical conversations were recorded or directly documented and utilized for the validation of results and interpretation
Informal ethnographic observation and interviews	About 65 discussions; e.g., weekly group meeting, milestone meeting, special issue meeting, etc. (partly documented and recorded)	Tracing the BMI initiative and the BM development within PumpCo. Ethnographic interviews and group discussions with senior managers to understand the strategic aspects of BMI. Interviews and discussions with middle managers, R&D and application engineers, and sales managers to gather in-depth insights into BMI possibilities through a process model. Discussing potential implications of existing barriers and conflicts to BMI and structural implications for decision-making with all informants
Intranet and emails	Internal documentation and communication about BMI, general innovation/product management, service business, customer relation management, value chain, and operations	Reviewing former and current innovation/product management projects concerning BMI and viability of present BM within the organization. Getting familiar with the terminology and thinking being used by the informants. Generating information for triangulation of findings and interpretations
Internal seminars/workshops	One production and product assembly workshop, two service/sales partner trainings, one extensive plant and company tour and inspection	Investigating and tracking the main part of value creation, offering, and capture in PumpCo's supply and value chains. Generating insights into crucial business processes and logics
Company publications, reports, and presentations	Company and product brochures of annual reports and other publications	Analysis and interpretation of changes in the strategies, activities, and performance of PumpCo during the last decades. Generating information for triangulation of findings and interpretations
Customer Feedback (Focus Groups)	Four documented customer visits (Industries: Chemicals, Food, and Environmental services) with area sales manager	Tracking and investigating the customer and industry view and perception from potential or key customer concerning new business models and the innovation of value creation, offering, and capture mechanisms. Understanding the business environment and focal niche of PumpCo

Source	Type of data	Use in analysis
Semi-structured top and higher middle management interviews	15 interviews about BMI, decision-making logic and governance	The first part of the interview is about the incumbent BM and its innovation process of pivoting. Concerning the BM, we did not directly ask for the business model and the process as a whole. Rather we asked for its design elements, stages, dimensions, practices, logics, and routines during innovation concerning the following key topics as an excerpt of our semi-structured interview guideline: *BMI process* (e.g., What are opportunities and threats for your BM? How have the business model elements changed over time? Can you describe the process by naming and explaining critical steps, practices, outcomes, and incidents or conflicts? If no changes have existed, what were the reasons for this persistence on the incumbent BM?) *Value offering innovation* (e.g., What kind of value proposition in terms of products and services do you currently offer or plan to deliver? How do you differentiate from your competition? Whom do you want to reach with your offering? How would you innovate your value offering to increase customer benefits?) *Value architecture innovation* (e.g., How do you create and deliver value to stakeholders? What are the needed core resources and competences to provide, extend, or innovate the BM and its architecture/infrastructure? How do you innovate the value creation architecture? How are customers/other industry partners involved in value creation processes? etc.) *Revenue model innovation* (e.g., How do you capture the created value? How do you create revenue and what are main income drivers? Where do you see potentials for new revenue patterns and streams? What are the associated costs and its driver of existing and new BMs?) *Governance* (e.g., Which governance/control mechanisms do you use internally/externally to safeguard created value in innovation like BMI? How do you measure success on BM level? How do you reduce uncertainty and risk in innovation projects like BMI? How would you describe your governance for decision-making? How strategy and BM design are linked to and influence each other? What might be issues and conflicts regarding BMI and your strategic governance setting?) The second part of the interview guideline had the objective to examine in-depth which decision logic, while the interview partner was modifying the value logic of the firm's BM (*effectuation vs. causation*):

Source	Type of data	Use in analysis
		Basis for action (*goal vs. means orientation*) (e.g., What is the basis for taking actions for BMI? How do you act on BMI when you are constrained by limited means? Why do you think that the new value proposition would be successful? How do you evaluate and decide on it? How would you describe the degree of freedom and practices you had and applied?) *Perception of risk* (e.g., How are risk, resources, and financial aspects assessed during BMI? How do you perceive investments in BMI? How do you perceive freedoms/regulations regarding the employment of resources and investments? What are financial framework conditions?) *Attitude towards others* (e.g., Which partners are/were involved in the BMI process? How did you choose them? How do you interact with them and integrate their opinion or create commitment? How do you build relationships? (a) Internal: with other departments, levels, etc. (b) External: competitors (enemies or potential partners), customers (interaction, integrating their opinion), suppliers, etc. (c) Pre-Commitments to reduce risks) *Attitude towards the unexpected* (e.g., Which unexpected events occurred during the BMI process and how did you react to them? How do/did you deal with uncertainties in terms of contingencies? Did you change the plan/approach during the process and if yes, why?) *View of the future* (e.g., How do you frame the management of the future in BMI? How predictive is the management of BMI? How should it be? How do you determine central success factors, challenges, barriers, and conflicts? Where do you see the biggest potentials to pursue such a project more efficient?)

Acknowledgements The authors would like to thank the German Research Council (DFG) for their support within the Cluster "Internet of Production", Project ID 390 621 612.

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