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Bridging Business Models and Business Processes: A Systematic Review of Methods

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Research full-length paper

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Abstract

Business models are increasingly recognized as a concept to support innovation in organizations. The implementation and operation of a new or altered business model involves the (re-)design of an organization's business processes and their successful execution. However, we currently lack an understanding of how existing research can be used to guide organizations in systematically moving from a business model design to the implementation and operation of the business model through their underlying business processes. Therefore, this study aims at identifying and analyzing methods that relate business models and business processes. For this purpose, we conducted a systematic literature review on methods that bridge business models and business processes. We classified the selected methods according to their characteristics and support during the design, implementation, and operation of business models. The results of our systematic review provide an overview of existing methods that organizations can adopt when moving from business model design into the implementation and operation of their business model using processes. Our work also synthesizes knowledge gaps and identifies future research avenues for relating business models and business processes.

Keywords: Business Model, Business Model Management, Business Process, Systematic Literature Review.

1 Introduction

The current business landscape is characterized by disruptive changes and increased adoption of digital technologies (Röglinger et al., 2022; Turetken et al., 2019). To remain competitive, organizations are forced to adapt and innovate their business models and business processes (Röglinger et al., 2022). Recent studies have highlighted the need for Business Process Management (BPM) to become more innovation-driven (Grisold et al., 2019; Helbin and van Looy, 2021). Researchers have coined the term explorative BPM to suggest that organizations should develop capabilities to detect innovation opportunities in view of emerging technologies and business models (Grisold et al., 2019). Explorative BPM refers to "*the offering of the same, enhanced, or new value propositions through the reengineering of existing processes or the creation of new processes*" (Grisold et al., 2019, p. 5). An important opportunity for further research in the field of explorative BPM is the integration of theoretical foundations and concepts from alternative research streams.

A research stream that investigates similar issues related to the creation of new value propositions is business model research (Massa et al., 2017). The business model concept has gained increasing importance both in research and practice (Massa et al., 2017; Wirtz et al., 2016). We view the business model as a useful concept to extend the knowledge base of explorative BPM. A business model is "*a design or architecture of how an organization creates, delivers, and captures value"* (Teece, 2010, p. 172). From an information systems (IS) perspective, it functions as an intermediary concept between an organization's strategy and business processes, including its information technology (IT) systems (Veit et al., 2014). The process of innovating and adapting a business model can be viewed as a continuous cycle, which is referred to as the Business Model Management (BMM) lifecycle (Wirtz, 2020). The BMM lifecycle encompasses the following five phases: design, implementation, operation, adaption and modification, and monitoring and controlling (Wirtz, 2020). To implement and operate a business model, business processes have to be (re-)designed and executed (Osterwalder et al., 2005; Turetken et al., 2019).

Existing research has focused on developing models to provide insight into how the concepts of business model and business process are related (e.g., Al-Debei and Avison, 2010; Osterwalder et al., 2005; Solaimani and Bouwman, 2012). However, practitioners lack guidelines that provide support during the implementation and operation of a business model (Geissdoerfer et al., 2018). Without proper guidance, organizations might fail to adopt business model innovation initiatives (Geissdoerfer et al., 2018; Teece, 2010). Therefore, multiple authors have identified the need to develop structured methods for implementing and operating business models by designing and executing related business processes (Al-Debei and Avison, 2010; Osterwalder et al., 2005; Solaimani et al., 2018). Despite several research contributions over the last couple of decades, we currently lack an understanding of how existing research can be used to guide organizations in systematically moving from a business model design to the implementation and operation of the business model through their underlying business processes.

Therefore, our research objective in this study is to provide an overview of *the current state of knowledge regarding the methods that bridge business models and business processes*. In particular, we aim to identify certain structural characteristics of the methods and how they can be used to guide the implementation and operation of business models. We intend to identify what methods relate business models to business processes, and to what extent the methods support the activities in both the BMM lifecycle and the BPM lifecycle. Accordingly, we conducted a systematic literature review to identify the relevant methods (Okoli, 2015). To guide our analysis, we developed a concept matrix and mapped the extracted characteristics of the identified methods (Webster and Watson, 2002). The contribution of this classification is twofold. On the one hand, we provide an overview of existing methods that organizations can adopt when managing their business model through processes. On the other hand, our results allow for identifying knowledge gaps for future research and inform the development of improved methods that structurally relate business models and business processes.

The remainder of the paper is structured as follows. Section 2 provides an overview of the background and related works on business models, the relationship between business models and business processes, and the link between the BMM and BPM lifecycles. Section 3 explains the research design for the systematic literature review, while Section 4 presents the results. Subsequently, Section 5 discusses our research findings and proposes future research avenues. Finally, in Section 6 we conclude by summarizing our findings and the limitations of our research.

2 Background and Related Work

2.1 The business model concept

A business model depicts an organization's value proposition, the customer segment to which it is offered, the capabilities needed to put it forward, and the costs and benefits associated with this. As such, business models are viewed as a concept to analyze, design, innovate, and manage the business logic of an organization (Osterwalder et al., 2005) and as a mediator between the organization's strategy and business processes (Al-Debei and Avison, 2010). Three main interpretations of the business model concept can be identified in the current literature: "(1) business models as attributes of real firms, (2) business models as cognitive/ linguistic schemas, and (3) business models as formal conceptual representations of how a business functions" (Massa et al., 2017, p. 73). In this study, we adopt the latter interpretation as it allows us to understand the business model as a conceptual tool to manage the way a company does business (Osterwalder et al., 2005) and to study its intersection with the firm's operational business processes (Al-Debei and Avison, 2010; Veit et al., 2014).

While in the past the term "business model" was often used interchangeably with concepts such as "business process" and "strategy" (DaSilva and Trkman, 2014), in recent years there has been a growing consensus about how a business model is perceived (Massa et al., 2017; Wirtz et al., 2016). Initially, models and frameworks were created to link business strategy directly to business processes. For instance, in the Business Engineering Framework (Winter, 2001), information systems are designed according to three layers: strategy, process, and systems, and in the Strategic Alignment Model (SAM) by Henderson and Venkatraman (1993), four perspectives are represented: strategy execution, technology transformation, competitive potential, and service level. However, in the contemporary business environment, the shift from traditional ways of business to new digital business has caused a gap between business strategy and processes (Al-Debei and Avison, 2010). New digital businesses require quicker changes and are characterized by a high level of complexity, which calls for new ways of thinking about how organizations do business (Al-Debei and Avison, 2010; Grefen and Turetken, 2018). Consequently, the business model has emerged as a distinct unit of analysis and concept used for innovation (Frankenberger et al., 2013).

2.2 The relationship between business models and business processes

Strategy, business models, and business processes depict different concepts, which are interlinked and represent different organizational levels. In practice, the strategy focuses on the corporate planning level, business models on an organization's business unit and architecture level, and business processes on the functional, implementation, and operational level (Bask et al., 2010). The business strategy describes how organizations compete against other players in the market and how the organization positions itself in an industry (Magretta, 2002; Porter, 1980). The business model can be derived from the business strategy as it describes in more detail how the business architecture is composed (Al-Debei and Avison, 2010; Globocnik et al., 2020). In turn, business processes represent the operational level and depict the translation of a business model into concrete elements, including the operational infrastructure to execute the business model (Globocnik et al., 2020; Osterwalder et al., 2005).

Extant research has aimed at understanding how the concepts of business models and business processes are related through models. Gordijn et al. (2000) were one of the first to analyze and distinguish the difference between the business model and business process model concept by stating that a business model depicts *what* is offered by *who*, and processes focus on *how* the offering is operationally fulfilled. Osterwalder et al. (2005) clarify the relationship between both concepts by emphasizing that business models are implemented by defining the business structure, business processes, and infrastructure and IS. The relationship between both concepts is further elaborated by Al-Debei and Avison (2010), who argue for the need to align business models to business processes and vice versa. Casadesus-Masanell and Ricart (2010) claim that business models are made up of concrete choices, and these choices will represent consequences on the specific logic of the organization's operation. Cavalcante et al. (2011) use a process-based perspective of the business model to imply that core standard repeated processes are key to the business and its performance. Solaimani and Bouwman (2012) introduce a framework for aligning business models and business processes that contains three layers: value, information, and processes (VIP). More recently, Globocnik et al. (2020) developed an integrated management framework in which the specific design of the business model and the resource configuration for the operation of the business model represent tactical choices that determine the operation of the business model and affect the definition of the underlying business processes and operational infrastructure. However, despite the research on the intersection between business models and business processes, the relationship between both concepts still lacks clarity (Betzwieser et al., 2020; Osterwalder et al., 2005).

To provide an overview of the relationship between business models and business processes, Betzwieser et al. (2020) conducted a systematic review. In this review, they differentiate approaches based on the direction of the relationship (i.e., bottom-up vs. top-down). In this study, the authors highlight an absence of approaches that focus on the representation of the process perspective and a lack of understanding regarding how processes change in view of business model innovation. Nonetheless, there is no clear distinction between the types of contribution (e.g., models or methods as specified by Hevner et al. 2004) that the studies propose and their support throughout the different phases of the BMM lifecycle. Solaimani et al. (2018) call for urgent guidelines on business model implementation and provide a list of studies that intend to translate or map a business model into a business process model. However, this list does not provide a comprehensive overview of the methods and how they support business model implementation and operation. Moreover, practitioners not only lack awareness of the methods, but it is also unknown whether the extant methods are indeed useful as there is no clarity over their empirical validation. In summary, methods can be assessed based on certain characteristics, such as employed directionality, process perspective, and evaluation technique, as well as the support they provide during the BMM lifecycle.

2.3 Business model management and business process management lifecycles

Throughout the BMM lifecycle, we encounter multiple convergence points with the BPM lifecycle, which comprises the phases of process identification, discovery, analysis, redesign, implementation, and monitoring (Dumas et al., 2018). During the design phase of the business model, opportunities are uncovered, and new business model ideas are generated. In this phase, business model prototypes and alternatives are created, evaluated, and selected (Wirtz, 2020). To create business model prototypes, different ontologies have been proposed in the literature. Some of the most frequently used business model frameworks include the Business Model Canvas (BMC) (Osterwalder and Pigneur, 2010), e3-value (Gordijn and Akkermans, 2001), and the Resource-Event-Actor (REA) ontology (McCarthy, 1982). The BMC is a template-style framework that has become the quasi-standard for representing business models (Massa et al., 2017). The business model design serves as a starting point for identifying processes and organizational capabilities (Turetken and Grefen, 2017). Based on the organization's capabilities and processes, different business model prototype alternatives can be evaluated to identify their potential impact and select the most promising alternative (Wirtz, 2020).

Next, the newly designed business model is implemented, which involves analyzing and designing new processes or redesigning existing ones (Osterwalder et al., 2005). This phase is also concerned with process implementation, which requires considering both organizational change management and process automation (Dumas et al., 2018). Subsequently, the business model is put into operation, which is enabled by executing processes and involves continuous monitoring and control for financial and operational performance and potential risks for timely adaptations (Globocnik et al., 2020; Wirtz et al., 2016). Afterward, the adaption and modification of a business model deal with the continuous improvement and development of the business model design (Wirtz, 2020). Lastly, the monitoring and controlling phase refers to the assessment of the business model to ensure the creation and protection of competitive advantage (Wirtz, 2020). This research focuses on methods that support the advance from the business model design phase into the implementation and operation phases through the design and execution of business processes.

3 Research Design

This study aims to identify and analyze existing methods that relate business models and business processes according to two main aspects: characteristics and support in the BMM lifecycle. For this purpose, we conducted a systematic literature review following the guidelines proposed by Okoli (2015) and Webster and Watson (2002). In the following subsections, we present the followed procedure and discuss the developed concept matrix.

3.1 Systematic literature review process

We conducted the systematic literature review in four phases: *planning, selection, extraction,* and *execution* (Okoli, 2015). During the *planning phase*, we identified the purpose and scope of the study and defined our research objective (as presented in the introduction section of this paper). We defined our search string as: "business model*" AND "business process*".

In the *selection phase*, we applied a practical screen and searched in the Web of Science, Scopus, and AISeL digital libraries as they publish extensive research related to both business models and business processes. For the practical screen, we defined inclusion and exclusion criteria for the selection process as presented in Table 1. We included studies available in English and published from 2000 onward, as this is when the business model concept rose to prominence in the literature (Osterwalder et al., 2005). Considering our research objective, the selected studies needed to focus both on business models and business processes and relate them to each other. Therefore, the selected studies had to be aligned with the descriptions of the concepts presented in the introduction and background section. We included studies that are either journal articles, conference papers, or scientific book chapters and excluded workshop proceedings and book editorials.

Protocol element	Definition in this study
Research question	What is the current state of knowledge regarding the methods that bridge business models and business processes?
Sources	Scopus, Web of Science, AISeL
Search terms	"business model*" and "business process*"
Search strategy	Search in relevant databases to both business models and business process and snowball from identified relevant articles
Inclusion criteria	Include only papers written in English Include only papers indexed in the databases from 01-01-2000 until 22-Apr-2022 Include only papers that are available for download Include only papers published in journals, conferences, and scientific book chapters
Exclusion criteria	Exclude papers that use the business model and business process concepts interchangeably

Protocol element	Definition in this study
	Exclude papers that do not explicitly address business models, business processes, or their relationship
Quality criteria	Only peer-reviewed papers

Table 1. Systematic literature review protocol based on Boell and Cecez-Kecmanovic (2015).

Figure 1 shows an overview of the research design followed during the *extraction phase*. In the selected libraries, we found an initial set of 2,771 studies (as of 22-Apr-2022) distributed as 1,728 in Scopus, 833 in Web of Science, and 69 in AISeL. We merged the data set and removed duplicated studies, leaving 1,918 studies. Subsequently, the two leading authors evaluated the remaining studies based on their title, abstract, and keywords. Both authors evaluated half of the studies using the predefined inclusion and exclusion criteria. To assess the degree of agreement among these authors, a sample set of 100 studies was randomly selected from the 1,918 studies and evaluated independently. This evaluation resulted in a level of agreement between both authors of 90%. Additionally, we used Cohen's kappa coefficient to measure inter-rater reliability by considering the possibility of agreement between authors occurring by chance. The result was 0.675, which reflects a substantial level of inter-rater agreement between both authors (Landis and Koch, 1977). Then, we performed a full-text review of the remaining 409 studies. During this review, we identified that some authors published multiple studies concerning a single approach over the course of time. In these cases, we selected the most comprehensive publication (e.g., Boubaker et al., 2017; de Castro et al., 2011; Edirisuriya and Johannesson, 2008). We found 19 studies that match our research objective. Afterward, we performed a forward and backward search, as suggested by Webster and Watson (2002), by reviewing the studies' citations and by using Google Scholar. This search led us to an additional set of 15 relevant studies, resulting in a final set of 34 studies.

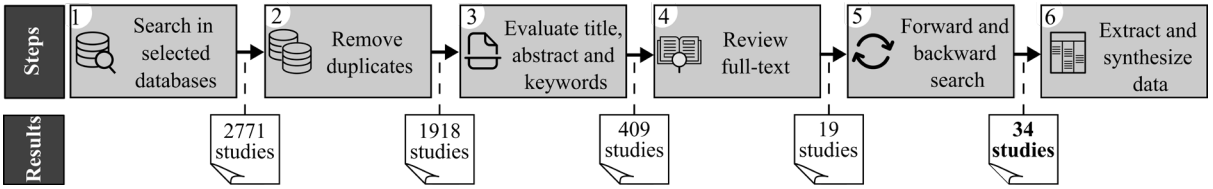

Figure 1. Overview of the research process for the systematic literature review.

During the *execution phase* of the review process, we analyzed and synthesized the selected studies. We developed a concept matrix as suggested by Webster and Watson (2002), which we used to categorize the 34 selected studies. The concept matrix provides an overview of the existing literature and allows the identification of knowledge gaps. The identified studies are positioned in the left column of the matrix, and the relevant categories and subcategories are positioned in the headers of the remaining columns in Table 3.

3.2 Development of the concept matrix

The concept matrix was developed iteratively during the extraction phase of the review process. We identified two main categories to classify the methods in the literature: *characteristics* and *support in the BMM lifecycle*. For each of the categories, we identified subcategories which we describe in Table 2. The *characteristics* refer to certain general features of the methods that relate business models to business processes and the *support in the BMM lifecycle* refers to whether a method provides guidelines to systematically carry out an activity in the business model design, implementation, or operation. In the *support in the BMM lifecycle* category, the first level of subcategories represents the initial phases of the BMM lifecycle (Globocnik et al., 2020; Wirtz, 2020), while the second level of subcategories includes phases in the BPM lifecycle (Dumas et al., 2018).

Characteristics	
Directionality	Interaction between business model and business processes (Betzwieser et al., 2020)
Top-down	Use of the business model as a source of analysis for assessing the effect on underlying processes and resources of an organization
Bottom-up	Use of the business processes as a source of analysis for assessing the effect on the related business model
Process perspective	Dimensions used to characterize a business process (Betzwieser et al., 2020)
Functional	Activities performed.
Behavioral	Sequencing and conditions between the activities
Organizational	Participants, roles, and systems that perform the activities
Informational	Data and artifacts produced or manipulated
Evaluation	The perceived evaluation technique to provide proof of the validity and usefulness of an artifact in question (Peffers et al., 2012)
Illustrative scenario	A demonstration of an artifact using a synthetic or real-world situation to illustrate its suitability
Case study	The application of an artifact in a real-world situation to evaluate its effect
Action research	Use of the artifact in a real-world situation as part of research intervention, while simultaneously evaluating its effect
Prototype	An implementation of the artifact to demonstrate its utility or suitability
Subject-based experiment	A test involving subjects to evaluate whether an assertion is true
Expert evaluation	An assessment through one or more experts i.e., interviews.
Logical argument	An argument with face validity
Technical experiment	A performance evaluation of the implemented artifact in relation to the real world
Support in the BMM lifecycle	
Business model design	Activities related to the idea generation, prototyping, feasibility, and decision making (Wirtz, 2020)
Business model prototyping	Representation of possible business model alternatives through ontologies (Wirtz, 2020)
Process/capability identification	Identification of the current or potential process architecture and organizational capabilities (Dumas et al., 2018)
Impact assessment/ Decision-making	Evaluation of the feasibility, viability, and risks of the business model in consideration of the process architecture and organizational capabilities (Wirtz, 2020)
Business model implementation	Activities related to the definition and configuration of business processes and required resources before the actual operation of the business model (Wirtz, 2020)
Process discovery/ modeling	Process modeling or documentation (Dumas et al., 2018)
Process analysis	Process assessment of potential impact and estimated effort using performance metrics (Dumas et al., 2018)
Process redesign	Redesign existing business processes or identify new processes required to implement a new business model (Dumas et al., 2018; Globocnik et al., 2020)
Process implementation	Activities related to organizational change management and automation of business processes (Dumas et al., 2018)
Business model operation	Operation of the business model through the execution of business processes (Globocnik et al., 2020; Wirtz, 2020)
Process execution	The actual execution or enactment of the business processes (Globocnik et al., 2020)
Process monitoring and controlling	Evaluation of the performance and compliance of the business processes to potentially trigger changes in the business processes or in the business model (Dumas et al., 2018; Globocnik et al., 2020)

Table 2. Description of the categories used in the concept matrix.

4 Results

In the following subsections, we synthesize and discuss the extant research based on the categories presented in the concept matrix. Table 3 provides an overview of the classification of the discovered studies in the literature. Figure 2 shows the distribution of the articles by year (from 2000 to 2022), the publication type (journal, book chapter, and conference proceeding), and the business model specificity (general or specific type) addressed in the publication. The distribution over the years shows a peak during 2005 and 2010. In terms of publication type, the studies published in conference proceedings represent the majority (76%), followed by journal articles (21%) and book chapters (3%). While conference proceedings were published during earlier years, journal articles have been more recently developed, showing an increase in the topic's maturity. Lastly, regarding the business model specificity, the methods that address specific types of business models (73.5%) refer to a particular domain or field of application (e.g., network business models, service business models, product-service system business models). In contrast, only 26.5% discuss methods for general business models (i.e., no specific context or domain of application). Accordingly, the implementation of business models and the relationship between business models and business processes has been considered in many domains and contexts.

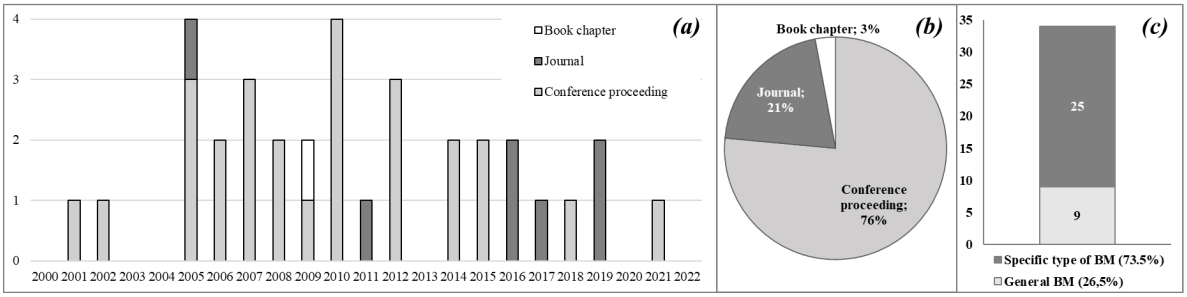

Figure 2. (a) Distribution of articles by year, (b) type, and (c) business model (BM) specificity.

4.1 Characteristics

4.1.1 Directionality

In the directionality category, 27 methods employ a *top-down* directionality, while only five methods employ a *bottom-up* directionality. This reflects a greater use of the business model as a source of analysis to identify, define, or analyze related business processes. Various approaches in the top-down category use a designed business model to transform it into specific business processes or identify specific process elements (e.g., activities, resources, participants). For instance, Suratno et al. (2018) propose a three-step method to operationalize service-dominant business models (Gilsing et al., 2018; Turetken et al., 2019) into conceptual business process models. Another group of methods in this category evaluates the potential effect on business processes when changing business model elements (e.g., Zancul et al., 2016). In the bottom-up category, we identified some methods that use business processes to derive a business model (e.g., Boubaker et al., 2017). Deriving a business model from business processes can convey the meaning of why business processes are executed in a certain way (di Valentin et al., 2015). It reflects the business intent and expresses the reason why particular activities are performed in a particular manner (Boubaker et al., 2017). Other methods in this category evaluate the effect that process elements have on a business model (e.g., Braccini, 2010).

In our analysis, we identified one study that uses both top-down and bottom-up directionalities. Di Valentin et al., (2015) propose matching Key Performance Indicators (KPIs) to business model elements to measure the effects of transforming a business model into business processes (top-down direction). Moreover, the authors suggest identifying process-relevant KPIs and mapping them to corresponding

business model elements to monitor business model performance (bottom-up direction). Lastly, we also discovered three methods with no perceived directionality, which are used to identify the alignment and consistency between business and process models. For instance, Bodenstaff et al. (2008) propose a method to identify dynamic and static consistency between e3-value models and process coordination models expressed in the Business Process Modeling Notation (BPMN).

	Characteristics																				Support in the BMM lifecycle										
	Direction.		Process perspectives					Evaluation													BM design			BM implementation				BM operation			
	Top-down	Bottom-up	Functional	Behavioral	Organizational	Informational	Illustrative scenario	Case study	Action research	Prototype	Expert evaluation	Subject-based experiment	Logical argument	Technical experiment	BM prototyping	BP/capability identification	Impact assessment/	BP discovery	BP analysis	BP redesign	BP implementation	BP execution	BP monitoring and controlling	
Andersson et al. (2006)	●		●	●	●	●	●								*			●		●				
Azam et al., (2007)	●		●	●	●	●	●								●			●		●	●			
Bergholtz et al. (2005)	●						●								●		●			●				
Bergholtz et al. (2002)	●		●	●	●	●	●											●		●				
Bodenstaff et al. (2008)			●	●	●	●	●								*			*					●	
Boubaker et al. (2017)		●	●	●	●	●	●			●		●			●			*					●	
Braccini (2010)		●	●		●			●							*									
De Castro et al. (2011)	●		●	●	●	●		●		●					*			*			●			
Di Valentin et al. (2015)	●	●	●		●	●					●					●	●	●		●			●	
Di Valentin et al. (2012)	●				●	●	●								●	●	●	●		●				
Edirisuriya & Johannesson (2009)	●		●	●	●		●								*			●						
Fatemi et al. (2010)	●		●	●	●			●							*			●						
Fayoumi & Loucopoulos (2016)	●		●	●	●	●		●							●	●	●	●	●	●				
Grégoire & Schmitt (2006)	●		●		●	●	●								*	●	●			●				
Hänel & Felden (2015)	●		●	●	●	●			●						●	●				●				
Hofreiter et al. (2012)	●		●	●	●	●						●			●			●		●				
Hotie & Gordijn (2019)	●		●	●	●	●			●						*		●	●		●				
Huemer et al. (2009)	●		●	●	●	●	●								*			●		●				
Jayaweera et al. (2001)	●		●	●	●	●	●								●			●		●				
Mohamed et al. (2010)	●		●	●	●	●		●							●	●	●	●		●				
O'Donnell (2005)	●		●		●			●								●	●							
Pijpers & Gordijn (2007)	●		●	●	●	●		●							●	●	●	●		●				
Roelens et al. (2019)			●						●	●	●				●	●							●	
Rudtsch et al. (2014)	●						●						●				●				●			
Salgado et al. (2014)		●	●		●		●								●			*					●	
Schief et al. (2012)	●		●				●				●				●	●	●							
Schuster et al. (2010)	●		●	●	●	●	●			●					*			●		●				
Silva Torres et al. (2021)		●	●	●	●	●			●						●			*					●	
Suratno et al. (2018)	●		●	●	●	●	●								*			●		●				
Weigand et al. (2007)	●		●	●	●		●										●	●		●				
Wieringa & Gordijn (2005)	●		●	●	●	●	●								●			●		●				
Wieringa et al. (2008)	●						●								*			●		●				
Zancul et al. (2016)	●		●	●	●	●		●							●		●			●				
Zlatev & Wombacher (2005)			●	●	●	●	●								*			*					●	
Total = 34 studies	**27**	**5**	**30**	**20**	**30**	**22**	**19**	**8**	**4**	**4**	**3**	**2**	**1**	**0**	**17**	**7**	**13**	**21**	**1**	**23**	**8**	**0**	**10**	

Table 3. Concept matrix of methods that relate business models and business processes (● : Category classification,: BM prototype or BP model as method input, BM: Business Model, BP: Business Process)*

4.1.2 Process perspective

Our objective regarding the process perspective category is to identify which elements of a business process the method intends to describe. The methods focus on two process perspectives equally: *functional* and *organizational*. This is expected because, in general, the information regarding key activities and participants is relevant for both a business model and a business process. For example, Salgado et al. (2014) employ the Unified Modeling Language (UML) use case diagrams to depict high-level system functionalities of a platform's services in relation to actor roles.

Noticeably, methods that focus on describing the *behavioral* (20 methods) and *informational* perspective (22 methods) of business processes were less common. Moreover, less than half of the methods (15 methods) consider all four process perspectives in their proposed approaches. For instance, da Silva Torres et al. (2021) use BPMN to describe the activities and their sequencing, participants, and message flow of the information elements of a business process of the Dutch National Bank and use this to derive an e3-value model.

4.1.3 Evaluation

In general, we found that most studies lack a proper evaluation of the methods. The most common form of assessment is through *illustrative scenarios,* which can be considered a weak form of evaluation (roughly half of the studies) (Peffers et al., 2012). For instance, Edirisuriya and Johannesson (2008) introduce a method to systematically derive a process model expressed in BPMN from a business model expressed in e3-value. The authors demonstrate their approach using a massive multiplayer online game (MMOG) case. Compared to illustrative scenarios, *case studies* represent more substantial evidence of the method's efficacy, validity, or performance (Peffers et al., 2012). In this category, we found eight representative methods. Case studies were performed to both evaluate the feasibility of applying the method (e.g., de Castro et al., 2011), identify the method limitations, and propose potential re-engineering routes for how the method can be changed to properly solve the stated problem (e.g., Braccini, 2010).

Action research and *prototypes* represent the third common evaluation technique, with four methods in each category. Distinctively, two of the methods in the action research category utilize technical action research (Hotie and Gordijn, 2019; da Silva Torres et al., 2021), which is intended to evaluate an experimental artifact and observe its effects in practice (Wieringa and Moralı, 2012). Studies that use prototypes either propose mapping methods to transform a business model to business processes (or vice versa) using the Eclipse Modeling Framework (EMF) (Boubaker et al., 2017; de Castro et al., 2011; Schuster et al., 2010), or a technique for process-goal alignment using the ADOxx platform (Roelens et al., 2019).

We identified two methods that use *expert* and *subject-based* evaluation techniques. Subject-based evaluations were all conducted using students in an academic setting (e.g., graduate students in Boubaker et al., 2017), while expert evaluations were conducted using industry experts (e.g., software industry experts in di Valentin et al., 2015). Lastly, we identified one study that only employed informed arguments to persuade readers about the usability of the method (Rudtsch et al., 2014), which can be considered the weakest form of an evaluation (Peffers et al., 2012). We did not identify any methods that implement a technical experiment as an evaluation form.

4.2 Support in the business model management lifecycle

4.2.1 Business model design

In our selected studies, we found that 23 studies provide support for business model design. Related to the *business model prototyping* category, 17 studies suggest using a specific ontology, with the most common being e3-value, followed by the business model canvas (Osterwalder and Pigneur, 2010) and

REA (resource-event agent) (McCarthy, 1982). In most studies, the method begins with designing a business model prototype that is then used to identify business processes to implement such prototype (e.g., Fayoumi and Loucopoulos, 2016; Schief and Buxmann, 2012; Zancul et al., 2016). However, 13 methods do not explicitly mention the design of the business model prototype as a step. Yet, these methods use a prototype as an input in the development of their proposed approach. For instance, de Castro et al. (2011) use as input an e3-value model to identify business actors, activities, and limitations of the underlying IS.

We found six methods related to the activity of process/capability identification. For instance, di Valentin et al. (2012) propose using the supply chain of a certain industry (e.g., software industry) to identify processes in the organization and assess business processes and capability alternatives to implement a new business model.

We uncovered 13 methods that provide support for the activities related to *impact assessment/decision-making*. In these methods, we identified studies that propose analyzing possible business model implementation alternatives through different business processes (e.g., di Valentin et al., 2012), identifying which processes would be affected by the implementation of a new business model and the impact on the processes (e.g., Schief et al., 2012), and using KPIs (e.g., cost, time, and efficiency) to identify the potential impact or risk of the new business model on existing business processes (e.g., Zancul et al., 2016). To exemplify, Fayoumi and Loucopoulos (2016) suggest identifying alternative patterns from best practices and standards to support the design and decision-making of the appropriate solution.

4.2.2 Business model implementation

We identified a total of 25 studies that focus on *business model implementation*. Most of the methods in this category focus on *process discovery or modeling* (21 methods) and *process redesign* (23 methods). These methods mainly intend to convert, map, integrate, or derive specific business process models from a business model (i.e., *process modeling activity*), in which the assembled process is intended to implement the business model (i.e., *process redesign activity*). BPMN and UML activity diagrams are the most commonly used notations to model processes. For example, Hotie and Gordijn (2019) propose a method to operationalize a business model by using an e3-value model as a starting point, then assembling two intermediate models for possession- and trust-flows, and finally arriving at a BPMN model. We identified six methods that use process models as an input to develop other activities in the BMM lifecycle (mainly *process monitoring and controlling*) but do not explicitly provide guidelines to identify the process. For instance, Bodenstaff et al. (2008) use an e3-value model and a BPMN coordination process model as inputs to determine the consistency among the models.

In our literature search, we identified one method with activities related to *process analysis*. Fayoumi and Loucopoulos (2016) evaluate processes in terms of implementation cost, implementation time, execution time, process efficiency, process maturity, and sustainability.

Related to the activity of *process implementation*, we found eight methods that provide guidelines related to enabling process automation and identifying the underlying IT architecture. De Castro et al. (2011) propose guidelines to obtain executable lower-level platform-independent behavioral models (web service models) from an e3-value model and a conceptual process in BPMN.

4.2.3 Business model operation

Compared to the other phases of the BMM lifecycle, methods focus less on the *business model operation*. We did not find any method that specifically targets activities related to *process execution*. Methods in the business model operation category consist of ten studies related to *business process monitoring and controlling*. In this category, we identified a group of studies concerned with the consistency, compliance, and alignment of business processes to a business model. Zlatev and Wombacher (2005) provide a guide for determining the consistency of an e3-value model and a UML activity diagram. They

do so by individually transforming both the value model and the activity diagram into a pair of so-called reduced models in an ad-hoc modeling notation. Then, the authors provide steps for checking the semantic equivalence of the resulting models. Another set of methods in this same category analyzes the effect of business process execution on the business model. One approach aids the identification of the impact of IT resources that enable a certain business process on value-generating activities in an organization (e.g., impact on costs and revenues of the business model) (Braccini, 2010).

5 Discussion and Future Research Avenues

Through a systematic review of the literature, we identified, classified, and analyzed 34 studies that provide methods that aim to bridge business models and business processes. Our analysis has uncovered various knowledge gaps, which we present in Table 4 with potential research avenues and recommendations.

Knowledge gap	Research avenue	Recommendation
Lack of methods that use business processes as a source of analysis (i.e., *bottom-up* directionality)	Associating existing methods in the BPM field to the activities of the BMM lifecycle	Incorporating *explorative BPM* approaches to identify possible process design alternatives for business model implementation. Using *exploitative BPM* methods for the development of business model operation methods
Lack of methods that focus on the *informational* and *behavioral* process perspectives	Developing methods that address all business process perspectives	Identifying data elements and artifacts that are produced and manipulated by IT enabled business processes while making process design decisions based on a business model
Lack of methods that are *evaluated* empirically using real-world business cases	Evaluating methods to prove their effectiveness through rigorous evaluation techniques	Using rigorous evaluation techniques to give prove to the effectiveness and validity of the methods (e.g., case study, action research)
Lack of methods that provide guidelines for *identifying processes and capabilities* to design a business model	Developing methods that address the identification of the process architecture and capabilities in relation to a business model	Developing methods that use the business model as a basis to identify the current or potential process architecture and capabilities and using these to understand the impact, feasibility, viability, or risk of implementation
Lack of methods that support all activities required for *business model implementation*	Engineering integrated approaches to support business model implementation using business processes	Designing integrated approaches that support all phases of business model implementation, building on existing methods to construct enhanced approaches that focus on *process analysis* and *process implementation*
Lack of methods that support *business model operation*	Building methods to support business model operation using processes	Building methods that support the monitoring of executed processes and impact on the business model (e.g., using KPIs)

Table 4. Research avenues for methods that bridge business models and business processes.

Organizations that wish to succeed in changing competitive environments must rethink and innovate their business model to enable digital innovation (Legner et al., 2017). Thus, organizations must understand how business models can be implemented (Osterwalder et al., 2005). In this review we explored the link between business models and how they can be operationalized through processes. Future works can further explore the relationship between business models and business processes to strengthen the knowledge of how BPM supports digital innovation through the operationalization of new business models.

Future studies can use existing approaches in the BPM field to further develop methods that bridge business models and business processes. Explorative BPM approaches can be used to design methods that support the BMM lifecycle. For instance, according to Rosemann (2020), explorative business process patterns provide a dedicated business process lens, which is currently missing in business model

implementation methods. On the other hand, business model research has proposed an array of 194 business model patterns (e.g., razor/blades, subscription, freemium), which describe proven solutions to recurring problems during business model design and are used for systematic business model innovation (Weking et al., 2020). We argue that business model patterns can guide the decision of *what* changes to implement (Lara Machado, 2021), while explorative process patterns can identify *how* to implement those changes. Coupling explorative process patterns with business model patterns can help ideate possible design alternatives on *how* to implement a business model.

We also see an opportunity to use traditional (exploitative) BPM approaches for the development of the BMM lifecycle. Traditional BPM techniques and tools focus on the efficiency and effectiveness of business processes (Grisold et al., 2019). Future studies can develop methods to determine operative inefficiencies to initiate adaptations in the business model and business process level. These methods can draw from previous studies in the business process field (van de Ven, 2021). For instance, the reporting and monitoring of KPIs have been an extensive research topic in BPM (e.g.,del-Río-Ortega et al., 2013). Existing knowledge from the field of BPM can be used to develop KPIs to monitor the impact of process performance on a business model. This monitoring can support the identification of timely triggers to change and (re-)design business model elements, understanding the impact of business process execution on the business model, and checking the alignment of business processes with respect to previously defined business model implementation goals (di Valentin et al., 2015; van de Ven et al., 2022).

6 Conclusion and Limitations

Our review of the academic literature resulted in the discovery of 34 studies that present methods to bridge business models and business processes. We coded the identified methods in two main categories using a concept matrix: characteristics and support in the BMM lifecycle. Our analysis of the methods' characteristics showed that the studies tend to focus on the functional and organizational perspectives of the business processes (i.e., activities, and participants). The majority of studies take a top-down perspective, and the leading evaluation method is illustrative scenarios. Regarding the method's support in the BMM lifecycle, we revealed that most existing studies provide guidelines to model and redesign processes. However, there is a lack of methods to identify the processes/capabilities when designing a business model, a lack of methods to analyze and implement business processes in the context of business model implementation, and a lack of methods to monitor and control the process performance in the operation of a business model. Future research avenues can focus on developing methods that cover the presented knowledge gaps and using preexisting methods in BPM research to further develop the guidelines for BMM. The concept matrix developed in this study can help practitioners in selecting appropriate approaches for managing their business models using processes. It can provide support for managers when adopting relevant methods for operationalizing their business model through business processes. Nevertheless, the specific context and needs of the organization still need to be considered when choosing the appropriate method identified in this study.

Despite following a rigorous research approach (Okoli, 2015; Webster and Watson, 2002), our study is subject to some limitations. In our literature search, we interpreted the business model concept as a formal, conceptual representation of how an organization creates, delivers, and captures value (Massa et al., 2017). This limits the selected set of methods as we purposely did not include methods that consider the business model as an attribute of the firm or as cognitive/linguistic schemas. We acknowledge that the activities related to business model design, implementation, and operation are more extensive than the scope covered in our analysis (e.g., planning, communicating, and project management activities). However, we chose to narrow our scope and exclusively focus on the development of these activities through processes.

References

Al-Debei, M. and Avison, D. (2010), "Developing a unified framework of the business model concept", *European Journal of Information Systems*, Vol. 19 No. 3, pp. 359–376.

Bask, A.H., Tinnilä, M. and Rajahonka, M. (2010), "Matching service strategies, business models and modular business processes", *Business Process Management Journal*, Emerald Group Publishing Limited, Vol. 16 No. 1, pp. 153–180.

Betzwieser, B., Levkovskyi, B. and Krcmar, H. (2020), "At the nexus of business models and business processes: A systematic literature review", *Proceedings of the 24th Pacific Asia Conference on Information Systems: Information Systems (IS) for the Future, PACIS 2020*, available at: https://aisel.aisnet.org/pacis2020/150.

Bodenstaff, L., Wombacher, A., Wieringa, R. and Reichert, M. (2008), "An Approach for Maintaining Models of an E-commerce Collaboration", *2008 10th IEEE Conference on E-Commerce Technology and the Fifth IEEE Conference on Enterprise Computing, E-Commerce and E-Services*, pp. 239–246.

Boell, S.K. and Cecez-Kecmanovic, D. (2015), "On being 'Systematic' in Literature Reviews in IS", *Journal of Information Technology*, SAGE Publications Ltd, Vol. 30 No. 2, pp. 161–173.

Boubaker, A., Leshob, A., Mili, H. and Charif, Y. (2017), "A pattern-based approach to extract REA value models from business process models", *Intelligent Systems in Accounting, Finance and Management*, John Wiley & Sons, Ltd, Vol. 24 No. 1, pp. 29–48.

Braccini, A.M. (2010), "How do IT Resources Support the Value Generation Process of the Organization? An Ontology Based Approach", *MCIS 2010 Proceedings*, p. 16.

Casadesus-Masanell, R. and Ricart, J.E. (2010), "From Strategy to Business Models and onto Tactics", *Long Range Planning*, Vol. 43 No. 2, pp. 195–215.

de Castro, V., Marcos, E. and Vara, J.M. (2011), "Applying CIM-to-PIM model transformations for the service-oriented development of information systems", *Information and Software Technology*, Vol. 53 No. 1, pp. 87–105.

Cavalcante, S., Kesting, P. and Ulhøi, J. (2011), "Business model dynamics and innovation: (re)establishing the missing linkages", *Management Decision*, Emerald Group Publishing Limited, Vol. 49 No. 8, pp. 1327–1342.

DaSilva, C.M. and Trkman, P. (2014), "Business Model: What It Is and What It Is Not", *Long Range Planning*, Vol. 47 No. 6, pp. 379–389.

del-Río-Ortega, A., Resinas, M., Cabanillas, C. and Ruiz-Cortés, A. (2013), "On the definition and design-time analysis of process performance indicators", *Information Systems*, Vol. 38 No. 4, pp. 470–490.

Dumas, M., la Rosa, M., Mendling, J. and Reijers, H.A. (2018), *Fundamentals of Business Process Management: Second Edition*, *Fundamentals of Business Process Management: Second Edition*, Springer Berlin Heidelberg, pp. 1–527.

Edirisuriya, A. and Johannesson, P. (2008), "On the Alignment of Business Models and Process Models", *BPM 2008*, Vol. 17, Springer, Berlin, Heidelberg, pp. 68–79.

Fayoumi, A. and Loucopoulos, P. (2016), "Conceptual modeling for the design of intelligent and emergent information systems", *Expert Systems with Applications*, Pergamon, Vol. 59, pp. 174–194.

Frankenberger, K., Weiblen, T., Csik, M. and Gassmann, O. (2013), "The 4I-framework of business model innovation: A structured view on process phases and challenges", *International Journal of Product Development*, Inderscience Publishers, Vol. 18 No. 3–4, pp. 249–273.

Geissdoerfer, M., Vladimirova, D. and Evans, S. (2018), "Sustainable business model innovation: A review", *Journal of Cleaner Production*, Vol. 198, pp. 401–416.

Gilsing, R., Turetken, O., Adali, O.E. and Grefen, P. (2018), "A Reference Model for the Design of Service-Dominant Business Models in the Smart Mobility Domain", *ICIS 2018 Proceedings*, available at: https://aisel.aisnet.org/icis2018/innovation/Presentations/3.

Globocnik, D., Faullant, R. and Parastuty, Z. (2020), "Bridging strategic planning and business model management – A formal control framework to manage business model portfolios and dynamics", *European Management Journal*, Pergamon, Vol. 38 No. 2, pp. 231–243.

Gordijn, J. and Akkermans, H. (2001), "Designing and evaluating e-business models", *IEEE Initelligent Systems*, Citeseer, Vol. 16 No. 04, pp. 11–17.

Gordijn, J., Akkermans, H. and van Vliet, H. (2000), "Business Modelling Is Not Process Modelling", *ER 2000*, Vol. 1921, Springer, Berlin, Heidelberg, pp. 40–51.

Grefen, P.W.P.J. and Turetken, O. (2018), "Achieving business process agility through service engineering in extended business networks.", BPTrends, April 2018.

Grisold, T., Gross, S., Röglinger, M., Stelzl, K. and vom Brocke, J. (2019), "Exploring Explorative BPM - Setting the Ground for Future Research", *BPM 2019*, Springer, Cham, pp. 23–31.

Helbin, T. and van Looy, A. (2021), "Is Business Process Management (BPM) Ready for Ambidexterity? Conceptualization, Implementation Guidelines and Research Agenda", *Sustainability*, Vol. 13 No. 4, available at:https://doi.org/10.3390/su13041906.

Henderson, J.C. and Venkatraman, H. (1993), "Strategic alignment: Leveraging information technology for transforming organizations", *IBM Systems Journal*, Vol. 32 No. 1, pp. 472–484.

Hevner, A.R., March, S.T., Park, J. and Ram, S. (2004), "Design Science in Information Systems Research", *MIS Quarterly*, Management Information Systems Research Center, University of Minnesota, Vol. 28 No. 1, pp. 75–105.

Hotie, F. and Gordijn, J. (2019), "Value-Based Process Model Design", *Business & Information Systems Engineering*, Vol. 61 No. 2, pp. 163–180.

Landis, J.R. and Koch, G.G. (1977), "The Measurement of Observer Agreement for Categorical Data", *International Biometric Society*, Vol. 33 No. 1, pp. 159–174.

Lara Machado, P. (2021), "Towards Business Model Implementation: from business model patterns to business processes", *Business Model Conference Doctoral Workshop*, Copenhagen.

Legner, C., Eymann, T., Hess, T., Matt, C., Böhmann, T., Drews, P., Mädche, A., *et al.* (2017), "Digitalization: Opportunity and Challenge for the Business and Information Systems Engineering Community", *Business & Information Systems Engineering*, Vol. 59 No. 4, pp. 301–308.

Magretta, J. (2002), "Why business models matter.", *Harvard Business Review*, Vol. 80 No. 5, pp. 86–92.

Massa, L., Tucci, C.L. and Afuah, A. (2017), "A critical assessment of business model research", *Academy of Management Annals*, Briarcliff Manor, NY, Vol. 11 No. 1, pp. 73–104.

McCarthy, W.E. (1982), "The REA Accounting Model: A Generalized Framework for Accounting Systems in a Shared Data Environment", *The Accounting Review*, American Accounting Association, Vol. 57 No. 3, pp. 554–578.

Okoli, C. (2015), "A Guide to Conducting a Standalone Systematic Literature Review", *Communications of the Association for Information Systems*, Association for Information Systems, Vol. 37 No. 1, pp. 879–910.

Osterwalder, A. and Pigneur, Y. (2010), *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*, Vol. 1, John Wiley & Sons.

Osterwalder, A., Pigneur, Y. and Tucci, C.L. (2005), "Clarifying Business Models: Origins, Present, and Future of the Concept", *Communications of the Association for Information Systems*, Association for Information Systems, Vol. 16 No. 1, pp. 1–25.

Peffers, K., Rothenberger, M., Tuunanen, T. and Vaezi, R. (2012), "Design Science Research Evaluation", in Peffers, K., Rothenberger, M. and Kuechler, B. (Eds.), *DESRIST 2012*, Springer, Berlin, Heidelberg, pp. 398–410.

Porter, M.E. (1980), "Industry structure and competitive strategy: Keys to profitability", *Financial Analysts Journal*, Taylor & Francis, Vol. 36 No. 4, pp. 30–41.

Roelens, B., Steenacker, W. and Poels, G. (2019), "Realizing strategic fit within the business architecture: the design of a process-goal alignment modeling and analysis technique", *Software & Systems Modeling*, Springer, Vol. 18 No. 1, pp. 631–662.

Röglinger, M., Plattfaut, R., Borghoff, V., Kerpedzhiev, G., Becker, J., Beverungen, D., vom Brocke, J., *et al.* (2022), "Exogenous Shocks and Business Process Management", *Business & Information Systems Engineering*, pp. 1–19.

Rosemann, M. (2020), "Explorative Process Design Patterns", in Fahland, D., Ghidini, C., Becker, J. and Dumas, M. (Eds.), *BPM 2020*, Springer, Cham, pp. 349–367.

Rudtsch, V., Gausemeier, J., Gesing, J., Mittag, T. and Peter, S. (2014), "Pattern-based Business Model Development for Cyber-Physical Production Systems", *Procedia CIRP*, Vol. 25, pp. 313–319.

Salgado, C.E., Teixeira, J., Machado, R.J. and Maciel, R.S.P. (2014), "Generating a Business Model through the Elicitation of Business Goals and Rules within a SPEM Approach", in Dregvaite, G. and Damasevicius, R. (Eds.), *Communications in Computer and Information Science*, Vol. 465, Springer, Cham, pp. 47–58.

Schief, M., Bonakdar, A. and Weiblen, T. (2012), "Transforming software business models into business processes", *ICEIS*, pp. 167–172.

Schief, M. and Buxmann, P. (2012), "Business Models in the Software Industry", *2012 45th Hawaii International Conference on System Sciences*, pp. 3328–3337.

Schuster, R., Motal, T., Huemer, C. and Werthner, H. (2010), "From Economic Drivers to B2B Process Models: A Mapping from REA to UMM", in Abramowicz, W. and Tolksdorf, R. (Eds.), *BIS 2010*, Springer, Berlin, Heidelberg, pp. 119–131.

da Silva Torres, I., Fantinato, M., Branco, G.M. and Gordijn, J. (2021), "Design Guidelines to Derive an e3 value Business Model from a BPMN Process Model in the Financial Securities Sector", in Serral, E., Stirna, J., Ralyté, J. and Grabis, J. (Eds.), *PoEM 2021*, Springer, Cham, pp. 153–167.

Solaimani, S. and Bouwman, H. (2012), "A framework for the alignment of business model and business processes", *Business Process Management Journal*, Emerald Group Publishing Limited, Vol. 18 No. 4, pp. 655–679.

Solaimani, S., Heikkilä, M. and Bouwman, H. (2018), "Business Model Implementation within Networked Enterprises: A Case Study on a Finnish Pharmaceutical Project", *European Management Review*, John Wiley & Sons, Ltd, Vol. 15 No. 1, pp. 79–96.

Suratno, B., Ozkan, B., Turetken, O. and Grefen, P. (2018), "A Method for Operationalizing Service-Dominant Business Models into Conceptual Process Models", in Shishkov, B. (Ed.), *BMSD 2018*, Springer, Cham, pp. 133–148.

Teece, D.J. (2010), "Business Models, Business Strategy and Innovation", *Long Range Planning*, Pergamon, Vol. 43 No. 2–3, pp. 172–194.

Turetken, O. and Grefen, P. (2017), "Designing Service-Dominant Business Models", *ECIS 2017 Proceedings*, available at: https://aisel.aisnet.org/ecis2017_rp/141.

Turetken, O., Grefen, P., Gilsing, R. and Adali, O.E. (2019), "Service-Dominant Business Model Design for Digital Innovation in Smart Mobility", *Business and Information Systems Engineering*, Gabler Verlag, Vol. 61 No. 1, pp. 9–29.

di Valentin, C., Burkhart, T., Vanderhaeghen, D., Werth, D. and Loos, P. (2012), "Towards a Framework for Transforming Business Models into Business Processes", *AMCIS 2012 Proceedings*, available at: https://aisel.aisnet.org/amcis2012/proceedings/EnterpriseSystems/10.

di Valentin, C., Werth, D. and Loos, P. (2015), "Analysis of IT-Business Models-Towards Theory Development of Business Model Transformation and Monitoring", *Fifth International Symposium on Business Modeling and Software Design*, Vol. 1, pp. 171–177.

Veit, D., Clemons, E., Benlian, A., Buxmann, P., Hess, T., Kundisch, D., Leimeister, J.M., *et al.* (2014), "Business Models", *Business & Information Systems Engineering*, Vol. 6 No. 1, pp. 45–53.

van de Ven, M. (2021), "Designing a Method for Defining and Monitoring Business Model Performance Indicators", *BPM 2021 Doctoral Consortium*, CEUR-WS, pp. 91–96.

van de Ven, M.R., Lara Machado, P., Athanasopoulou, A., Aysolmaz, B. and Turetken, O. (2022), "Key Performance Indicators for Business Models: A Review of Literature", *ECIS 2022 Research Papers*, AIS Electronic Library (AISeL), available at: https://aisel.aisnet.org/ecis2022_rp/126.

Webster, J. and Watson, R.T. (2002), "Analyzing the past to prepare for the future: Writing a literature review", *MIS Quarterly*, JSTOR, pp. xiii–xxiii.

Weking, J., Hein, A., Böhm, M. and Krcmar, H. (2020), "A hierarchical taxonomy of business model patterns", *Electronic Markets*, Springer, Vol. 30 No. 3, pp. 447–468.

Wieringa, R. and Moralı, A. (2012), "Technical Action Research as a Validation Method in Information Systems Design Science", in Peffers, K., Rothenberger, M. and Kuechler, B. (Eds.), *DESRIST 2012*, Springer, Berlin, Heidelberg, pp. 220–238.

Winter, R. (2001), "Working for e-Business-The Business Engineering Approach", *International Journal of Business Studies*, Vol. 9 No. 1, pp. 101–117.

Wirtz, B.W. (2020), *Business Model Management*, 2nd ed., Springer, Cham, available at:https://doi.org/10.1007/978-3-030-48017-2.

Wirtz, B.W., Pistoia, A., Ullrich, S. and Göttel, V. (2016), "Business Models: Origin, Development and Future Research Perspectives", *Long Range Planning*, Pergamon, Vol. 49 No. 1, pp. 36–54.

Zancul, E. de S., Takey, S.M., Barquet, A.P.B., Kuwabara, L.H., Cauchick Miguel, P.A. and Rozenfeld, H. (2016), "Business process support for IoT based product-service systems (PSS)", *Business Process Management Journal*, Emerald Group Publishing Ltd., Vol. 22 No. 2, pp. 305–323.

Zlatev, Z. and Wombacher, A. (2005), "Consistency between e 3-value models and activity diagrams in a multi-perspective development method", *On the Move to Meaningful Internet Systems 2005: CoopIS, DOA, and ODBASE. OTM 2005*, Springer, Berlin, Heidelberg, pp. 520–538.