

**UNDERSTANDING BUSINESS MODEL, BUSINESS STRATEGY, AND THEIR
ROLE FOR FIRM PERFORMANCE IN THE ERA OF DIGITAL
TRANSFORMATION:
A Mixed Methods Approach**

Inauguraldissertation

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To
Rieli Mies,
Ralph-Peter Mies,
and Ralph-Rainer Mies.

To
Christiane Strohscheer,
and Eckard Strohscheer.

Preface

The outbreak of Covid-19 has outlined that humanity greatly relies on personal interaction not only for the purpose of social comfort but merely to spur creativity and excellence in what we do. Personally, I have to acknowledge that, without such personal interaction and the support from many different people, the completion of this PhD thesis would have been impossible.

Most and foremost, I would like to thank my supervisor a.pl. Prof. Dr. J. Piet Hausberg from the department of technology and innovation management. Piet, thank you for constantly challenging me to critically reflect on my work. Thanks for the inspiring discussions – especially those during lunch or coffee breaks – that helped me to discover promising research opportunities where I sometimes did not even expect them to exist. Thanks for your tremendous support in making this happen. Thanks to Dr. Sven Packmohr who I met during my very first conference. Sven, by now we will probably have completed a research paper together. Thanks for your contributions and the seamless collaboration. All the best for your personal future.

Many thanks go also to Prof. Dr. Uwe Hoppe who agreed to co-advise this doctoral thesis.

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Osnabrück, im Februar 2022

Yannick A. Mies

Notes on the Structure of the Document

This cumulative dissertation is composed of two separate parts. Part A represents a structural framework that provides a contextual overview of the research papers included in this dissertation. Part B consists of the individual research papers that, taken together, represent the core contribution of this work.

Part A starts with a short introduction to the topic and current research gaps. This is followed by an elaboration on the different research questions in this dissertation, a short summary of the findings, as well as a description of their respective contributions to the field of research. Part A ends with the limitations of the findings and the related starting points for further research. Part B is a composition of the four research papers discussed in part A. Each paper is itself a stand-alone document that received the invitation to be presented at highly acknowledged research conferences.

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
Alpha	Cronbach's Alpha
AVE	Average Variance Extracted
BM	Business Model
BMI	Business Model Innovation
B2B	Business to Business
B2C	Business to Customer
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CIO	Chief Intelligence Officer
CMV	Common Method Variance
Coeff.	Coefficients
CR	Composite Reliability
DBS	Digital Business Strategy
df	Degrees of Freedom
DT	Digital Transformation
EBMD	Efficiency-centered Business Model Design
ERP	Enterprise Resource Planning
FAQ	Frequently Asked Question
HIT	Human Intelligence Task
HR	Human Resources
ICT	Information and Communication Technology
IoT	Internet of Things
IS	Information Systems
IT	Information Technology

KPI	Key Performance Index
MN	Mean
MTurk	Amazon Mechanical Turk
NBMD	Novelty-centered Business Model Design
OLS	Ordinary Least Squares
PLS	Partial Least Squares
PSS	Product Service Systems
RFID	Radio Frequency Identification
RMSEA	Root Mean Square Error of Approximation
RQ	Research Question
R&D	Research and Development
SD	Standard Deviation
TIS	Thyssenkrupp Industrial Solutions
VIF	Variance Inflation Factor
WoS	Web of Science

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A. STRUCTURAL FRAME

A.I. GENERAL INTRODUCTION

A.I.1. New Technology Management in the Context of Digital Transformation and the Growing Relevance of Strategy and Business Model

Technological change has been a driving force in the competitive game as technology is recognized as a major factor in determining a firm's market success (Franko, 1989; Fusfeld, 1989; Zahra & Covin, 1993). Technological change spurs the intensification of competition and can result in the full destruction of long-established competitive patterns (Bergek et al., 2013). Following the idea behind what Schumpeter (1983) coined creative destruction, firms have to identify effective ways of managing and exploiting new technology. The innovation management literature shows that firms select among different options to do so. For example, they can choose to invest in R&D to change their technological core competence (Berchicci, 2013; Min et al., 2020), network to extend their R&D activities (Enkel et al., 2009), or adapt their routines and processes in order to anticipate environmental changes more dynamically (Bessant et al., 2005). Nevertheless, successfully managing technology shifts is not necessarily a technology problem (Christensen, 2006; Tongur & Engwall, 2014). Sometimes firms cannot simply exchange their core technology for a different one (Leonard-Barton, 1992), but rather need a new cognitive framework to envision alternative technology use or an alternative customer value proposition that results in innovative means for value creation and capture (Amshoff et al., 2015). In this context, contingency theory (Chandler, 1962; Galbraith & Schendel, 1983; Luthans & Stewart, 1977; R. E. Miles & Snow, 1978) has evolved to declare the management of new technology as a major factor for the firm's competitive advantage.

Recent research on business dynamics shows that successful firms are those that manage technology shifts with the help of carefully developed strategies and aligned structural changes in their organizations (Casadesus-Masanell & Ricart, 2010). Accordingly, scholars investigating the field of technology management have paid particular attention to the concepts of business strategy (Beard & Dess, 1981; Drnevich & Croson, 2013; Zahra & Covin, 1993)

and business model (Foss & Saebi, 2017; Massa et al., 2017; Spieth et al., 2016; Teece, 2010). The successful management of technological shifts depends on business strategies that help firms to anticipate environmental changes early on, to define an individual competitive position, and to develop value-capturing mechanisms that transform competitive advantage into performance improvements (Casadesus-Masanell & Ricart, 2010). The business model fine tunes business strategy, “describes the design or architecture of the value creation, delivery and capture mechanisms” (Teece, 2010, p. 172), articulates “the business logic required to earn a profit” (Teece, 2010, p. 174), and thus enables firms to “commercialize new ideas and technologies” (Chesbrough, 2010, p. 354).

While the concepts of business strategy and business model gained prominence already with the rapid growth of e-business in the late 1990s (Amit & Zott, 2001; Foss & Saebi, 2017; Spieth et al., 2014), the interest in the field has further accelerated. Major advancements in information and communication technology (ICT) sparked thought on how to develop alternative means of conducting business (Amit & Han, 2017; Bharadwaj et al., 2013; König et al., 2019). New digital technology has started to transform business processes, products, and relationships (Park & Mithas, 2020; Porter & Heppelmann, 2014, 2015; Yoo et al., 2010, 2012) and provides technology managers with a plethora of business opportunities.

At the firm level, this option is coined as digital transformation, referring to the “use of digital technologies (social media, mobile, analytics, or embedded devices) to enable major business improvements” (Fitzgerald et al. 2014, p. 2). To compete in increasingly complex digital environments, firms look for new ways to develop relevant capabilities (Pavlou & El Sawy, 2006, 2010), resources (Amit & Han, 2017), and infrastructures (Tilson et al., 2010).

In this context, technology and innovation management has come to the fore of information systems (IS) research. As such, IS research addresses the business options that have emerged with the recent updates of information technology (IT). While new IT applications are

manifold, they require firms to develop new organizational structures and management concepts that go beyond the original understanding of business strategy (Matt et al., 2015; Ukko et al., 2019; Yeow et al., 2018) and business model (König et al., 2019; Loebbecke & Picot, 2015; Schallmo et al., 2017). Considering the prominent role of IT in digital innovation management, IS research suggests that functional IT strategy and business strategy should not remain aligned, but rather become integrated concepts with blurring demarcation lines, ending up in a seamless fusion between the two (Bharadwaj et al., 2013; Coltman et al., 2015). As a result of this fusion, IS research has recently promoted the new management concept of digital business strategy (Bharadwaj et al., 2013; Chi et al., 2018; Holotiuk & Beimborn, 2017; Park & Mithas, 2020). Digital business strategy draws on digital resources with the purpose of creating distinct competitive advantage for the firm (Bharadwaj et al., 2013) and is therefore a highly relevant concept to be included in investigations on technology management in the course of digital transformation.

This is further reflected in the literature from the field. The management concepts of business strategy, business model, and IT strategy relate closely to technology and innovation management, as can be seen in the number of associated academic publications that have appeared over time. Instead of a linear development, the academic work in these areas tends to grow curvilinearly, indicating rising interest for the respective research streams. Even though the body of research on business strategy and business model has already grown significantly regarding technology and innovation management topics, the corresponding academic interest related to IT strategy has accelerated at even higher rates over the last 30 years (see figure 1)¹.

¹ The database for the literature search was the ISI Web of Science (WoS). The results depicted in the figure were extracted by applying the following search algorithms: For *Business Strategy and Technology Management* TS = ((business strat*) AND (technology manag* OR innovation manag*)); for *Business Model and Technology Management* TS = ((business mod*) AND (technology manag* OR innovation manag*)); and for *IT Strategy and Technology Management* TS = ((IT strat*) AND (technology manag* OR innovation manag*). All results were selected to be available in English with the search history ranging from 1990 to 2020. The data sample only refers to those works stemming from the following WoS categories: Business, Computer Science Information Systems, Economics, and Management.

Again, this emphasizes that strategic management and innovation management perspectives should be complemented by insights from IS when investigating the management of new digital technology.

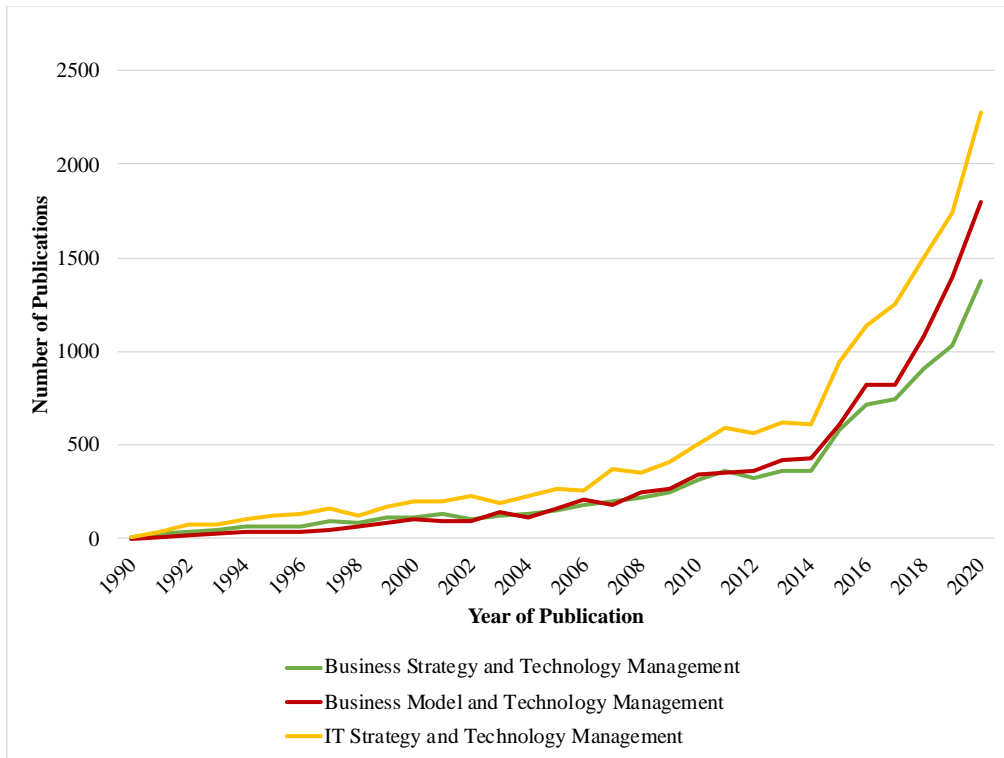


Figure 1: Publications in Research Topics of Interest over Time

A.I.2. Aim and Structure

Considering the aforementioned, technology management literature is currently experiencing a revival spurred by the rise of digital technology. Therefore, the purpose of this doctoral thesis is to explore the relevant management concepts for new digital technology. Considering the magnitude and fragmented nature of this field (Bharadwaj et al., 2013; Hausberg et al., 2019; Massa et al., 2017; Nambisan et al., 2019), related research endeavors should be directed towards particular focus topics. The work at hand focuses specifically on the management concepts of business strategy, business model, and IT strategy. The aim is to contribute to the strategic management, innovation management, and IS literature by providing evidence of how firms could develop and apply these concepts, how these concepts interrelate, and how their use could benefit firm performance when facing the rapid improvements in ICT.

Therefore, this work abides by a mixed-methods approach (Venkatesh et al., 2013) supported by academic literature and theory, conceptual models, qualitative and quantitative data, recommendations, as well as practical and theoretical implications in order to address the subsequent research goals:

- the conceptualization of digital transformation, the identification of its drivers, and the development of propositions regarding the driver's implications for new types of business models in the era of digital;
- providing empirical evidence for theory about digitally savvy business strategies and quantitatively deriving archetypes for digital business strategy;
- inductively building theory on digital business strategy that accounts for the growing importance of IT strategy during the digital transformation journey, and which guides companies towards business model innovation with the goal of exploiting new digital technology opportunities;
- disentangling the contingent effects of business model and digital business strategy for firm performance, and hence elaborating on the value potential that resides with digital transformation.

The sections of Part A are structured as follows. Section II depicts the individual research contributions included in this dissertation, an overview of the research methods chosen to address stated goals, followed by a classification of the research contributions in a comprehensive framework. Along the structure of this framework, Section III provides a general summary of the selected contributions, their methods, and key results. Finally, section IV draws on the theoretical and practical implications of this work, its limitations, and the consequential potential for future research. In the end, section V concludes Part A of this doctoral thesis.

A.II. RESEARCH DESIGN

A.II.1. Overview of the Research Contributions

This cumulative dissertation encompasses four individual research contributions that have all been presented in international, renowned academic research conferences, were published in the respective conference proceedings, or have recently been submitted to prestigious scientific journals. Every contribution has thus been reviewed and commented on by a consortium of multiple independent researchers worldwide in a (at least) double-blind peer review process. As the papers have been invited for presentation at the conferences (or included in the proceedings), a certain quality threshold for the research at hand should be assured. Table 1 shows the individual research contributions I, II, III, and IV, based on their bibliographic information and publication status. In line with this doctoral dissertation, every research contribution was written in English, as it has become the most popular and widely accepted language in business, economics, and information systems research. Please note that the framework of this dissertation has been written in American English. However, it may occur that some of the research contributions below incur British English spelling as it appeared as an obligation by one of the journals targeted for submission.

A.II.2. Spectrum of Methods

Even though methodological pluralism comes with several challenges and often diverging paradigmatic assumptions (Guba, 1987; Venkatesh et al., 2013), it has been agreed that a combination of different research methods can significantly help to establish and extend a cumulative body of knowledge (Mingers, 2003; Mingers & Brocklesby, 1997). Mixed methods research describes a research design that uses multiple methods in one research inquiry (Bowen et al., 2017), where quantitative and qualitative methods can be applied either concurrently or sequentially (Venkatesh et al., 2013).

No.	Year	Title	Status / Publication	Authors
I	2019	Business Model Innovation in Flux: Theory of Constraints and the Role of Digital Transformation's Key Features	Presented at the Conference on a Special Issue in the Journal of Business Economics (JBE), Cologne	Mies, Yannick & Hausberg, J. Piet* ¹ (2019)
	2021	Exploring Digital Transformation: The Role of Business Model Innovation in Manufacturing Firms	Presented at the 81st Annual Meeting of the Academy of Management (AOM), Virtual Meeting	Mies, Yannick & Hausberg, J. Piet* ² (2021)
	2022	Business Model Innovation in Manufacturing Firms: Exploring the Driving Forces of Digital Transformation	Submitted to the International Journal of Innovation and Technology Management (<i>currently in review</i>)	Mies, Yannick & Hausberg, J. Piet* ² (2022)
II	2021	Digital Business Strategy: Towards an Empirical Typology	Presented at the R&D Management Conference 2021, Glasgow	Mies, Yannick; Hausberg, J. Piet & Packmohr, Sven* ³ (2021)
	2022	Digitising Miles and Snow: Using Cluster Analysis to Empirically Derive Digital Business Strategy Types	Submitted to the Journal of Technology Analysis and Strategic Management (<i>currently in review</i>)	Mies, Yannick; Hausberg, J. Piet & Packmohr, Sven* ³ (2022)
III	2021	New Frontiers in Business Model Innovation: How Digital Business Strategy Guides the Transformation of Established Firms	Presented at the European Academy of Management 2021 Conference (EURAM), Montreal	Mies, Yannick & Hausberg, J. Piet* ⁴ (2021)
	2021	Drawing Roadmaps for New Business Model Adaptation: How Digital Business Strategy Guides the Transformation of German Established Firms	Submitted to the Journal of Strategy and Management (<i>currently in review</i>)	Mies, Yannick & Hausberg, J. Piet* ⁴ (2021)
IV	2021	Managing Digital Technology: Business Model, Business Strategy, and Firm Performance	Presented at the ISPIM Connects Valencia Conference 2021, Valencia	Mies, Yannick & Hausberg, J. Piet* ⁵ (2021)
	2021	Managing Digital Technology: Business Model, Business Strategy, and Firm Performance	Appeared in the Proceedings of the ISPIM Connects "Reconnect, Rediscover, Reimagine" - Valencia 2021 (<i>ISBN 978-952-335-691-7</i>)	Mies, Yannick & Hausberg, J. Piet* ⁵ (2021)

Comments

*¹ Prof. Dr. J. Piet Hausberg critically reflected and advised on the content and methodology of each contribution.

*² Prof. Dr. J. Piet Hausberg made noteworthy contributions to the development of the drivers of digital transformation and led critical discussions on the research concept and goals (section 4). The remaining work was delivered by the author of this dissertation.

*³ The authors equally contributed to the setup of this research design and the design of the questionnaire. Yannick Mies collected the data. Both, Prof. Dr. J. Piet Hausberg and Yannick Mies conducted the data analysis with the majority of the contributions residing with Prof. Dr. J. Piet Hausberg. All authors contributed to the writing process of this paper with a slight majority of the contributions attributed to Yannick Mies. Dr. Sven Packmohr was especially consulted for his expertise in information systems research and added great value to critical debates in the group, the theory, framework, and the discussion part in the paper.

*⁴ Prof. Dr. J. Piet Hausberg provided noteworthy contributions during the conceptual drawings of the paper. Moreover, he advised on the methodology of analyzing and coding expert interviews. The author of this dissertation did the remainder of the work.

*⁵ Accompanied by the advice and critical reflection by Prof. Dr. J. Piet Hausberg, this work is primarily a contribution of the author of this dissertation.

Table 1: Overview of the Research Contributions

Especially, the triangulation of qualitative and quantitative data is considered increasingly feasible beyond the goal of investigating a broad, fragmented, and complex research topic (Datta, 1994; House, 1994; Venkatesh et al., 2013).

In social and behavioral research, especially IS research, the mixed methods approach is regarded as a promising path towards methodological diversification in a single research inquiry² with the purpose to deepen the understanding of a phenomenon (Denzin & Lincoln, 2017; Jick, 1979). This dissertation as a whole abides by the principles of mixed-methods research and therefore aggregates different paradigms, methods, and types of data to approach its research goals. Since the rapid advancements of ICT and the emergence of completely new digital technology have brought about numerous effects on various socioeconomic levels, researchers often encounter situations in which established theories and research findings may not sufficiently help to explain a certain phenomenon anymore. Hence, the contributions in this dissertation started to approach the investigation of technology management concepts in digital transformation with conceptual (contribution I) and qualitative research (contribution II) methods that particularly fit with exploratory research intentions (Denzin & Lincoln, 2017; Eisenhardt, 1989; Eisenhardt & Graebner, 2007; M. B. Miles & Huberman, 1994; Strauss & Corbin, 1990). Given the insights from qualitative data, this dissertation continues the intended explorative research endeavor by systematically identifying structures (Hartmann et al., 2016; Ketchen & Shook, 1996; Sarstedt & Mooi, 2014; Täuscher & Laudien, 2018) in quantitative data (contribution III) and finally (contribution III and IV) testing suggested relationships and their strengths in a large scale quantitative study (Aiken et al., 1991; Baron & Kenny, 1986; Bedeian & Mossholder, 1994).

² In this context, “single research inquiry” refers to the in-depth investigation of a single phenomenon and should not be confused with a single research paper. Furthermore, “A single research inquiry could lead to multiple papers” (Venkatesh et al. 2013, p. 22) and hence fits well the structural set up, contextual purpose, and research goals of a cumulative dissertation.

Table 2 shows the individual research methods applied during the preparation of the different research contributions depicted in the previous section. An in-detail description of these methods can be found in the full versions of the respective works.

Research Method	Contribution				References
	I	II	III	IV	
Qualitative Methods	Systematic Literature Review	✓			Böckel et al. (2021); Rietveld and Schilling (2021); Watson & Webster (2020); Webster & Watson (2002)
	Expert Interviews			✓	Bogner et al. (2009); Döringer (2021); Eisenhardt (1989); Österle et al. (2011); Schultze & Avital (2011); Snow & Thomas (1994); Solarino & Aguinis (2021); Yin (1994)
	(Open/Axial) Coding			✓	Gioia et al. (2013); Miles & Huberman (1994); Souitaris & Zerbinati (2014); Strauss & Corbin (1990)
Quantitative Methods	Web-based Survey		✓		Cheung et al. (2017); Hulland et al. (2018); Mellahi & Harris (2016); Shah & Corley (2006)
	Cluster Analysis		✓		Breckenridge (1989); Galbraith & Schendel (1983); Ketchen & Shook (1996); Saarstedt & Mooi (2014)
	Regression Analysis		✓	✓	Aguinis (1995); Aiken et al. (1991); Baron & Kenny (1986); Bedeian & Mossholder (1994); Darrow & Kahl (1982); Gable (1994)

Table 2: Spectrum of the Applied Research Methods

A.II.3. Framework of the Research Contributions

Each research contribution of this cumulative dissertation is the result of an independent research project. Each project followed a tailored research process of i) idea generation, problem identification and research topic definition, ii) research strategy design, iii) data generation and analysis, and finally iv) results interpretation and discussion (Jenkins, 1985) with the purpose of answering a project-specific research question. Nevertheless, all research contributions were conducted within the frame of an overarching research inquiry with the superordinate goal to investigate the relevant concepts for new technology management when facing the socio-economic disruptions that emerge as a result of accelerating digitization in the

business world. Abiding by the overall research goals of this dissertation (see I.2.), each of its contributions investigates a distinct research question that targets a specific subordinate area from the field. From the perspective of this research, the particular field of interest is shown in Figure 2. Accordingly, the individual research contributions address the respective topics accordingly with its findings depicted in section III. Examining the status of different review processes, revisions, and resubmissions of the journals or conferences to which the contributions have been submitted, the depicted order of the contributions in the framework does not necessarily correspond with their chronological timely order of publication or initial submission.

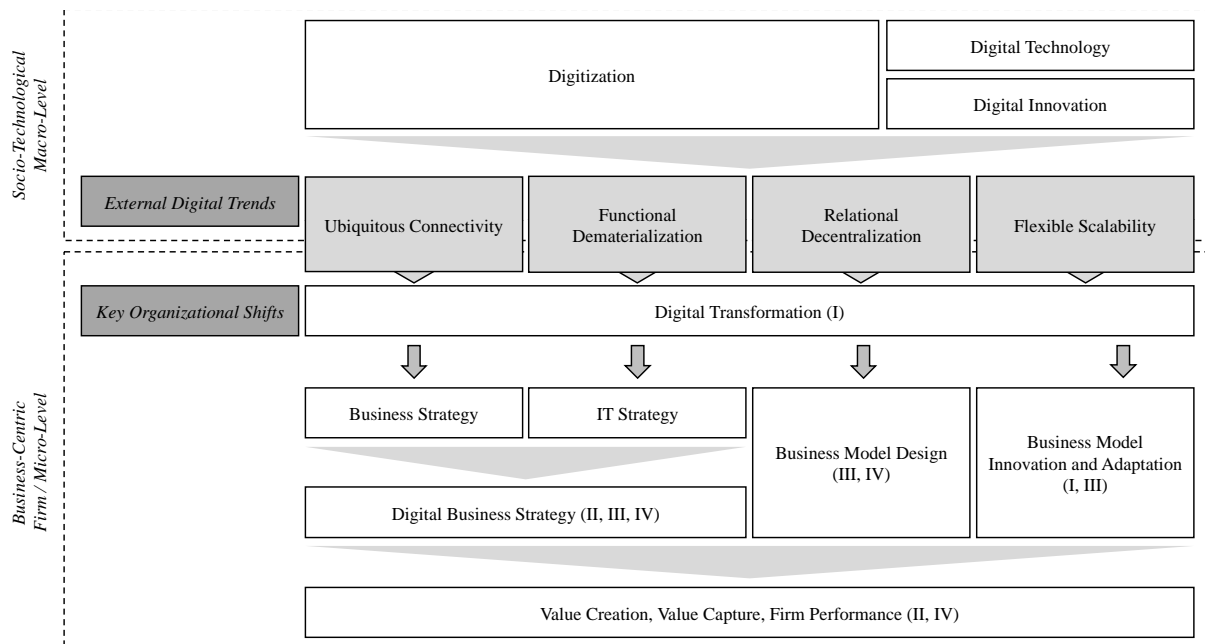


Figure 2: Framework of Research Contributions

In contribution I, the status quo of digital transformation research is examined, followed by a description of its position in the overarching macro-level context of digitization research. As a result of a literature review, this contribution provides an analysis on what actually drives digital transformation in the business world. Looking at manufacturing firms in particular, this work proceeds by developing specific archetypes of business models for firms that see themselves confronted with different drivers of digital transformation. This first contribution

concludes with theoretical propositions on which business model archetype would best fit given a certain combination and strength of the derived digital transformation drivers.

The second contribution examines the concept of digital business strategy. This contribution draws on data from a large sample of internationally dispersed firms that was collected in an online survey. The subsequent research aims at the empirical derivation of a typology for different digital business strategies. With the help of cluster analysis, four distinct types of digital business strategies are derived that each depend on the firm's unique characteristics of business and IT strategy. Finally, this research concludes with an examination of the digital business strategy type's implications for firm performance.

Contribution III shifts the attention away from the macro-level considerations on digitization towards the micro-level implications of new digital technology and the associated management challenges, implications, and tasks. Based on empirical analysis of qualitative data from expert interviews, this contribution provides insights into how established firms master the challenge of adapting their actual business model in place. Precisely, it reveals what generic business models established firms may build given their approach towards business model front-end design and back-end design. Given such firms' individual competitive positions, this contribution outlines how different digital business strategies represent effective tools in guiding the firm's business-model adaptation journey towards a business model archetype that would more effectively exploit the business opportunities implied by digital transformation.

Contribution IV brings together the aforementioned insights on digital transformation, business model, and digital business strategy. This work interlinks business model design with digital business strategy, and explores both the concepts' individual and combined effects on firm performance. Applying multivariate regression analysis to a data sample of multiple firms worldwide, this research contribution confirms existing insights on business model design, provides new knowledge and empirical insights to the research endeavors on digital business

strategy, and reveals that a business model has to be carefully aligned with new digital business strategy to strengthen, and not decrease the firm's potential for value creation and value capture, which resides with the radical improvements in ICT.

A.III. FINDINGS

A.III.1. Digital Transformation Drivers and Emerging Business Models

Accelerating digital innovation has recently led to the emergence of significantly new technology with unique properties that incurs yet unimaginable business opportunities in multiple markets (Porter & Heppelmann, 2015; Yoo et al., 2010). Nevertheless, digital technology's implications have become especially remarkable in manufacturing industries, where academics and practitioners alike hold the belief that the recent improvements in ICT have marked the starting point of the next industrial revolution (Frank et al., 2019; Horváth & Szabó, 2019; Kiel et al., 2017). Apart from obvious innovation in products and processes, the actual technological advancements inhibit multiple new options for firms to (re-)design their actual business models and hence to precipitate a concrete business improvement from the use of digital technology (Fitzgerald et al., 2014). As a beginning of our overarching research inquiry that addresses the question how firms manage new digital technology, digital transformation and its antecedents in terms of drivers were examined, followed by a theoretical subsumption on how business models for manufacturing firms could look like in a digital era. Accordingly, in contribution I, titled "Business Model Innovation in Manufacturing Firms: Exploring the Driving Forces of Digital Transformation," the following research questions were formulated and answered, respectively:

- i. Which are the drivers of digital transformation in manufacturing firms?*
- ii. What are the business models that become important for such companies as the particular digital transformation drivers unfold their dynamics?*

Generally, digital transformation describes an overarching concept that refers to every socio-economic change related to the enhanced use of new digital technology and accelerating diffusion of digital innovation (Gobble, 2018; Hinings et al., 2018; Horváth & Szabó, 2019; Loebbecke & Picot, 2015). For the purpose of this research contribution and the entire cumulative dissertation, the focus rests upon the business-centric perspective of digital transformation that encompasses the economic (primarily micro-economic) implications of digital transformation. As such, DT is defined as the “use of digital technologies (social media, mobile, analytics, or embedded devices) to enable major business improvements (such as enhancing customer experience, streamlining operations, or creating new business models)” (Fitzgerald et al. 2014, p. 2). In order to understand the actual characteristics and appearance of these business improvements, the drivers of digital transformation were examined.

In order to build a solid theoretical foundation and to generate a sound understanding of the different concepts in the digital context (not only for the purpose of this contribution, but also for the whole dissertation and subsequent contributions), a literature analysis was conducted³. As a result, the theory on digital transformation could be structured along four driving key traits, namely ubiquitous connectivity, functional dematerialization, relational decentralization, and flexible scalability, which were defined accordingly (Mies & Hausberg, 2021):

- *Ubiquitous connectivity* describes the progressing connection of people, machines, and objects on a micro level, and the tightening cross-linkages among firms and their environment (such as customers, partners and suppliers).

³ The ISI Web of Science database and the Scopus database were searched for highly ranked articles, reviews, and editorials in the databases' respective categories that would match business-related entries in English. In a first step, the following search strings were applied: “digital transformat*,” “digital innovat*,” “digitiz*” OR “digitaliz*,” and “industry 4.0*” OR “internet of thing*” OR “big data*” OR “cloud comput*.” Consequently, 269,000 items were eliminated. In a second step, the search terms “digital transformat*” AND “business model*” as well as “industry 4.0*” AND “business model*” were applied to particularly address the specific research questions of this contribution and the included concepts of interest.

- *Functional dematerialization* describes the shift in the firm's competitive success factors away from physical resource availability and product feature quality towards the virtualization of processes, infrastructures, products, services, and activities that surround the firm.
- *Relational decentralization* describes the decreasing importance of central agencies in the context of communication, transaction, and mediation processes.
- *Flexible scalability* describes the firm's dynamic capability of up- or downsizing its scale, scope, and the corresponding activities.

Driven by these different trends, firms may achieve major business improvements. Among the improvements are new options for innovative business model designs that enable firms to manage and exploit the value that resides with new digital technology (Amshoff et al., 2015; Bogers et al., 2016; Frank et al., 2019; König et al., 2019). Digital technology inhibits the potential to significantly shift the decoupling point between a manufacturing firm's activities and those of its customers (Bogers et al., 2016; Koren, 2010) in a way that the locus of value creation shifts more and more away from the manufacturer towards its customer (Mies & Hausberg, 2021). Considering the varying influence of digital technology on a manufacturing firm's locus of value creation (manufacturer vs. customer) and its business focus (efficiency focus vs. market focus), a typology of four potential business model archetypes was developed. As such, firms that undergo digital transformation may build a business model that expresses its business logic of creating, delivering, and capturing value by integrating all related activities into a comprehensive and transparent architecture that fosters complexity management (*lighthouse supplier business model*); in terms of the value add that originates when firms offer services in addition to the value that stems from their physical core product (*service enthusiast business model*); by analyzing big data and thus creating, delivering and capturing "value through the generation of actionable insights [...]" and capitalizing "on the analytical

opportunities associated with the big data phenomenon” (Carillo, 2017, p. 599) (*data scientist business model*); or by providing “interfaces that can serve to mediate transactions between two or more sides” (McIntyre & Srinivasan, 2017, p. 143) (*platform owner business model*).

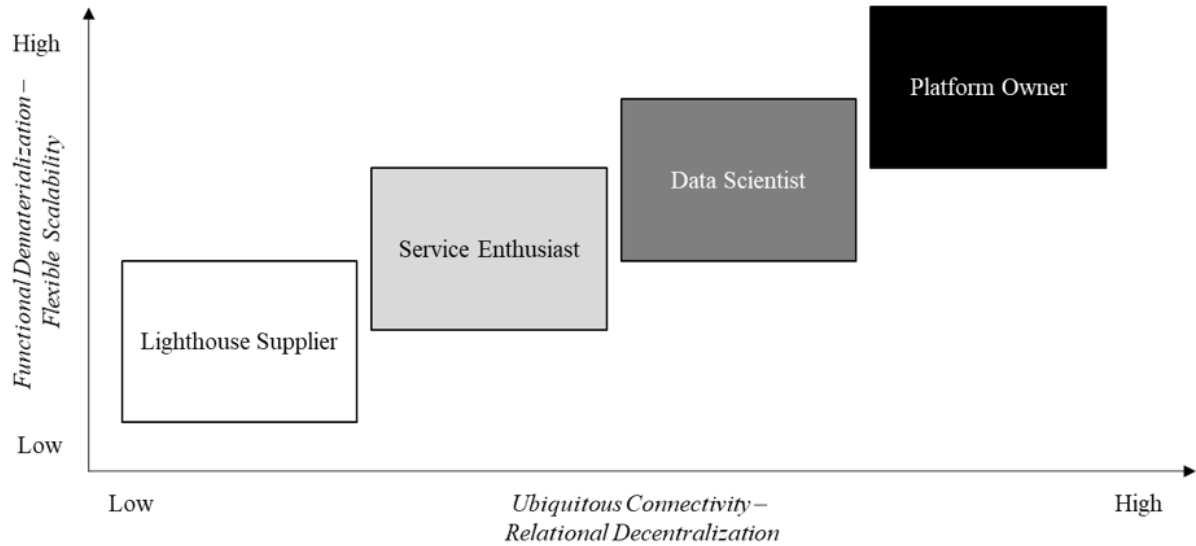


Figure 3: Business Model Archetypes for Digital Transformation

(Mies & Hausberg, 2021)

Finally, theoretical propositions were developed in order to express recommendations on the different business model archetypes best fit when looking at manufacturing firm’s individual exposure to different digital transformation drivers (see Figure 3). Accordingly, this research contribution allows manufacturing firms to develop multiple scenarios for business model design that depend on the company’s individual degree of digital maturity and its business exposure to digital technology.

A.III.2. Types of Digital Business Strategy and Firm Performance

The investigation of the research questions in research contribution II has revealed that the fundamental improvements in information, communication, and connectivity technologies do not only require firms to rethink their underlying business logic in terms of business model. It appears that a firm’s superordinate strategic rationale (guiding its innovation-centered activities towards additional value creation from digital technology) is also key to successful

digital transformation. With its implications for structures, objects, and capabilities, digital technology has especially changed IT strategy's role (Park & Mithas, 2020; Pavlou & El Sawy, 2006, 2010). Against the original perspectives from the traditional alignment view of information systems (Coltman et al., 2015; Yeow et al., 2018), digitization increasingly causes subordinate functional IT strategy to fuse with originally superordinate business strategy (Bharadwaj et al., 2013). Consequently, recent work from the information systems literature, innovation management literature, and strategic management literature promoted an integrative perspective on strategy that resulted in the emergence of the digital business strategy concept (Bharadwaj et al., 2013; Chi et al., 2018; Holotiuk & Beimbom, 2017; Mithas et al., 2013). However, empirical research, especially on generic metrics, has remained scarce in recent works on DBS. Accordingly, in research contribution II, titled "Digitising Miles and Snow: Using Cluster Analysis to Empirically Derive Digital Business Strategy Types," the following research question was formulated:

- i. Which generic types of digital business strategy can be empirically distinguished?*

Aiming at answering this research question, the literature on IT strategy and business strategy was reviewed to develop an integrative DBS framework, based on which different DBS archetypes were empirically derived applying two-step cluster analysis (Ketchen & Shook, 1996) on sample data of internationally dispersed firms. Business strategy is a business approach that draws on environmental adaptation to gain competitive advantage with different firms choosing different approaches towards adaptation (R. E. Miles & Snow, 1978). In this research context, the focus is on firms that have to adapt to environments increasingly permeated by digital technology (Nambisan et al., 2017; Park & Mithas, 2020). During the cluster analysis, the sample firms were finally assigned to four different clusters given their respective adaptation approach determined by individual characteristics in entrepreneurial and engineering orientation, exposure to external digital trends, and key organizational shifts.

Hence, the results of the cluster analysis were four different types of empirically derived digital business strategy (see figure 4). In this research contribution, they were referred to as *non-digital reactor* (low in all four dimensions), *digital producer* (high in all four dimensions), *analyzer* (low in external digital trends and key organizational shifts while high in entrepreneurial orientation and engineering orientation), and *digital opportunist* (high in external digital trends and key organizational shifts while low in entrepreneurial orientation and engineering orientation).

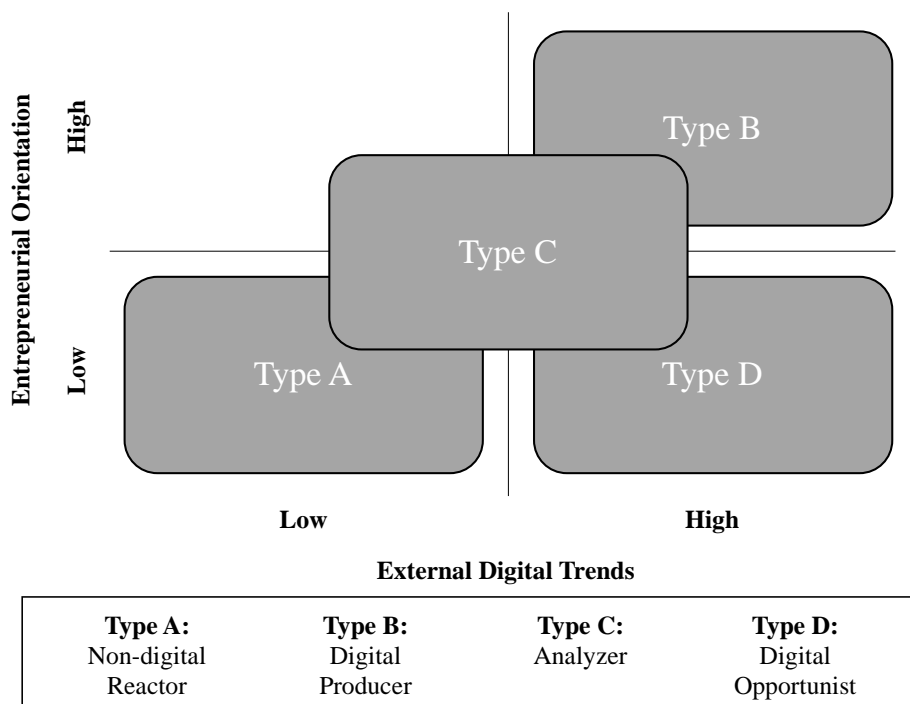


Figure 4: Typology of Digital Business Strategies

(Mies et al., 2021)

To evaluate, amongst others, the plausibility of these results, every digital business strategy type was related to its relative contribution to firm performance, tested by the help of one-way analyses of variance between the four identified clusters (see table 3). Generally, it was found that the digital-producer DBS type (depicting the highest affinity for digitization) outperforms the other DBS types. Nevertheless, a second important finding shows that firm performance does not solely depend on high degrees in the dimensions describing digital

affinity. It is, rather, all dimensions that, in certain combinations, mutually determine firm performance. As for example the analyzer DBS type outperforms the digital opportunist DBS type.

Thus, this particular research delivers valuable insights to distinct research fields from the innovation management, information systems, and strategic management literature by extending the extant views on business strategy using an up-to-date information technology perspective. It enhances the theoretical development of the digital business strategy concept with the systematic development of four empirically derived strategy archetypes and their relative impact for firm performance.

	Non-digital Reactor n=34 Cluster 1 (Type A)	Analyzer n=44 Cluster 2 (Type B)	Digital Opportunist n=56 Cluster 3 (Type C)	Digital Producer n=58 Cluster 4 (Type D)	F-Value
<i>Entrepreneurial Orientation</i>					
Cluster Mean	-0.69	1.09	0.28	-0.69	70.10
Standard Deviation	0.80	0.61	0.63	0.74	(p < 0.0001)
<i>Engineering Orientation</i>					
Cluster Mean	-0.76	0.94	0.32	-0.71	78.82
Standard Deviation	0.64	0.64	0.51	0.71	(p < 0.0001)
<i>External Digital Trends</i>					
Cluster Mean	-1.12	0.67	-0.29	0.69	89.21
Standard Deviation	0.72	0.45	0.59	0.61	(p < 0.0001)
<i>Key Organisational Shifts</i>					
Cluster Mean	-1.23	0.63	-0.34	0.75	128.02
Standard Deviation	0.64	0.51	0.50	0.50	(p < 0.0001)

Table 3: Performance Outcome by Digital Business Strategy

(Mies et al., 2021)

A.III.3. Digital Business Strategies for Business Model Adaptation

The identified research gaps depicted in research contribution I reveal that there is a need to understand the drivers of digital transformation and their implications. One of the implications is that new digital technology provides companies with manifold options to further

develop their underlying business logic, which would apply to the extended or alternative potential of value creation and capture that resides with digital innovation (Nambisan et al., 2019; Osterwalder & Pigneur, 2010; Sebastian et al., 2017; Yoo et al., 2012). Whereas born-digital firms build digitally savvy business logics from the moment of their foundation, established firms (which had already been in business before early stage digital technology was introduced to the markets) especially undergo the often complex process of digital transformation (Berends et al., 2016; Berggren et al., 2015; Piccoli & Watson, 2008). For established firms this often means that they need to adapt their actual business models to arrive at a new business logic that better fits a market environment ubiquitously infused with digital technology. In that context, two major issues are critical to successfully achieve this aim. To begin, established firms need to reflect on what, in terms of business model design, would be their future market approach. Next, they must outline the strategic pathway that should direct their business model adaptation journey towards achieving the desired future business model for digital environments. In face of these considerations, contribution III, titled “Drawing Roadmaps for New Business Model Adaptation: How Digital Business Strategy Guides the Transformation of German Established Firms,” addressed the following research questions and their investigation respectively:

- i. *What are the distinct business model archetypes of established firms?*
- ii. *Which strategic approach do these firms pursue in order to update their business models in the course of digital transformation?*

Currently, there is no strategic blueprint that would outline how business model adaptation under the premises of mastering the firm’s digital transformation needs to be designed or executed. The firm’s individual approach towards digital transformation, and hence business model adaptation, will be unique given its fundamental approach to the market and the associated overall business logic. Although not every firm articulates its business model

explicitly, it has a certain guiding logic behind its business activities and the related governance of its value chain (Günzel & Holm, 2013; Osterwalder & Pigneur, 2010). By considering the business model as “design or architecture of the value creation, delivery, and capture mechanisms” (Teece, 2010, p. 191), the firm’s strategic rationale towards business model adaptation can be distinguished by its design principles in the two separate dimensions of the business model. Accordingly, digital business strategies for business model adaptation directed at digital transformation evolve out of the firm’s distinct design approach in the business model’s front-end, and the business model’s back-end. While successful firms will always include both business model dimensions in their design considerations, their emphasis within and across the dimensions will differ.

Based on expert interviews with several established firms (finally considering eight for in-depth analysis), four different business model archetypes for established firms were derived. They were distinguished by following either a customized or standardized business model-design approach in their back-end whereas their business model front-end could manifest either in a focused or diversified design philosophy. The identified business models for established firms are the following (Mies & Hausberg, 2021): *Small batch specialist* (targeting a specific, narrow group of customers with business model back-end designed to deliver customized products in lower volumes), *high-volume retailer* (serving specific customer groups that are in need of standardized products or services in large volumes), *multichannel partner* (governing diversified customer portfolios via numerous channels with a back-end serving to provide standardized products coming in large numbers), and *ecosystem moderator* (providing a variety of customized products or services to highly diversified customer groups with the help of a business model back-end design set up for high volumes).

During the expert interviews, it became apparent that established firms strive to change their actual business models to account for the business opportunities coming with new digital

technology and its implications. For this purpose, firms develop a strategic rationale that conveys a disruptive way of doing business and a detailed creative plan, delivering and capturing the value that resides with pervasive digital technology (Bharadwaj et al., 2013; Tongur & Engwall, 2014). As business model adaptation can be described in terms of business model design activities that encompass “incremental changes in individual components of business models, extension of the existing business model, introduction of parallel business models, right through to disruption of the business model, which may potentially entail replacing the existing model with a fundamentally different one” (Khanagha et al., 2014, p. 324), five digital business strategies (see Figure 5) were identified based on the insights from the sample firms’ activities in altering their business model design.

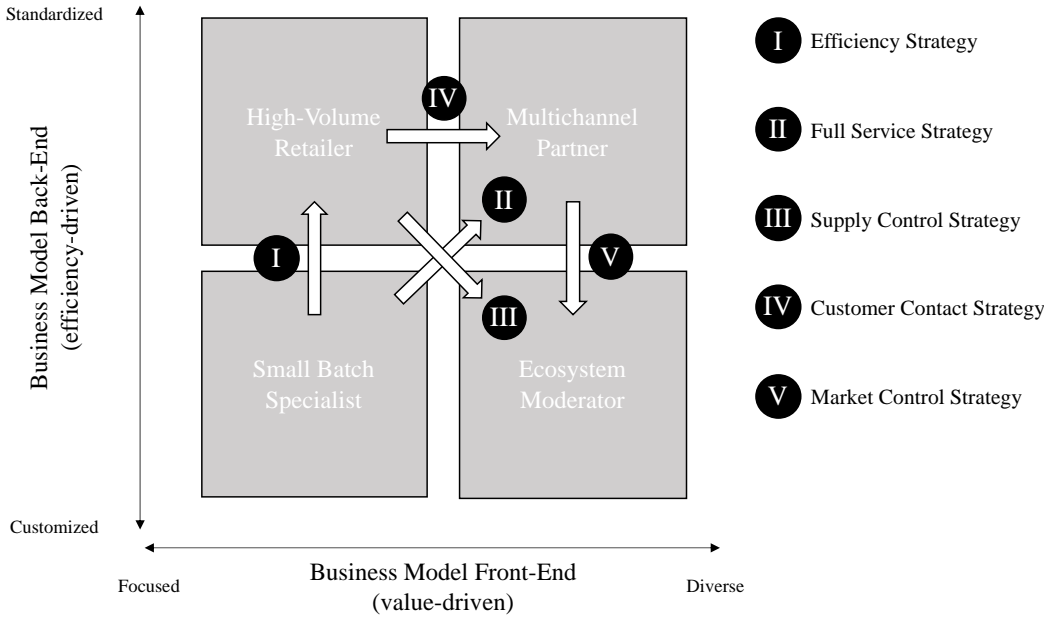


Figure 5: Digital Business Strategies for Business Model Innovation
(Mies & Hausberg, 2021)

First, established firms may pursue an *efficiency strategy*. This type of digital business strategy, building upon the concept of scale economies, applies to firms that want to change their business model back-end design to deliver more standardized products (sometimes also in higher quantities) with their customer segment remaining narrowly focused. Another digital business strategy for business model adaptation is a *full service strategy*. With this strategy, a

firm designs its business model to move away from a focused business model front-end and a customized business model back-end towards a diverse business model front-end and a standardized business model back-end. Third, established firms could build on lock-in effects of ecosystems and thus apply a *supply control strategy* to design a business model back-end directed at higher customization, with their business model front-end addressing more diversified markets. In contrast, the *customer contact strategy* favors business model adaptation that facilitates a maintenance of standardization-oriented business model back-end, and a development towards a diversification-oriented business model front-end, to provide large product quantities to a diversified set of customers. Finally, *market control strategies* will guide established firms to create a business model design that addresses a diversified set of customers with its business model front-end, while they deliver highly customized products in large quantities supported by their business model back-end.

Having these different goal-directed digital business strategies for business model innovation in mind, my research should guide management's thinking regarding how to master digital transformation. By altering the business model design in its back-end and front-end, the firm may generate multiple new options to create and capture additional value from the manifold business opportunities that accompany new digital technology.

A.III.4. Business Model, Business Strategy, and Firm Performance

In the previous research contributions, different management concepts, specifically that of business model and business strategy, were explored with regard to their role in a firm's exploiting the opportunities of digital technology and thus managing digital transformation. Especially, research contribution III has indicated that a firm's success, measured in terms of (commercial) performance, may unfold with different strengths as these management concepts reveal different design characteristics (Mies et al., 2021; Wei et al., 2014; Zott & Amit, 2008). As such, these observations motivate abiding by contingency theory (Chandler, 1962; Galbraith

& Schendel, 1983; Luthans & Stewart, 1977; R. E. Miles & Snow, 1978) and exploring the concrete relationships among environment, (digital) technology, and business with the purpose of investigating different factors' impact on a firm's value-creation and value-capture capabilities. In this dissertation's context, these factors are the novel, digitalization-related developments in a firm's strategy and structure, and their independent but joint contribution to firm performance. Specifically, this contribution strives to examine the impact of those management concepts that gained momentum in the context of digital innovation and technology management. Researchers from information systems and strategic innovation management have both agreed that these are (digital) business strategy (Bharadwaj et al., 2013; Chi et al., 2018; Hanelt et al., 2021; Holotiuk & Beimbom, 2017; Park & Mithas, 2020; Ukko et al., 2019) and business model (Amit & Han, 2017; Khanagha et al., 2014; Spieth et al., 2016; Wei et al., 2014; Zott & Amit, 2008). Consequently, research contribution IV, titled "Managing Digital Technology: Business Model, Business Strategy, and Firm Performance" centered on the following research question:

- i. *How does business model design, independently and together with digital business strategy, impact firm performance?*

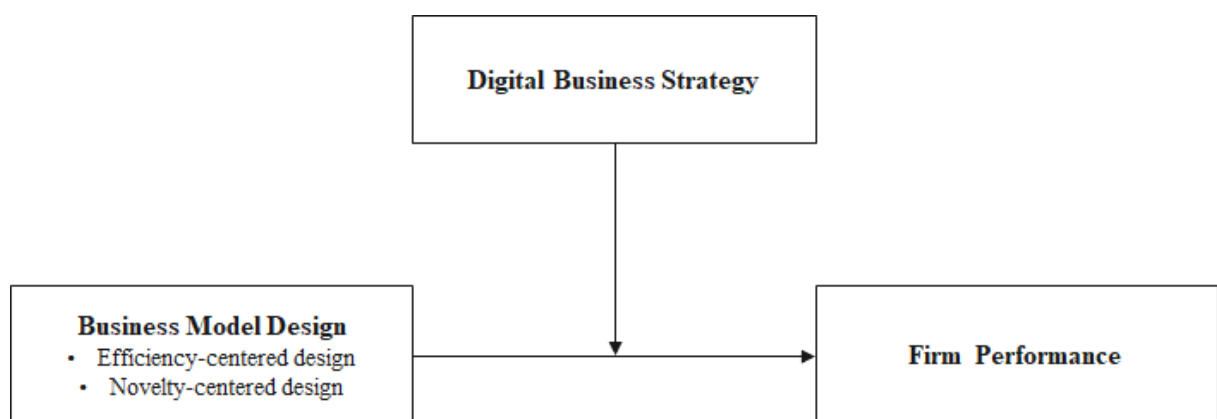


Figure 6: Theoretical Model

For the purpose of this study, a theoretical model (see Figure 6) was developed based on the extant theoretical insights on contingency theory and firm performance, business

ecosystem theory and business model design, as well as IT alignment theory and digital business strategy. Business ecosystem theory is core to any value-centric perspective on new technology management and identifies effective business model design as a means to obtain competitive advantage from the use of innovation and new technology (Loebbecke & Picot, 2015; Tongur & Engwall, 2014; Wei et al., 2014; Zott & Amit, 2010). Moreover, IT alignment theory has recently experienced a fundamental directional disruption in the sense that business strategy is thought to increasingly integrate various strategy disciplines with one another, instead of just aligning them (Coltman et al., 2015; Yeow et al., 2018), and said to create differential value based on leveraging digital resources (Bharadwaj et al., 2013). Taken together, business strategy and business model tend to present relevant concepts for the effective management of new (digital) technology, which need to be investigated regarding both their individual, independent impact and their contingent effect for firm performance.

Accordingly, based on findings from the latest scholarly evidence, five different hypotheses addressing the individual relationships among business model design, digital business strategy, as well as firm performance were formulated and tested empirically. Based on a large-scale sample of data from various firms worldwide, econometric modeling and estimation was followed by tests of the model's reliability and validity to finally conduct multivariate regression analysis (see Table 4). This research contribution can confirm the findings from prominent research in the field that both, novelty-centered business model design (NBMD) and efficiency-centered business model design (EBMD) are effective management concepts to successfully manage new technology such that the firm's performance increases (Amit & Zott, 2015; Wei et al., 2014; Zott & Amit, 2008). Precisely, it is found that the relationship between NBMD and firm performance is positive, while the relationship between EBMD and firm performance is curvilinear.

Most importantly, this study shows how DBS is related to firm performance and how this relatively new management concept interacts with the relatively established ones of business model. Considered independently, DBS is found to represent another factor that positively drives firm performance. When investigating the joint effects of business model design and DBS, it is found that the presence of DBS further strengthens the aforementioned performance effects of business model design. As such, research contribution IV of this dissertation greatly emphasizes and empirically confirms the conceptual work done in research contributions I to III. This work concludes a series of theoretical and empirical, as well as inductive and deductive, investigations on management concepts for newly emerging technology in the course of digitalization. Its findings transparently confirm why firms cannot avoid pursuing the journey of digital transformation, and that harmonized designs of business model and digital business strategy will guide the associated efforts towards successful completion.

Dependent Variable: Firm Performance	Model 1		Model 2		Model 3		Model 4	
	Coeff.	VIF	Coeff.	VIF	Coeff.	VIF	Coeff.	VIF
<i>Independent Variable</i>								
Firm Age	0.151**	1.203	0.136**	1.246	0.097	1.287	0.101	1.292
Firm Size	0.090	1.241	0.098**	1.284	0.104	1.285	0.108*	1.285
Industry Life Cycle	0.053	1.053	0.093	1.066	0.056	1.102	0.021	1.136
Industry Type	-0.189***	1.007	-0.079	1.229	-0.038	1.274	-0.076	1.340
EBMD			0.520****	2.667	0.470****	2.734	0.410****	2.821
EBMD ²			0.448****	2.241	0.377****	2.378	0.377****	2.414
NBMD			0.139*	1.786	0.073	1.903	0.161**	2.119
DBS					0.224***	1.345	0.122	1.858
<i>Interactions</i>								
EBMD x DBS							0.051	3.335
EBMD ² x DBS							0.310***	3.375
NBMD x DBS							0.225***	2.374
<i>R</i> Square (adjusted)	0.082 (0.066)		0.241 (0.218)		0.278 (0.253)		0.323 (0.290)	
<i>R</i> change			0.159		0.037		0.045	
<i>F</i> value	5.174***		16.011****		11.818***		4.930***	

*P < 0.1 (two-tailed test), **P < 0.05 (two-tailed test), ***P < 0.01 (two-tailed test), ****P < 0.001 (two-tailed test)

Table 4: Regression Results

(Mies & Hausberg 2021)

A.IV. DISCUSSION

A.IV.1. Theoretical Contribution

The theoretical contributions of this work are manifold; they need to be considered with regard to the different research gaps identified in the individual contributions to this cumulative dissertation. Generally, the overarching research inquiry abides by a mixed methods approach in order to investigate the focal topic from various perspectives and to provide research results that are as comprehensive, valid, and reliable as possible. This approach supported the overall intention of this dissertation to develop an in-depth understanding of how firms reply to the rise of new technology in the socio-economic context of digitization by installing, (re-)designing, and aligning management concepts beyond the competitive goal of mastering digital transformation, and hence to ensure their future value add.

Contribution I delivers valuable insights to the literature on digital transformation and digital business models (Amit & Han, 2017; Berman, 2012; Bouncken et al., 2019; Frank et al., 2019; Loebbecke & Picot, 2015; Remane et al., 2017; Schallmo et al., 2017). By systematically reviewing the extant literature on digital transformation and related terms, we identify the numerous characteristics of digital transformation, and proposed four unique drivers that would especially affect manufacturing firms in the different dimensions of their value chains. Thereby, we provide structure to a fragmented field of research. We set clear demarcation lines against related research topics, and explicitly relate the firm-centric concept of digital transformation to macro-level phenomena (e.g., digitization, digital innovation, and datafication), to industry-specific trends (e.g., Industry 4.0), and to relevant technology advancements (e.g., cloud computing, internet of things, or additive manufacturing). Given this conceptual basis, we continued to theorize on what would be adequate business models to successfully master digital transformation depending on the drivers' individual strengths. With this approach, we initially add distinct facets to the rather high-level concept of digital transformation (distinguishable by

the strength and manifestation of its drivers). As such this work sparks research on firms' digital maturity (Kane et al., 2017; Mettler & Pinto, 2018) by providing insights on the relevant antecedents and corresponding business model design elements.

In contribution II, the theoretical impact is delivered in two consecutive stages. At the first stage, we systematically explore structures in a quantitative data set on different firms' digital business strategies from all over the globe. The result is an empirically derived typology that consists of four alternative archetypes for digital business strategies. We therefore answer the rising calls from IS research (Bharadwaj et al., 2013; Park & Mithas, 2020) and provide in-depth empirical insights on a relatively young strategy concept to describe the latest fusion between overall business strategy and subordinate functional IT strategy. On a second stage, we enriched this work's academic value for strategic management and IS researchers by linking the identified digital business strategy archetypes to firm performance. Based on statistically significant results from regression analysis, we outline that digitally savvy strategies are a major factor in determining a firm's competitive success. Thus, we empirically confirm and support the *raison d'être* for a new strategy concept, like digital business strategy, that accounts for the changing role of IT in strategy making and strategy execution. As we are not aware of any other academic contribution that has provided empirical insights on the performance impacts of digital business strategy, this work represents a major milestone in strategy research that guides researchers and practitioners into the digital era.

Contribution III uses insights from practitioner interviews to examine how established firms innovate their business models to become more capable of exploiting new digital technology. This particular work contributes to the literature in two ways. On the one hand, the work contributes to the strategic management literature, specifically business model (design) literature (Amit & Zott, 2015; Chatterjee, 2013; Günzel & Holm, 2013; Kulins et al., 2016; Osterwalder & Pigneur, 2010; Zott & Amit, 2010). It confirms that, given individual design

approaches in their business model's front-end and back-end, established firms will build a business model that can be found in an overarching typology that consists of four general business model archetypes. On the other hand, this work showcases how established firms use digital resources with the purpose of building a strategy for business model innovation and differential value creation. Thereby, this contribution enriches the extant knowledge on innovation management (Bouncken et al., 2019; Foss & Saebi, 2017; Spieth et al., 2014; Teece, 2010) and the recent IS perspectives on business strategy (Bharadwaj et al., 2013; Chi et al., 2018; Holotiuk & Beimborn, 2017; Park & Mithas, 2020; Yeow et al., 2018). This work adds an interesting perspective to the current understanding of digital business strategy by cultivating it as a valuable framework to navigate a firm's innovation processes (with the business model as object of innovation) directed at its digital transformation endeavors.

The intention of the setup of contribution IV is to interlink the different theoretical constructs of this dissertation and to show how they, independently and together, impact firm performance. Drawing on contingency theory (Chandler, 1962; Galbraith & Schendel, 1983; Luthans & Stewart, 1977; Zott & Amit, 2008) and business ecosystem theory (Adner & Kapoor, 2010; Weill & Woerner, 2015; Zott & Amit, 2010), we investigated how different business model designs and types of digital business strategy affect firm performance. Given the results of multivariate regression analysis, this work brings valuable insights into the direct and interaction effects of business model design and digital business strategy for firm performance. We confirm the results from previous studies (Wei et al., 2014; Zott & Amit, 2008) that business model design can be beneficial for firm performance when considered in isolation. Instead, digital business strategy has to reveal particular characteristics to confirm positive performance effects. When considering the combined effects of business model and digital business strategy, their direct effects remain somewhat vague, since it turns out that firm performance would depend a lot on each concept's maturity. A major contribution of this work is therefore to

support the claims (Kane et al., 2017; Mettler & Pinto, 2018) for future investigations and conceptualizations on digital maturity that will become a decisive factor in determining a firm's competitive success.

A.IV.2. Managerial Implications

From a practitioner-oriented point of view, this dissertation aims to address a diversified audience from the business world. With its implications, the research at hand is directed towards general managers, strategy makers, innovation and R&D managers, as well as IS leaders. First, this dissertation provides managers with a comprehensive picture of digitization's implications for the business world. The recommendations from the different research contributions support managers in taking the necessary steps to design a successful digital transformation journey. Managers should extend their knowledge on what really drives digital transformation in order to enhance the chances to identify and design a firm-specific management concept empowering their business to extract the value potential residing with new digital technology.

Second, when innovation managers, IS experts, and strategic business leaders aim to design new (digital) business models or business strategies with the goal to manage and exploit digital technology more effectively, they should screen their environment for the different extant types and designs. Having identified the latter, firms may finally benchmark their own ideas against the most successful correspondents in the market in order to identify their concept's strengths and weaknesses. The thorough execution of such analysis forms the foundation for a goal-directed digital transformation process towards inevitable business model innovation and organizational change.

Third, this research proves that managers have to carefully align business model with business strategy to generate additional firm value in terms of performance. Even though the firm had designed both concepts, independently, to ultimate perfection by contributing a positive value add, in combination they could harm firm performance if not well-aligned. Also,

what appears to determine the direction and strength of the performance effect is the degree to which the firm's business strategy is digitally savvy. From that perspective, managers can be provided with three recommendations. Work hard, on the one hand, to digitally transform your business model or business strategy, and streamline both towards a common goal of advanced digital maturity. On the other hand, remain patient if your efforts regarding progressive use and exploitation of digital technology do not pay off immediately.

A.IV.3. Limitations and Future Research

The contributions in this dissertation aimed to shed light on the management concepts that enable firms to successfully navigate technological change. Precisely, this has led to the development and performance-centric evaluation of archetypes for business model and business strategy that fit an environment characterized by the soaring availability of new digital technology. Even though this work claims to deliver valuable theoretical contributions supported by a multitude of empirical investigations with methodological richness, its findings are neither comprehensive nor exhaustive, and still inhibit tremendous opportunities for further research.

On a macro level, one has to consider the enormous speed at which digitization progresses. Of course, this dissertation aimed to provide sustainable, long-term insights and recommendations for academics and practitioners from the field. Nevertheless, the extant findings remain the results of a snapshot from data on the current conditions in the business world. The manifestations of business model and business strategy will continuously update within ever-shorter cycles, and hence have to be investigated on a regular basis to enrich research with up-to-date contributions. In this particular context, future investigations should re-focus on dynamic capabilities, the firm's absorptive capacity, as well as empirical studies on the value delta that resides with higher or lower levels of the aforementioned. With regard to the sample data, one has to note that the majority of the contributions here centered on

established firms. Necessarily, the question arises of how young ventures and startup firms would design their business model and strategy. Considering such firms as born-digital inevitably involves understanding how digital business models and business strategies are built from the start, without the burden of any transformation process necessary in advance. Future work could draw on benchmarking as an effective tool for established firms to speed up their innovation processes and digital transformation alike.

On a micro level, we are in need of both conceptual work and advanced empirical insights regarding corporate digital maturity. How would different maturity levels affect the firm's business model design, digital business strategy and finally, performance? Knowledge on how to assess a firm's actual and optimal digital maturity level would guide managers in designing a business model and aligning it with digital business strategy. Finally, this could make a noteworthy contribution to further academic examinations on how firms would create and deliver differential value as a result of carefully formulated digital business strategy in harmony with digitally savvy business models.

A.V. CONCLUSION

New technology has always been a key driver of economic progress. However, at the firm level, new technology benefits only those companies that find effective ways to exploit technological opportunities. Lately, new technological opportunities are related to the rise of digital technology and significant advancements in ICT. Hence, today's IS and business leaders must identify or develop those management concepts that provide their firms with an adequate idea of creating organizational value and competitive advantage based on the peculiarities of recent technology and its ramifications. In this context, business strategy and business model have come to the fore of strategic management research (Amit & Han, 2017; Amit & Zott, 2001; Casadesus-Masanell & Ricart, 2010; Massa et al., 2017; Teece, 2010) and information systems (Bharadwaj et al., 2013; Chi et al., 2018; Loebbecke & Picot, 2015; Matt et al., 2015;

Nambisan et al., 2017; Park & Mithas, 2020), but also the innovation management literature (Foss & Saebi, 2017; König et al., 2019; Nambisan et al., 2019; Schallmo et al., 2017; Spieth et al., 2014, 2016). While a lot of research has already addressed the relevant technological updates accompanying digitization, little has emerged about the alterations in management concepts that provide firms with a cognitive logic and structural frame for navigating digital transformation (Fitzgerald et al., 2014; Loebbecke & Picot, 2015; Sebastian et al., 2017; Tongur & Engwall, 2014).

The aggregated research contributions in this doctoral thesis aimed to explore and examine the current concepts for managing new technology in the course of a firm's digital transformation. In order to specify the goals of this research inquiry in detail, each contribution followed an individual research question. The work at hand answers these research questions in a consolidated manner by summarizing different theoretical frameworks, conceptual models, data sources, research methods, empirical findings, action recommendations, theoretical or practical implications, as well as suggestions for future research projects. Specifically, in contribution I, systematic literature analysis was applied to identify the key drivers of digital transformation and develop the corresponding business model archetypes for firms facing and anticipating these drivers for their own benefit. Contribution II continues and systemizes the exploration of digital business strategies by providing an empirically derived typology based on cluster analysis. In contribution III, expert interviews explored the digital business strategies that could guide established firms in updating their business models in the face of ubiquitously emerging digital technology. Last but not least, contribution IV interlinks digital business strategy with business model design and provides recommendations on their combinatory fit with regard to firm performance investigations.

As such, this dissertation provides comprehensive insights on how to manage new technology in the course of the firm's digital transformation. Based on mixed methods and a

complementary research approach that links perspectives from strategic management, innovation management, and IS literature, this work examines particularly (digital) business strategy and business model as those management concepts with the highest momentum in a phase of rapidly accelerating digitization.

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B. RESEARCH PAPERS

B.I. CONTRIBUTION I

Title	Business Model Innovation in Manufacturing Firms: Exploring the Driving Forces of Digital Transformation
Author(s)	Mies, Y. A.; Hausberg, J. P.
Year	2023
Outlet	International Journal of Innovation and Technology Management
Ranking	VHB: C
Status	Published
Reference No.	DOI: 10.1142/S0219877023500487
Abstract	<p>The adoption of digital technology has become a critical factor in the context of innovation management. The process of digital transformation leads to the realization of concrete business improvements that promote the innovation of entire business models. So far, it has remained unexplored what drives this business model innovation, especially when looking at digitally savvy firms from the manufacturing industry. This study aims to identify the key drivers of digital transformation of business models based on a systematic literature review. A four-step review approach draws on the findings from a core sample of 51 articles from two databases and results in the description of four key drivers for digital transformation of business models, namely ubiquitous connectivity, functional dematerialization, relational decentralization, and flexible scalability. Finally, a conceptual framework of four digital business model archetypes (lighthouse supplier, service enthusiast, data scientist, and platform owner) is proposed that considers a manufacturing firm's business model exposure to the identified digital transformation drivers. While this study is limited to theoretical findings, it likewise provokes valuable follow-up thoughts for empirical academic work and practitioners from the manufacturing industries.</p>
Keywords	Business model innovation; digital transformation; systematic literature review

B.II. CONTRIBUTION II

Title	Digitising Miles and Snow: Using Cluster Analysis to Empirically Derive Digital Business Strategy Types
Author(s)	Mies, Y. A.; Hausberg, J. P.; Packmohr, S.
Year	2023
Outlet	Technology Analysis & Strategic Management
Ranking	VHB: C
Status	Published
Reference No.	DOI: 10.1080/09537325.2023.2234508
Abstract	<p>Digitisation is among the macro-trends that significantly influence the business world in the twenty-first century. Firms striving to succeed in this environment must develop new strategic approaches. The accelerating development of information technology (IT) drives digitisation. Therefore, IT and business strategies must be integrated. In this context, the information systems literature promotes the concept of digital business strategies (DBSs), reflecting a fusion between IT and business strategies. However, knowledge of the types and characteristics of such DBSs is currently scarce. Therefore, we developed a conceptually and empirically grounded typology of DBS based on the well-known business strategy classification by Miles and Snow (1978). Using a dataset comprising 192 firms worldwide, we conducted a cluster analysis, identified basic types of DBS, and evaluated their effects on firm performance. Moreover, we identified four types of DBS: non-digital reactor, analyser, digital opportunist, and digital producer. The study contributes to a better understanding of new business strategy concepts in the digitisation context.</p>
Keywords	Digitisation; business strategy; firm performance; cluster analysis

**Drawing Roadmaps for New Business Model Adaptation:
How Digital Business Strategy Guides the Transformation of German
Established Firms**

Author(s) Mies, Y. A.; Hausberg J. P.

Year 2021

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B.III. CONTRIBUTION III

Title	Drawing Roadmaps for New Business Model Adaptation: How Digital Business Strategy Guides the Transformation of German Established Firms
Author(s)	Mies, Y. A.; Hausberg, J. P.
Year	2021
Outlet	Journal of Strategy and Management
Ranking	VHB: C
Status	In Review
Reference No.	
Abstract	Nowadays, firms increasingly strive to exploit the opportunities that come with digital technology. For that purpose, IS and business leaders seek to discover new ways of advancing their business models. This article builds upon the findings from a study of eight established German companies that develop digital business strategies with the goal of adapting their business models over the course of their digital transformation journey. Given these firms' individual design approach in their business model's back-end and front-end, we develop a typology of four different business models – small batch specialist, high-volume retailer, multichannel partner and ecosystem moderator. On this basis, we provide IS and business leaders with a set of generic digital business strategies that fit those firms, which strive to adapt their current business models to (re-)position themselves in the competitive environment of a rapidly evolving digital world.
Keywords	Business model, business model innovation, digital transformation, digital technology, digital business strategy, established firms, expert interviews

**DRAWING ROADMAPS FOR NEW BUSINESS MODEL ADAPTATION:
HOW DIGITAL BUSINESS STRATEGY GUIDES THE TRANSFORMATION OF
GERMAN ESTABLISHED FIRMS**

Abstract

Nowadays, firms increasingly strive to exploit the opportunities that come with digital technology. For that purpose, IS and business leaders seek to discover new ways of advancing their business models. This article builds upon the findings from a study of eight established German companies that develop digital business strategies with the goal of adapting their business models over the course of their digital transformation journey. Given these firms' individual design approach in their business model's back-end and front-end, we develop a typology of four different business models – small batch specialist, high-volume retailer, multichannel partner and ecosystem moderator. On this basis, we provide IS and business leaders with a set of generic digital business strategies that fit those firms, which strive to adapt their current business models to (re-)position themselves in the competitive environment of a rapidly evolving digital world.

Keywords

Business model, business model innovation, digital transformation, digital technology, digital business strategy, established firms, expert interviews

B.III.1. Introduction

Recently, the emergence of digital technologies has started to pave the way for a new wave of major business improvements (Fitzgerald *et al.*, 2014). This development has been coined as digital transformation and is defined as “the use of new digital technologies (social media, mobile, analytics or embedded services) to enable major business improvements” (Fitzgerald *et al.*, 2014, p. 2). Firms experience one of these improvements in the manifold opportunities to develop new business models (Almeida *et al.*, 2019; Peter *et al.*, 2020; Tongur and Engwall, 2014). Established companies have often built their business logics upon business models that worked perfectly well in the pre-digital ages but that are nowadays threatened by new market entrants or disruptive market mechanisms (Sebastian *et al.*, 2017). Thus, business leaders of established firms speed up to discover new digital business strategies of overhauling their actual business models in place (Chi *et al.*, 2018; Park and Mithas, 2020; Yeow *et al.*, 2018). Consider for example physical product manufacturers such as automotive companies or consumer goods companies, which increasingly strive to change the nature of their offerings and value propositions. In addition to their original value proposition’s core of delivering a physical product, these firms start to introduce several new personalized services and corresponding billing options (Porter and Heppelmann, 2015). Consumer goods companies often use digital technology with the purpose of enhancing the customer’s brand experience and optimizing the firm’s supply chain (Bogers *et al.*, 2016; Edelman, 2010). Even though we already perceive a growth in shining examples for new business model development in the course of digital technology use (Amit and Han, 2017; Berman, 2012; Bouncken *et al.*, 2019; Foss and Saebi, 2017; Nambisan *et al.*, 2017, 2019), digital transformation remains yet an enormous struggle for the majority of established firms.

So far, there exists no strategic blueprint for new business model development towards digital transformation (Hansen *et al.*, 2011). Business leaders that head their firms’ digital transformation face high uncertainties when designing prospective business models (Amshoff

et al., 2015). Often, there is a lack of concrete guiding principles how alternative business model designs could look like and how to adapt them. In this work, we suggest that digital business strategy could provide that guidance, outlining pathways towards the adaptation of other business model types. Hence, we propose the following research question: *What are the digital business strategies that provide established firms with options to adapt new business models in the course of digital transformation and how do these business models look like?*

To answer that question, we investigated eight established, medium- to large-sized companies from different industries in Germany that have started to approach digital transformation of the organization and its underlying business models. Based on the results from qualitative expert interviews, we contribute to the extant literature in several ways. To begin, we provide an idea by what rationale established firms design their business models and develop a framework that consists of four business model archetypes differing in the firm's individual design approach towards the business model's front-end and back-end. In consideration of these business model types, we discuss different digital business strategies that describe how firms could implement another business model type and hence adapt their existing business model with the help of digital technology use. We conclude with recommendations for leaders of companies that will start, or have already started the digital transformation journey and which consider business model adaptation as an integral stage of that trip.

B.III.2. Theoretical Background

B.III.2.1. The Role of Business Model

Competitive advantage does not necessarily flow from the sole use and application of technology (Henfridsson *et al.*, 2014; Tongur and Engwall, 2014). Instead, it resides with comprehensive organizational structures and mechanisms that convey a clear idea of how to create, deliver and capture value and thus depict a disruptive way of how to conduct business (Amit and Zott, 2001; Casadesus-Masanell and Ricart, 2010). This unique business logic of a

firm usually resides with its business model (Amit and Zott, 2012; Magretta, 2002). “A business model is a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm. It is a description of the value a company offers to one or several segments of customers and of the architecture of the firm and its network of partners for creating, marketing, and delivering this value and relationship capital, in order to generate profitable and sustainable revenue streams” (Osterwalder et al., 2005, p. 3). No matter whether they explicitly articulate it, all companies have a business model (Günzel and Holm, 2013). In our research, we consider business models as “design or architecture of the value creation, delivery, and capture mechanisms” (Teece, 2010, p. 191). Executives lead their companies by distinguishing between the designs of two separate dimensions of the business model. This dual-sided design approach turns out as the underlying strategic rationale to envision and guide any further effort of innovating the firm’s business model in the course of digital transformation. Inspired by their individual market environments and organizational conditions, business leaders structure their logics of conducting business concrete assumptions on the design of their business models’ front-end and their business models’ back-end (Amshoff et al., 2015; Günzel and Holm, 2013).

B.III.2.2. Business Model Front-End Design

When firms design their business model’s front-end, they aim to develop a business logic that is mainly value-driven. Business leaders that follow a front-end design approach focus merely on the customer relationships, customer channels and customer segments of their business models. Front-end designs aim at acquiring new and maintaining already existing customers, integrating them into carefully selected processes in the value chain, and developing a sensitively coordinated game plan for customer contact and penetration. Front-end-centered designs target different customer groups. Firms with business model front-end designs may *focus on a group of market participants* that consists of a low number of customers with a highly specialized demand (narrow niche markets). On the other hand, front-end designs may

appeal to a *diverse group of market participants* that consists of a high number of customers with converging, often the same, preferences (broad mass markets).

B.III.2.3. Business Model Back-End Design

When firms design their business model's back-end, they aim to develop an efficiency-driven business logic. The back-end design sharpens business leaders focus towards the activities, resources, partners and cost structure of their business models. Back-end designs aim at optimizing internal processes along the supply chain in order to warrant a smooth flow of the firm's operations and a seamless integration across interfaces between different organizational units. The business model's back-end can be structured to spur operations along a supply chain that has the goal to release either highly *customized products or services* (often coming in small batch sizes) or that have more *standardized product and service* outputs (often coming in large quantities).

B.III.2.4. Digital Business Strategy

The concept of business model has always been closely related to that of business strategy (Casadesus-Masanell and Ricart, 2010; Spieth *et al.*, 2016). In contrast to business model, business strategy determines how a firm strives to compete in a certain market environment by the choice of a specific business model (Casadesus-Masanell and Ricart, 2010). This interdependence becomes even more relevant in uncertain market environments such as to be found in digital business contexts. Digital technology significantly changes the ways how organizations work, hence reconfigure traditional business model set ups (Correani *et al.*, 2020), and alters the “very nature of competitive advantage itself” (Adner *et al.*, 2019, p. 254). Accordingly, companies are in need of strategic guidance on what business models to select and adapt in order to compete successfully in changing market environments characterized by digital transformation. An integral mechanism to “conceive and bring about digital transformation” is digital business strategy (Hanelt *et al.*, 2021, p. 1166). By linking (digital)

technology and business aspects within the firm's strategic framework digital business strategy is key to spur an organization's transformation (Bharadwaj *et al.*, 2013; Hanelt *et al.*, 2021; Park and Mithas, 2020; Sia *et al.*, 2016). The digital business strategy view accounts for the pervasiveness of digital resources in any organizational function (e.g. operations, marketing, purchasing), inhibiting the explicit potential for additional business value (Chi *et al.*, 2018; Ukko *et al.*, 2019; Yeow *et al.*, 2018). Hence, digital business strategy is defined as "organizational strategy formulated and executed by leveraging digital resources to create differential value." (Bharadwaj *et al.*, 2013, p. 472). As such, the digital business strategy concept brings about many interfaces with that of business model, both addressing the firm's capability of creating, delivering, and capturing value from its operations.

B.III.3. Research Methodology

This research strives to investigate how the business models of established firms look like and how they adapt them during the course of digital transformation. We set out to identify the different strategic approaches that guide a firm's adaptation from one business model design to another. In order to achieve this aim, we applied a qualitative empirical research design of exploratory nature to provide inductive theory-building research (Eisenhardt, 1989; Gioia *et al.*, 2013). In order to provide more compelling evidence and a higher robustness in the conclusions than a single case study would do, we applied a multiple case study approach to enhance our results (Rong *et al.*, 2015; Yin, 2017).

With the purpose of theory building in mind, our research abides by the following steps to warrant adequate methodological quality (Weick, 1989, 1995) and internal as well as construct validity (Gibbert *et al.*, 2008) during this process: first, definition of selection criteria for the different cases; second, selection of interviewee(s) and interview questions; and third the in-detail description of data analysis with the research framework at hand. Accordingly, the selected companies had to evidence the following criteria in order to fulfill the sample constraints for the research purpose at hand:

- 1) The firms need to display characteristics of business model adaptation in terms of significant change in either the business model back-end design or the business model front-end design.
- 2) Change in the firms' business model design originates from either exogenous or endogenous influence that stem from the sudden availability of digital resources and technology. The firm should have identified digital transformation as a major concern in their overall strategy.
- 3) The selected companies stem from a wide variety of industry sectors.
- 4) The case firms display a different firm size and firm age.
- 5) The firms represent established organizations, also known as incumbents, with ongoing operations for more than 20 years and a headquarter based in Germany.
- 6) The sample firms should be at different stages in their adaptation of a different business model.

Our study centers on a selection of expert interviews from eight different firms. Originally, we had started to investigate a sample of ten different companies but excluded some of them from the sample during the research process, as their related organizational and content-related characteristics did not match the requirements of this work. Consequently, we arrived at a final sample of eight focus firms. We stopped extending the sample size at this point, as the marginal utility of every additional interview would have diminished towards zero. Table 1 depicts the different characteristics of the selected case companies along the defined selection criteria. As shown, the companies stem from a wide array of different industries and reveal different stages within their process of business model adaptation. Table 2 shows the identified key interviewees in the case companies. The interview partners are experts from different functions within the organization and execute tasks that relate to the management of DT, digital strategy, or the use of digital resources. Moreover, the informants exhibit a minimum degree of

seniority according to the companies' hierarchy, meaning that we were primarily interviewing people from top management or C-level.

B.III.3.1. Data Collection

We conducted semi-structured, open-ended in-depth interviews with several senior executives from our sample companies. These interviews represent the primary empirical data source in this study and were conducted on the basis of a pre-designed interview directory (see Appendix 1) that focused on the overall research question and the suggested conceptual framework. Thus, we ensured data reliability and construct validity (Gibbert *et al.*, 2008; Gioia *et al.*, 2013; Laudien and Daxböck, 2016; Yin, 2017). We ensure reliability in data collection by the use of the structured research design and the corresponding interview guidelines, consistently used in all interviews. These guidelines targeted the informants' understanding of digital transformation, the business model concept, the firm's design in its business model back-end or front-end, and the firm's individual approach towards business model adaptation. We ensure data validity by adopting a diverse set of multiple cases and caring for data triangulation. For triangulation purposes, we interviewed experts from different positions and functions within the sample companies and supplemented our interview data with archival secondary data such as information from the firm's websites as well as internal documents (presentations, photos or working documents) that we received from the interview partners. Therefore, we enrich our knowledge about the particular firm and avoid the risks emerging from potential retrospective bias. For purposes of data security, we keep company information as well as interviewee details in confidence (Gioia *et al.*, 2013). We contacted the preselected interview participants via telephone, e-mail and LinkedIn in order to inform them about the research's purpose and design. We interviewed most of the participants face-to-face with only some exceptions via phone or Skype.

B.III.3.2. Data Analysis

The interviews reveal an average duration of 1,25 hours, were tape-recorded, transcribed and coded, first open, then axially (Gioia *et al.*, 2013; Souitaris and Zerbinati, 2014; Strauss and Corbin, 1990). For the transcription, we employed Eisenhardt's (1989) 24-hour rule such that every interview was transcribed within 24 hours after the actual event. After transcription, the data was coded with the goal to discover patterns (Gioia *et al.*, 2013). Figure 1 provides an overview of the data structure that emerged from the application of a hybrid coding approach to our raw data. Generally, the data analysis abides by a three step approach (Rong *et al.*, 2015; Souitaris and Zerbinati, 2014) to record the firms' business model back-end and front-end designs (see table 3 for exemplary interview evidence) as well as their digital business strategies to adapt them (see table 4 for exemplary interview evidence): First, we applied open coding (Souitaris and Zerbinati, 2014) to understand the interview partner's attitude towards business model design. Exemplary, we found statements about "customer centricity", "product variety", or "single business logic". Second, we applied axial coding (Strauss and Corbin, 1990) and consolidated the identified categories from the first step. For example, statements about "automation", "efficiency", or "synergies" were transferred into the second-order concept of standardized business model back-end. Third, we aggregated our second-order concepts into overarching dimensions that display the existence of a recurrent pattern in the individual case's approach to business model design (business model front-end vs. back-end). We applied the same coding process to identify the case companies' strategic approach towards business model adaptation in the course of digital transformation.

Case Criteria	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
1) Business Model Adaptation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2) Affected by Digital Transformation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3) Industry Background	Pharmaceutical Manufacturing Equipment	Food & Healthcare Manufacturing Equipment	Energy Supply (Services)	Electronics	Food & Beverages	Consumer Goods	Furniture	Automotive
4) Firm Size (Employees) and Age (Founding Year)	> 300 1919	> 350 1885	> 42.700 2000	> 4.900 1850	> 11.600 1891	> 8.000 1748	> 6.700 1888	> 10.700 1913
5) Established Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6) Business Model Adaptation Stage	Early-Stage	Early-Stage	Advanced	Advanced	High-Maturity	Advanced	Advanced	High-Maturity

Table 1: Criteria and Company Demographics of the Research Sample

Company	Country	Role of Interviewee	No. of Interviewees	Interview Time (in min)	Supplementary Material	
Case 1	Alpha	Germany	CEO; Head of Process & IT	2	195	Website Information, Company Presentation, Project House Steering Tool
Case 2	Beta	Germany	CEO	1	60	Website Information
Case 3	Gamma	Germany	Head of Digital Portfolio Strategy; Manager Digital Strategy & Transformation	2	120	Website Information, Company Presentation, Digital Project Charter
Case 4	Delta	Germany	CTO	1	60	Website Information
Case 5	Eta	Germany	Strategic Project Manager	1	65	Website Information, Company Presentation, Informal Talk with Managing Director
Case 6	Epsilon	Germany	Senior Digital Strategist; Senior Director Digital	2	60	Website-, and Trade Show Information
Case 7	Zeta	Germany	Digital Project Manager	1	100	Website Information, Company Presentation
Case 8	Theta	Germany	Head of Digital Transformation	1	75	Website Information, Digital Accelerator Tour
not incl.		Germany	CFO	1	90	
not incl.		Germany	Research Institute	1	45	
				Total: 13	Total: 870	

Table 2: Interview List

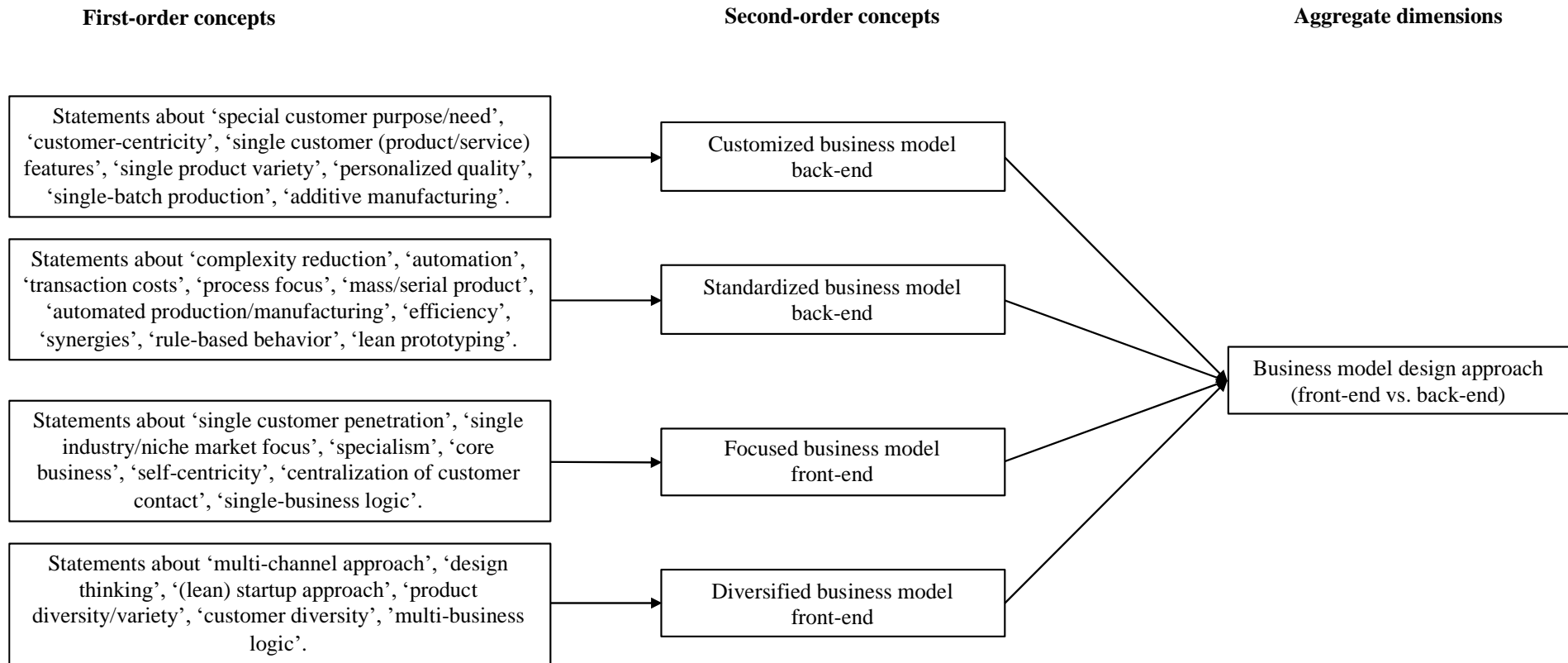


Figure 7: Data Structure

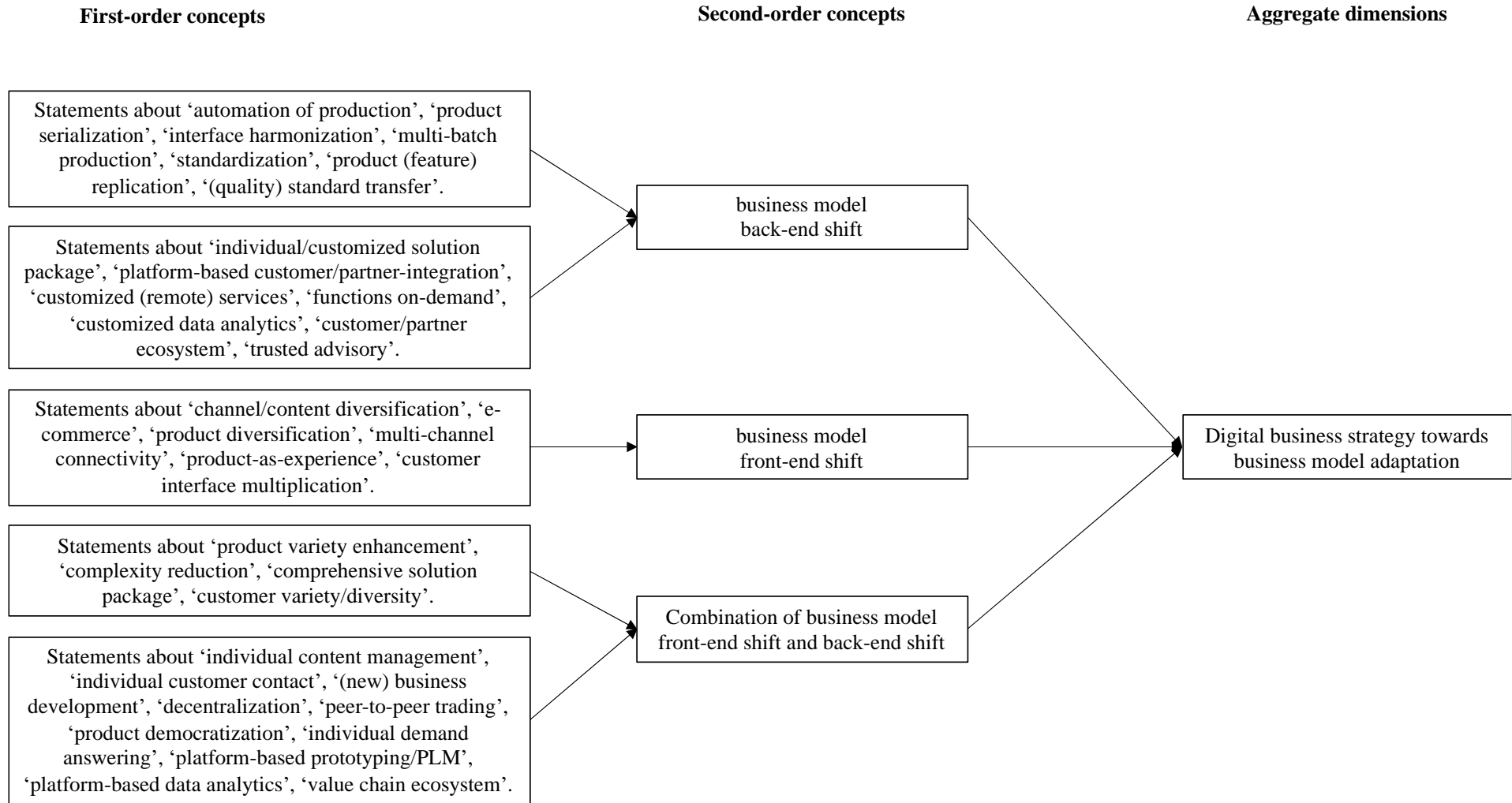


Figure 1 (continued): Data Structure

Business model back-end		
<i>standardized</i>	"This means that we try to harmonize the interfaces [with our customers] in a way that we do not have to execute any manual task."	Delta
	"We move away from a state where managers make decisions based on their gut feeling. I have to prove everything by data."	Gamma
	"This is a point where I can massively accelerate product development and where I can reduce cost by the reduction of prototypes."	Theta
	"I can serialize production and reduce the complexity in manufacturing and thus enhance predictability in supply chain management."	Theta
	"We use data to improve our processes."	Epsilon
	"Automation is something that is already very advanced in our factories, especially here in Germany."	Epsilon
	"E-mail requests, telephone calls, that is something you can automate very quickly. [...]. Robotic process automation shows how I can automatically execute those tasks, which I execute on a daily basis more than thousand times."	Epsilon
	"Radical efficiency [...]. Standardization of competencies is also a major point. I am thinking of every human competence as well as regulations that are based on standardized systems of rules."	Zeta
	"We are a mass producer. We are highly production oriented. This is a core competence."	Zeta
	"Our industry is highly process-oriented. [...] Here you can only produce if you will be highly automated. Otherwise you will not survive the competition."	Zeta
	"Centralization is what we try to do internally.[...].We work consciously for every group company to use and profit from synergies that arise from that central aspect."	Eta
	<i>customized</i> "This in turn is reflected in the design of the product, the features, just based on the expectation of the customer."	Beta
	"We have to improve the operator's convenience because it is the expectation of the customer."	Beta
	"The perceived variety for the customer is high while we provide a high degree of individualization."	Beta
	"We do not have as many standard parts as elsewhere."	Alpha
"Regarding R&D, we focus less on the development of big blockbuster products but it is more about single batches [...] to account for the aspect of personalized end-products."	Alpha	
"It will be more about the production of single-use products in single batch processes."	Alpha	
"3D printing is a major factor."	Alpha	
Business model front-end		
<i>focused</i>	"I was surprised that the customer values only such a small number of different versions of the product."	Beta
	"We build highly customized equipment. We are a specialist, no mass producer. That is a big difference."	Alpha
	"With this specific software nobody else could work. If somebody would try to use it, we would not care since it does only work together with our specific hardware."	Delta
	"We are situated in a very slow, conservative industry.[...]. I think our industry and our company is very concentric in itself."	Zeta
	"We have not had direct customer contact in the last 100 years. Since the foundation of this company, our only customer is the retail industry."	Eta
<i>diversified</i>	"Our customer wants a holistic solution approach."	Theta
	"The question is where do I provide direct channels, how many online shops do I provide, when do I integrate sales agents, and when do I exclude sales agents."	Theta
	"We exploit design thinking on a large scale in order to really identify customer problems by the help of many many customer interviews."	Theta
	"We apply a startup approach in order to test and build as many minimum viable products as possible".	Theta
	"We have a diverse set of KPIs which we want to implement next to the so-far established measures"	Theta
	"It does not matter which problem the customer actually has with the business, we want to have the right response to it."	Theta

Table 3: Evidence on Business Model Design from Expert Interviews

B.III.4. Business Model Types of Established Firms

A firm's comprehensive business model design has to incur both, a design approach for the front-end and the back-end of the business model. Successful business leaders create business model designs that will always incorporate both dimensions of the business model. What will differ is the leaders' emphasis on and across each dimension. Therefore, we design a framework that depicts four conceptual business model types according to the individual firm's design of the business model's front-end and back-end. First, companies need to determine the design of their business model's front-end in terms of either targeting focused, narrow or broad, diverse groups of market participants. Second, these companies need to decide whether their business model's back-end design should support the delivery of standardized or rather customized products and services. Our research derives four concrete conceptual business model types (see figure 2). They are:

- Small Batch Specialist
- High-Volume Retailer
- Multichannel Partner
- Ecosystem Moderator

B.III.4.1. Small Batch Specialist

Small batch specialists target a very specific, narrow group of market participants, which they aim to win or maintain as their customers. They design their business model back-end in order to provide highly customized products or services in lower volumes. Companies that sell special-purpose machinery (for example, Voith Group), deliver aircrafts (such as Boeing) or construct power plants (for example, Hitachi) are small batch specialists. The products of small batch specialists reveal high levels of complexity. The demand for these products stems merely from a selection of niche market customers with individual and highly specific requirements regarding their desired product's configuration. The determination of

such details in the product’s configurations requires close, often in person, customer relationship and sometimes collaboration in the product development process. A lot size of one in production as well as little numbers of repeat orders are often the rule and render supply chain design to be challenging. For example, Festo, a prime supplier of automation technology equipment, provides its customers with a variety of devices that allow for maximum productivity in factory and process automation. The production of the devices itself requires a number of highly interrelated, but manual assembly processes and often results in the delivery of special-purpose customer products with an individual design. Festo serves a very distinct segment of the market that includes a selected group of customers with a highly specialized demand and extraordinary requirements when it comes to product quality and (on-site) customer service.

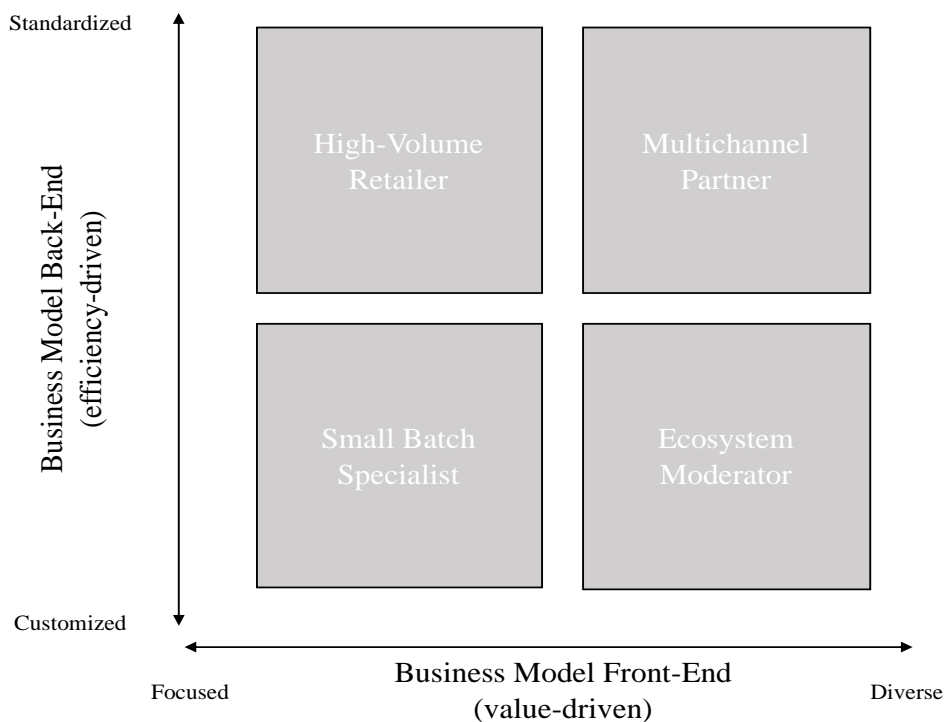


Figure 2: Business Model Types of Established Firms

Business model back-end shift		
<i>vertical, upwards</i>	"The approach is consistent product data in reproducible quality."	Alpha
	"In the future it will become increasingly important to create new production processes.[...].The consequence would be to rethink our specialization strategy, our business model would be outdated."	Alpha
	"We have to think of producing (standard) machines in high numbers [...] for very specific customer purposes. This would be a real mass product with high cost pressure."	Alpha
<i>vertical, downwards</i>	"An assumption is that we will focus on the development and production of 3D printers. This would result in a serial production. [...]. The result would be a more and more automated production."	Alpha
	"Our customer wants a comprehensive solution package that consists of products and solutions, which account for the individual requirements of its individual business."	Theta
	"We built a platform that allows the customer to manage its entire business.[...]. Because the customer asks for that comprehensive solution.[...]. We also launched a product which is an end-customer portal that provides the customer with online access to all such services online that were only accessible via offline retailers in the past."	Theta
	"Today, there are many platforms that become more and more open as they see that they will not survive on their own.[...]. In the moment, we open our business massively, on the one hand regarding the data exchange with other equipment providers, on the other hand along the entire value chain with the ultimate goal to create an ecosystem where everyone is connected and where we will have fully connected machines."	Theta
	"Virtual and augmented reality. Now, we can access the machine remotely. We can do remote services, can provide software updates, and we can activate additional features at the machine.[...]. The vision includes fully equipped machines and then I can activate functions on demand whenever I need them."	Theta
	"We strive to become the customer's trusted advisor.[...]. We want this ecosystem that consists of different hardware and software products to closely interlink and to represent a comprehensive solution for the customer."	Theta
Business model front-end shift		
<i>horizontal, rightwards</i>	"Digitization changes our communication channels and distribution channels.[...].This implies that we have to adapt our retail business. We have to strengthen our presence at e-commerce platforms like e.g. Amazon in order to reach our customers. Also our trade partners and sales agents do change in areas where you would not expect it."	Epsilon
	"I do not only need ERP data, size and weight, but nowadays I also need pictures, videos, and visually optimized texts. This is where we experience significant change with regard to the content required by our trade partners."	Epsilon
	"The vision implies that we will generate more than half of the turnover with new content in the future. Our products, services, solutions will have transformed in a way that the physical product is not the real revenue driver anymore."	Epsilon
	"We connect the extant infrastructure, which implies connectivity with suppliers, customers via EDI systems."	Zeta
	"Recently, we launched the first products that start to also address the end-customer."	Zeta
	"We focus on the customer interface.[...].This is also product placement. For us it is important that the customers in the brick-and-mortar business buy our products. If we increase that by enhancing our online experience it is nice. Prospectively, there will be opportunities for monetarization such as e-commerce or other event-based purchasing options."	Eta
"We want to create experiences. This means we have to reach out to the end-customer. Be it social media channels or a special website, which we launched."	Eta	
Combination of business model front-end shift and back-end shift		
<i>diagonal, upwards</i>	"It is the capability to keep the perceived product variety towards the customer but to reduce the internal variety.[...]. Thus, we are able to decrease delivery times significantly."	Beta
	"The final stage would be to provide this solution for our end-customer online. So far we have it for sales employees. The next step would be for agents and intermediaries and finally for our end-customer. Over the years, this will of course change the structure of our customer segments."	Beta

Table continued		
<i>diagonal, downwards</i>	"The customer of today has totally different expectations. They want to check their contracts online, check their individual consumption accurately and in real-time."	Gamma
	"The next step is new business development.[...]. Now we have the opportunity to develop products and business models that a company in our industry would usually not have developed in the past."	Gamma
	"Part of decentralization are totally new trends such as peer-to-peer trading.[...]. This is the democratization of our business."	Gamma
	"The development, the distribution of such products, is more and more supported by electronic platforms."	Delta
	"We provide a sensor platform. This platform starts to collect data. We access this data with our cloud solutions and can structure the data for our customer. Finally, we can mutually conduct data analytics together with our customers."	Delta
	"For us, this is a new business model. Thereby, we enter a new area where we deliver a new service that goes beyond the original product."	Delta
	"With the help of a new digital ecosystem, we want to acquire new customers, new markets. Together with partners, we want to survive in these markets."	Delta

Table 4: Evidence on Digital Business Strategy from Expert Interviews

B.III.4.2. High-volume Retailer

The high-volume retailer serves very specific groups of market participants, which require highly standardized products or services in large numbers. Industrial chemicals companies (for example, DowDuPont), equipment and spare parts suppliers (such as Continental) or wholesale firms (for example, Würth) are high-volume retailers. High-volume retailers sell products with low individual complexity (meaning highly standardized products), which they can produce in large quantities. Even though the customer portfolio of high-volume retailers consists of a narrow focus group, the customers themselves demand for high quantities of the retailer's product or service, often accompanied by repeat orders coming in high frequency. The relationship to the customer is rather supply chain- than product-oriented as adherence to lead times and quantity delivered is often at the center of customer interest. The product itself comes in highly standardized batches with features that conform to the same principles. Consider for example Haeefe. Haeefe Group is a leading worldwide manufacturer and supplier of furniture fittings with well-known customers from the furniture industry. Haeefe provides its customers with standardized components that represent integral elements in the structural design of furniture. The furniture industry requires huge quantities of these components that may not differ in their dimensions and quality standards. Accordingly, Haeefe

adheres to strict standard operating procedures and streamlines its supply chain towards maximum efficiency. Thus, Haefele aims to generate high output quantities with regard to products and services that always come in the same, commonly known quality.

B.III.4.3. Multichannel Partner

Multichannel partners own highly diversified sales pipelines and corresponding customer portfolios. The design of their business model's back-end serves to provide standardized products or services that usually come in large numbers. Insurance companies and banks (for example Liberty Mutual and Deutsche Bank), electronics companies (such as Samsung), or consumer good firms (for example Procter & Gamble are multichannel partners. Multichannel partners distribute highly standardized products or services, which they produce and sell in large amounts. Multi-channel partners communicate and attract (potential) customers by a variety of different methods. Hence, their customer portfolio consists of both, B2B and B2C customers across segments and industries. Such customers often place repeat orders with the multichannel partner. The customer relationship builds upon close and frequent interaction that often results in the co-development of new product configurations and alternative means towards customer contact or support. For example, Unilever, a British-Dutch multinational consumer goods company. For some of its brands, Unilever has established a multichannel strategy that closely integrates the customer in the whole product life-cycle process, starting with product development and finishing with final purchase of the product. For one of its premium ice cream brands, so-called Magnum, Unilever has established a multidimensional multichannel business model that combines traditional brick and mortar with virtual online channels. After Magnum had become a major success in retail stores such as usual supermarkets, Unilever decided to open brick and mortar stores in which customers could create their own ice cream. Given that input from their customers, Unilever acquired valuable insights for new product variations. Besides, Unilever created an own social media and online presence

for Magnum that included so-called stories on specific ice cream ingredients and the “user” experience (based on real-life reports from customer) that comes with Magnum. Thus, Unilever created a setting in which the company could link and collaborate with its customers via multiple channels.

B.III.4.4. Ecosystem Moderator

The ecosystem moderator serves highly diversified groups of market participants and owns a business model back-end design that enables the delivery of a variety of customized products or services in large amounts. Ecosystem moderators can be companies from all kinds of market segments that provide its related market participants with a platform to conduct business (for example, Google, Apple, or Microsoft). By that means, ecosystem moderators create relationships that form an ecosystem for providers and suppliers (Weill and Woerner, 2015). In that ecosystem, all participants may provide complementary, or sometimes even competing, products and services to their customers. Thus, the number and diversity of products, as well as that of customers is high for this kind of business model. The ecosystem moderator’s customer relationships can be both, either very close (e.g. in closed ecosystems where there is high dependency among the participants which requires high degrees of trust) or extremely lax (e.g. in open ecosystems where participants and moderator are rather anonymous and do not depend on one another). Google serves as a good example for a firm that moderates a world famous ecosystem (Iyer and Davenport, 2008; Weiss and Gangadharan, 2010). Around its proprietary platform, so-called Android, Google has built an ecosystem accessible to millions of mobile software developers. On its platform, Google offers an array of (partly free) powerful tools (e.g. Google Ajax Search, AdSense, and Maps) that third parties may use in order to create new products or services. In exchange, Google calls for access to the third parties’ ideas on new applications. Thus, Google acquires valuable information on new market

and product trends, which in turn serve as source for new product development activity at Google itself.

B.III.5. Five Digital Business Strategies Towards Business Model Adaptation

Digital transformation triggers firms to overthink their business models. Business model adaptation has become a valuable alternative to product innovation and a critical source of competitive advantage (Tongur and Engwall, 2014). In markets with an almost indefinite choice among products and services, it is often innovative business models that differentiate competitors from one another. What appears important for start-ups at first sight represents a major chance for established firms to account for change and to explore the business opportunities outside of their operational core. Enabled by new digital technology, these firms decide to change their actual business model designs towards new ones that better account for the market conditions in a digital world. We define business model adaptation as activities in the firm that reach from “incremental changes in individual components of business models, extension of the existing business model, introduction of parallel business models, right through to disruption of the business model, which may potentially entail replacing the existing model with a fundamentally different one” and hence bring about major design changes in the firm’s business model (Khanagha et al., 2014, p. 324). Given the four business model types mentioned above, we describe the different digital business strategies that established firms use in order to manage business model adaptation along their digital transformation endeavor. As illustrated in Figure 3, we identify five digital business strategies that represent individual business logics on operational efficiency and customer-value. These are:

1. Efficiency Strategy
2. Full Service Strategy
3. Supply Control Strategy
4. Customer Contact Strategy

5. Market Control Strategy

We describe these strategies as movements, which firms would undertake to switch from one zone (=business model type) to another and thus encourage innovation in their actual business models in place.

B.III.5.1. Movement I: Efficiency Strategy

Efficiency strategies are digital business strategies for business model adaptation that build upon the concept of scale economies. Efficiency strategies apply for firms that change the design of their business model back-end with the purpose to deliver more standardized products (often in higher quantities) while their customer segment remains narrowly focused. The CEO of Alpha explains:

"We have to think of producing (standard) machines in high numbers [...] for very specific customer purposes. This would be a real mass product with high cost pressure."

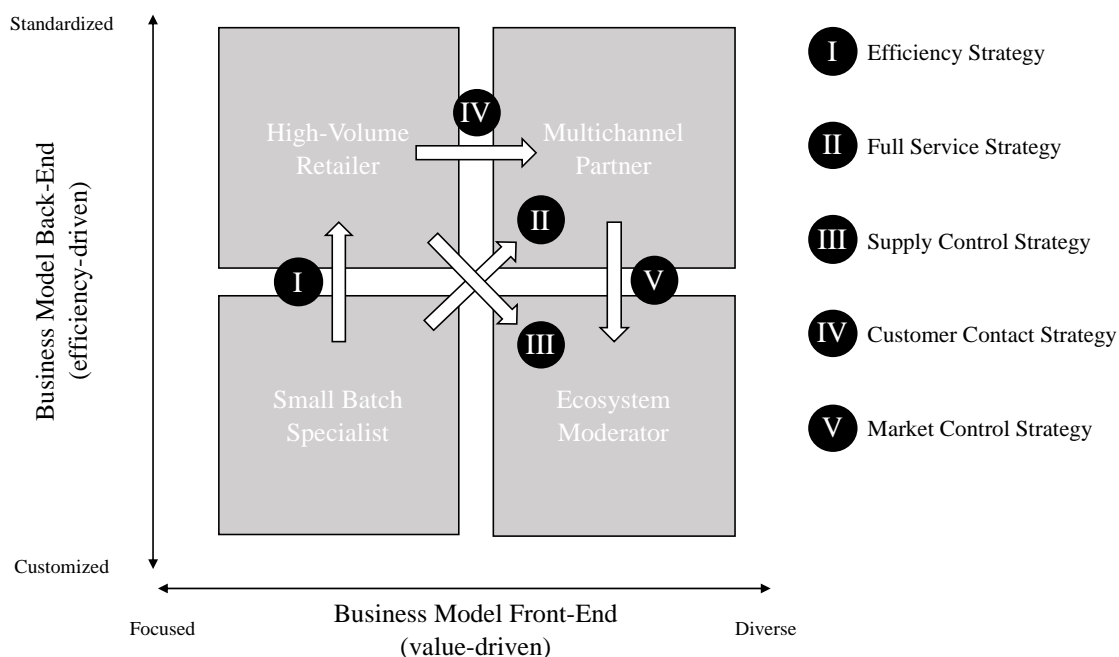


Figure 3: Digital Business Strategies for Business Model Adaptation

Efficiency strategies often apply for small batch specialists for which digital technologies provide new opportunities of automating multiple value chain activities (e.g. production). Smart factory concepts allow for production automation even for highly

specialized products that would originally come in low charges or lot size one. In order to automate value chain activities, firms will always require a certain amount of standard operating procedures. For production, this means that corporate IT has to build coding templates that displays operational standards in order to provide the factory's robotics with clear algorithm-based rules for order processing. For Alpha this means:

"In the future it will become increasingly important to create new production processes.[...]The consequence would be to rethink our specialization strategy, our business model would be outdated. [...]. The result would be a more and more automated production."

Apart from IT support for the work centers in production, corporate IT is responsible to link every single organizational department with one another in order to ensure smooth inter-organizational collaboration. This type of digital business strategy centers on the question of how to improve process reliability of production and with this how to optimize product quality and cycle times. Taken together, both, standardization and automation will enable small batch specialists to extend their production and produce bigger product charges at the same or even higher efficiency levels. Thus, the efficiency strategy represents a suitable digital business strategy for small batch specialists to innovate their business model and finally to become a high-volume retailer.

B.III.5.2. Movement II: Full Service Strategy

Besides the efficiency strategy, the small batch specialist may apply a full service digital business strategy in order to innovate its business model. When a firm changes its actual business design away from a focused business model front-end and a customized business model back-end towards a diverse business model front-end and a standardized business model back-end design, we refer to this digital business strategy as a full service strategy. Small batch specialists may go for such strategy with the goal to provide their customers with a

comprehensive all-inclusive experience. Full service strategies ground on new digital technologies that bring about new opportunities for customer contact and service. In this context Beta's CEO mentions:

"The final stage would be to provide this [digital] solution for our end-customer online. So far we have it for sales employees. The next step would be for agents and intermediaries and finally for our end-customer. Over the years, this will of course change the structure of our customer segments."

Consequently, corporate IT has to extend existing customer interfaces or build completely new ones. Moreover, the development of such business model types requires continuous support from IT departments that enable the firm's operational backbone to provide an array of new virtual products and services with individual features for each customer.

B.III.5.3. Movement III: Supply Control Strategy

With the emergence of new digital technologies, high-volume retailers sometimes perceive the opportunity to apply a supply control digital business strategy based on the principle of lock-in effects. Therefore, such firms undertake the effort to design their business model back-end towards higher degrees of customization while their business model front-end design serves more diversified market approaches. The chief digital strategist of Gamma elaborates:

"The customer of today has totally different expectations. They want to check their contracts online, check their individual consumption accurately and in real-time."

By that means, high-volume retailers become ecosystem moderators and hence innovate their business models. As diverse products, often ordered in large order quantities, require complex but stable supply chains, high-volume retailers strive to achieve better supplier access and control (Lee *et al.*, 2004). Digital technologies help companies to better synchronize their inter- and intra-corporate processes. In the case of Delta this means:

"The development, the distribution of such products, is more and more supported by electronic platforms."

Complex and hard-to-imitate value chain configurations make it difficult for competitors to replicate business models and hinder partners to break out of well-working mechanisms. A possible solution towards that goal is the creation of a business ecosystem that closely interlinks the business operations of the focal firm, its partners, customers, and other third-party stakeholders. Delta strives to do so:

"With the help of a new digital ecosystem, we want to acquire new customers, new markets. Together with partners, we want to survive in these markets."

Once, the focal firm succeeds in controlling the ecosystem as a shared business platform, its partners face significant switching costs that could prevent them to change their preferred customers. Well-designed ecosystems may also create technological lock-in dynamics for the members of a shared business platform such that suppliers would adhere to an inferior supply chain network even if better options show up later in their search process (Uotila *et al.*, 2017). For the purpose of that strategy, corporate IT has to design and promote its platform standard in a way that it is highly-user friendly and becomes the state-of-the-art infrastructure standard for the evolution of other firm's IT infrastructure. Delta's CTO says:

"We provide a sensor platform. This platform starts to collect data. We access this data with our cloud solutions and can structure the data for our customer. Finally, we can mutually conduct data analytics together with our customers."

Later on, the IT department has to organize platform control with the purpose to create technological lock-in dynamics that make platform participants unable to reverse their commitment to the platform's standard.

B.III.5.4. Movement IV: Customer Contact Strategy

In some cases, high-volume retailers are willing to maintain their business model back-end designs for standardized, large-scale production but aim to diversify or extend their customer portfolio. In these cases, firms develop digital “customer contact” business strategies in order to innovate their business model and to finally become multichannel partners. Consider the example of Epsilon:

"Digitization changes our communication channels and distribution channels.[...].This implies that we have to adapt our retail business. We have to strengthen our presence at e-commerce platforms [...] in order to reach our customers. Also our trade partners and sales agents do change in areas where you would not expect it."

Digital technologies bring about tools that help firms to contact and interact with (potential) customers in multiple new ways and hence to strengthen their efforts towards higher customer orientation. Firms, primarily active in the B2B business, explore new ways to extend their business towards the B2B market and vice versa. Thus, firms can access so-far unexplored fields in the market by bypassing expensive intermediaries, and reducing transaction costs or third-party dependencies. In order to bring this kind of digital business strategy alive, corporate IT has to invest in new infrastructure and hybrid forms of customer interfaces that can handle both, B2B and B2C business alike. So does Eta:

"We focus on the customer interface.[...].This is also product placement. For us it is important that the customers in the brick-and-mortar business buy our products. If we increase that by enhancing our online experience it is nice. Prospectively, there will be opportunities for monetarization such as e-commerce or other event-based purchasing options."

B.III.5.5. Movement V: Market Control Strategy

The fifth digital business strategy towards business model adaptation of established firms is the market control strategy. At some point, multichannel partners (with standardized business model back-end designs and business model front-end designs that target diverse markets and multiple customer segments) may decide to design their back-end designs in a way that it facilitates the production and proposition of a broad, but customized product portfolio. For Theta's Head of Digital Transformation this means:

"Our customer wants a comprehensive solution package that consists of products and solutions, which account for the individual requirements of its individual business."

This digital business strategy will result in business model adaptation in the sense that multichannel partners to become ecosystem moderators. As multichannel partners use multiple tools to contact their customers, they will not only communicate with a rising number of (potential) customers. Given the multiplicative potential that resides with digital technology, multichannel partners will also experience a rising diversity in their sales contact portfolio. Digital technology enables firms to overcome typical business limitations of analog markets such as scalability, accessibility, or real-time consumption tracking. Theta exploits this technology advantage as follows:

"We built a platform that allows the customer to manage its entire business.[...]. Because the customer asks for that comprehensive solution.[...]. We also launched a product which is an end-customer portal that provides the customer with online access to all such services online that were only accessible via offline retailers in the past. [...]. We can do remote services, can provide software updates, and we can activate additional features at the machine.[...]. The vision includes fully equipped machines and then I can activate functions on demand whenever I need them."

New digital channels help firms to interact with their customers in different ways no matter what would be the company's focal product or service. Theta explains:

"We strive to become the customer's trusted advisor.[...]. We want this ecosystem that consists of different hardware and software products to closely interlink and to represent a comprehensive solution for the customer."

Accordingly, firms can diversify a firm's customer portfolio and the corresponding market audience by using different means of customer interaction (Aversa *et al.*, 2020). As firms decide to do so, they will have to prepare their business model back-end for higher diversity in customer quotations and growing requirements towards their product portfolio diversity. For that purpose, corporate IT has to duplicate its already established front-end multichannel activity and provide a back-end design that allows for both, the integration of large numbers of business partners as well as high flexibility and modularity in production and distribution.

B.III.6. Discussion and Implications

The experience from our research is that digital transformation of established firms requires goal-oriented strategic guidance on the firm's soon-to-be business model design. Such guidance resides in individual digital business strategies that depict the firm's digital transformation pathways. Depending on their actual design preferences for the business model's back-end and the business model's back-end, established firms will select a certain digital business strategy that guides the entire organization towards an aspired future design in both business model dimensions. Given the firms individual preference to become either a small batch specialist, high-volume retailer, multichannel partner or ecosystem moderator, different digital business strategies with the overall purpose of enforcing either efficiency, full service, supply control, customer contact or market control are instrumental in guiding established firms' digital transformation journey. Accordingly, targeted digital business strategy based on

individual business model design preferences will finally enable the firm to take advantage of the several opportunities that come with the relentless rise of digital technology. Nevertheless, digital transformation will not come without any difficulties. It is a challenge for established firms to sacrifice so far established processes, structures and principles for unproven adjustments that lead into an uncertain future. Given the findings from our research, we provide recommendations for established firms to organize their digital transformation journeys as successful as possible.

B.III.6.1. Reflect on the Business Model in Place

The first step for business leaders towards a successful digital transformation journey is that of relentlessly analyzing their organization. Assessing so-far proven processes, recognizing weaknesses in established comfort zones and being brutally honest to oneself are key to setting the ground for a comprehensive organizational change endeavor. Effective leaders should be aware about their business model's strengths and weakness in order to prepare suggestions which pain points to remove and which unique selling points to exploit with regard to the design of their business model's back-end and front-end.

B.III.6.2. Act to Anticipate the Rise of Digital Opportunities

Especially for established firms there exists the pervasive threat of missing out on significant shifts in the industry. Business leaders may always feel too confident that the roots of past success would form the ground for future success. As the digital era evolves with tremendous speed and frequently opens up new innovation opportunities, it has become tremendously to send out perceptive company representatives that sense as many ideas from the digital arena as possible. In digitally shaped markets, settling down for the solution in place will be equally dangerous as isolating and hoping to win the desperate fight for oneself. Effective leaders will partner with competitors, customers, partners and third parties (such as universities or government institutions) alike to develop innovative solutions, common business

standards (e.g. communication protocols and interfaces) that foster the formation of closely connected business ecosystems abiding by the common goal of mutually exploiting digital technology's upside potential and generating individual commercial surplus.

B.III.6.3. Layout and Benchmark the Soon-to-be Business Model

Business leaders have to make concrete decisions on which new design in their business model's back-end and front-end would be the best for the digital sake of the company. Such decision should incur careful considerations on the firms actual strengths and weaknesses, the movements of associated market players, but also the effort (measured in terms of both, capabilities and resources) it takes to achieve this desired future state. Carefully developed digital business strategies will ensure that the future business model design would go hand in hand with the transformation targets of the company. Stakeholder benchmarking as well as KPI-based performance measurement are important tools to keep the digital transformation journey on track and avoid letting business model adaptation to become an end to itself.

B.III.6.4. Electrify the Audience

Culture eats strategy for breakfast. Plans are nothing without the necessary engagement of those that are meant to execute them. Successful digital transformation requires business leaders to continuously communicate their idea of a digital business strategy and its inherent vision of a future business model design. Apart from top management enthusiasm and unperturbed thought leadership, it has proven as an inevitable leadership competence to provide employees with an organizational atmosphere that encourages open-mindedness and excitement towards the unknown world of digital, its discovery and its exploitation in a new business model.

B.III.7. Conclusion

The rise of digital technology has a tremendous impact on the so far well-established rationales that form the fundamentals of our economy (Loebbecke and Picot, 2015; Nambisan

et al., 2017; Porter and Heppelmann, 2015). This development represents a major challenge especially for established firms and forces their senior executives to rethink their business logics. By describing five digital business strategies that outline different ways how to change the firm's business model in place, we provide IS leaders of established firms with strategic guidance on how to master digital transformation by the means of business model adaptation. In that context, business model adaptation is the result of major design changes in the design in either the firm's business model back-end, front-end, or both at the same time. For that purpose, IS leaders should adopt a clear idea in which direction they want to develop their future business and how digital technology would help to realize that vision. These ideas should reflect in individual digital business strategies that depict the firm's roadmap into the digital world. Successful digital business strategies will convey a clear picture under which (alternate) banner the firm will continue work towards operational efficiency and customer value creation. Digital transformation is a highly fragmented and still non-transparent field that offers firms with a highly diverse array of opportunities with not every opportunity turning out as the right one for each firm. Established firms will need a clear digital business strategy that helps them to distinguish suitable from non-suitable opportunities and hence to make the most promising pick. Firms that lack a digital business strategy and an idea of how their future digital business model should look like are likely to fail in choosing the particular digital technology that fits with their needs and run the risk to fall behind in the race for competitive advantage in a digital era.

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B.III.9. Appendix

General Information

1. Please describe your responsibility in the company.

Questions about digital transformation, business model design and adaptation

1. What is your understanding of the term “digitalization”?
2. In your opinion, what are the major trends in that context?
3. Based on the aforementioned, please describe the changes in the individual elements in your business model regarding
 - a. Partners & Suppliers,
 - b. Activities,
 - c. Resources & Competences,
 - d. Value Proposition,
 - e. Customer Relationships,
 - f. Channels,
 - g. Customer Segments,
 - h. Revenue Streams and,
 - i. Cost Structures.
4. Please describe the roadmap of a typical project with regard to a (strategic) digital initiative in the company.
5. Please describe the evaluation process and the measurement of the project’s success.
6. Does digitalization enable the measurement of new or different KPIs and activities?
7. As a summary, could you please describe a scenario for your business and your industry? What role does digitalization play in this scenario?

Appendix 1: Interview Guideline

B.IV. CONTRIBUTION IV

Title	Managing Digital Technology: Business Model, Business Strategy, and Firm Performance
Author(s)	Mies, Y. A.; Hausberg, J. P.
Year	2021
Outlet	Proceedings of the ISPIM Connects "Reconnect, Rediscover, Reimagine" - Valencia 2021
Ranking	
Status	Published
Reference No.	ISBN: 978-952-335-691-7
Abstract	Digital technologies fundamentally transform business processes and products alike. Hence, the issue arises which challenges this implies for new technology management. To explore the unique properties of digital technology management and its impact for the firm's capability of value creation, we suggest that the extant insights on established management concepts such as business model and business strategy need to be complemented by an information systems perspective that promotes an integrated rather than aligned perspective on IT strategy and business strategy. We examine how digital business strategy (namely the result of a fusion between IT strategy and business strategy) and business model, impact firm performance. Drawing on business ecosystem theory and contingency theory, we build a formal model that includes hypotheses on the contingent effects of digital business strategy, and business model design on firm performance. We empirically examine this model by investigating a unique dataset of firms from various countries.
Keywords	Business model; digital business strategy; digital transformation; quantitative research design
